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Nicolas de Sadeleer

Environmental Law Principles

From Political Slogans to Legal Rules

SECOND EDITION

Environmental Principles

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From Political Slogans to Legal Rules

Second edition

NICOLAS DE SADELEER

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Foreword to second edition

Nicolas de Sadeleer's second edition of *Environmental Principles—From Political Slogans to Legal Rules* is to be warmly welcomed. His original ideas—which remain both relevant and thought-provoking—are complemented and illustrated by developments which have taken place since the beginning of the twenty-first century at the time of the publication of the first edition. The nature of international environmental law still raises questions, notably around the new type of normativity it carries. Indeed, the principles of international environmental law are based on a new axiology and present challenges for the various legal orders that they inhabit. These principles have matured in a unique way. From their origins as vague political slogans, such principles have developed, through various means, into enforceable laws. Nicolas de Sadeleer's book traces this phenomenon of the evolution of environmental principles and unveils the intrinsic and extrinsic implications of such an evolution on the law.

Far from being similar to classical principles of law, they contribute to ensuring the regulation, the assessment, and the management of risk, which is a crucial function in modern society. Nicolas de Sadeleer underscores the autonomy of these principles in addition to, simultaneously, the central place occupied by environmental law in the international legal system and at the domestic level, as well as the influence of these principles on other areas of regulation, such as economic law.

Through an analysis of three fundamental principles of international environmental law—the polluter-pays, prevention, and precautionary principles—Nicolas de Sadeleer demonstrates how this body of law is rich with respect to its functions and its material content. As for the functions of environmental principles, they can be curative, preventive, or anticipatory. The book excels in demonstrating that beyond their difference in nature, these principles lead to different degrees of protection whether for environmental or for human health. As for the material aspect, they wear a wide array of profiles. Indeed, they can take—alternatively or simultaneously—the form of rules, directing principles, standards or approaches.

Continuing this epistemic approach, the study traverses two lines of inquiry: on the one hand the function of such principles in the assessment and the management of risk; and on the other hand, the legal status of these principles, that is, their proper place in the spheres of international law, EU law, and domestic law. This approach sets the work apart from more traditional analyses by inverting the usual tendency to start with evaluating the legal status of a rule and scrutinizing—only then and therefrom—the function that such rules might play in practice. Nicolas de Sadeleer advances the idea of the emergence of an atypical process of norm

formation whereby the function of that rule will exert a significant influence over its legal status. In so doing, the book breaks new ground in revealing the legal effects of environmental norms.

A strong emphasis is placed on various aspects of 'post-modern law'. This brings another original perspective to the study of international law where influential doctrinal writings have remained relatively silent, as is equally the case in the spheres of EU and domestic law. This makes the second edition of *Environmental Principles—From Political Slogans to Legal Rules* a very comprehensive work. Indeed, it makes a significant contribution in terms of post-modern legal analysis and illustrates the latter's content, scope, and limits through the prism of the principles of environmental law. Through his rigorous description of what contemporary law is, Nicolas de Sadeleer demonstrates that a genuine transformation of the normative process has taken place and that changes of the international and domestic legal orders have resulted from this transformation. The book is useful in helping legal scholars come to grips with this fact and stimulates the debate on innovative modes of legal regulation. The author's method effectively incorporates aspects and approaches emanating from all spheres pertaining to the principles of environmental law, be they legal, political, scientific, technical, historical, economic, or philosophical.

Another point to be highlighted is the legal treatment of scientific expertise. The book explores the stakes, the obstacles, and the potential solutions that could reduce the tension in the often uneasy relationship between law and science. It thus forges a path towards creative thinking in terms of setting up institutions and formulating national and international public policy, with appropriate pragmatism in putting forward new suggestions for developing the decision-making process.

The book is also stimulating in the way that it deals with the relationships between international environmental law and international economic law. Crucial questions are asked with a view to providing appropriate solutions to key problems on issues such as biodiversity, biotechnology regulations, and the interpretation of the SPS Agreement.

Lastly, this book constitutes a veritable repository of knowledge and facilitates access to both continental and Anglo-Saxon doctrine. Its efforts at achieving a synthesis of the various theories and opinions prevailing in the field of environmental law must be duly commended. Nicolas de Sadeleer, who presently holds his third prestigious EU chair, has written a very insightful and analytically powerful book.

Laurence Boisson de Chazournes
Professor at the University of Geneva

Preface to the second edition

I would like to express my gratitude to my former colleagues Gerrit Betlem, Piet Gilhuis, and Marc Pallemmaerts for having offered much food for thought when I wrote the first edition of my book, and to Suzan Leubusher as well who translated large parts of it. Their engagement with environmental law and policy have encouraged me to update my book.

There was a question as to whether a second edition of my book, which was published in 2002, was needed at all given that environmental principles have been thoroughly examined within the literature in the course of these last two decades. In particular, significant doctrinal debate has been conducted in relation to precaution. In the end, I decided to update it for a number of reasons.

First, regardless of their quality, the vast majority of contributions to the scholarship focus on the status or implementation of a specific environmental principle within a particular sector (fisheries, chemicals), focusing either on one specific legal order or on multiple legal orders. As a result, these analyses do not embed these principles within a broader legal framework and do not link them up with other legal principles. I am still convinced that environmental law must be understood in light of the three landmark principles discussed here, which intersect with a number of other general principles of law. A cross-cutting approach is thus needed. Moreover, a legal theoretical approach that is often lacking in other works is required in order to comprehend the interaction between principles and the various rules of this emerging branch of law within a number of legal orders.

Secondly, my analysis of the legal nature of the polluter-pays, prevention, and precautionary principles is still of particular salience, especially with respect to international and EU law. The fact that the meaning of general principles is dependent upon the regulatory context within which they operate does not deprive them of their general scope and, consequently, of their legal effects. International law provides for a minimal framework allowing States to apply these principles to their specific context. Moreover, the willingness to codify these key environmental principles within framework legislation as well as in international agreements is testament to their cross-cutting nature, thus superseding the specificities of domestic legal systems. Furthermore, the fact that States are under a customary obligation to exercise due diligence in order to prevent and pre-empt transboundary harm as well as to conduct environmental impact assessments confirms that a number of the principles discussed in this book form part of general international law.

One might criticize my approach not only for being too ambitious but also for overlooking the clear differences between the different legal orders considered,

particularly given the wide gap that separates the civil law family from the common law. My engagement with comparative law makes me keenly aware that these public law principles are likely to be applied differently in line with the specific rules of each national or regional legal order. Therefore, without delving into their specificities, I constantly stress the constitutional backdrop that has underpinned the rise (or indeed the fall) of these principles within different legal orders, whether international law, EU law, or domestic law.

Thirdly, most authors stress the effects of environmental principles on various decision-making processes whilst omitting their effects on other legal branches. As general principles of law, the polluter-pays, prevention, precautionary principles interact with other areas, including in particular tort law and tax law.

In this second edition, I focus on how these three principles have encouraged law-makers and courts alike to reform legal systems that had previously stopped short of preventing the spread of environmental risks. Although they might not address all root causes of environmental degradation, these principles—provided that they are correctly implemented—play a significant role in improving environmental law. The book thus focuses on regulatory improvements throughout various areas of the law in the light of the evolution of the case law of different jurisdictions (Part I). In other words, I make a renewed attempt to demonstrate how these principles call into question the business-as-usual approach.

Since the first edition of this book was published, many developments have been taking place.

In the first edition, I defended the thesis that environmental principles mirrored a transition from modern law to post-modern law, with more rigid norms being replaced by more flexible rules stemming from a variety of different sources. Since the key drivers (fragmentation, deregulation, expansion of soft law, etc.) of that transition have been exacerbated in the meantime, my original thesis has been confirmed (Part II, Chapter 4).

Environmental principles, and in particular the precautionary principle, have been dogged by controversy ever since. I have thus honed my arguments concerning the status and functions of these principles (Part II, Chapters 5 and 6). The opposition highlighted by many scholars between *guiding* principles and *binding* rules is far too simplistic. It is important to note that many rules expressed in prescriptive terms—including general principles—are indeterminate in nature. As a result, they can bind authorities, whilst at the same time leaving them a certain degree of leeway. I therefore seek to demonstrate in this book that environmental principles have indirect binding effects as well as performing interpretative functions. Although I consider an array of ecological, socio-economic, and political issues in understanding the factors underpinning the rise of these principles, my analysis is genuinely a legal one.

I disagree with the view propounded by scholars who contend that environmental principles cannot have universal status given the disparate manner in

which they are applied. When they are crystallized into customary principles of international law—as is the case for the no harm, the preventive, and to some extent the precautionary principle—they have a universal dimension although they are likely to be implemented differently depending on the particular activities at hand. Besides, other principles such as those set out in Article 191(2) of the Treaty on the Functioning of the European Union (TFEU) or the procedural principles enshrined in the Aarhus Convention and the Escazú Agreement have a regional dimension, and this is not impeded by the fact that they are fleshed out differently by the various States Parties. This is not a moot point. This theoretical debate has important practical implications: the universal and regional dimensions of environmental principles are key drivers in overcoming the fragmentation of environmental law. Besides, these principles reflect values underpinning environmental protection.

That said, I am keenly aware that principles play a limited role, or no role at all, when they are not supported by more appropriate legal mechanisms and when the human and financial resources required in order to implement them are lacking. Neither the obligation to conduct an Environmental Impact Assessment (EIA) nor the no harm principle is likely to stop harmful activities on their own. The speed of biodiversity loss has not been slowed down by the principle of conservation. Likewise, the level of chemical risks to which human beings are exposed has not fallen thanks to precaution.

In the course of updating my book, I took part in several seminars on environmental principles that were organized in Australian universities: in 2017 at the University of Canberra, in 2018 at ANCORS in Wollongong, and in 2019 at the University of Melbourne. I wish to thank respectively Professors Murray Raff (UC), Gregory Rose (ANCORS), and Lee Goden (Melbourne) for their support in organizing these seminars. In addition, I have been lecturing on the subject-matter at the University of Lomé and, in the course of 2019, I gave a number of speeches on the precautionary principle and related topics across Europe.

In the writing process of this second edition, I benefited from the reviews of several colleagues: A Aragão (Coimbra), N Ashford (MIT), V Davio (UStL), A de Vaucleroy (UCL), I Damjanovic (ANU), A Dutti (Max Planck), O-K Fauchald (UiO), V Karageorgou (Artistotle Univ), E Maitre (UiO), R Macrory (UCL), A Moreno (Carlos VII), M Morin, J McNeill (Massey), G Roller (Bingen), G Rose (ANCORS, Wollongong), A Sterling (Sussex Univ), T van Rijn (EC), L Verheugen, and C Voigt (UiO).

I would also like to express my thanks to Thomas Roberts who reviewed and improved many of the chapters into an enjoyable English text. I am also particularly indebted to my student assistant, Gauthier Michiels, for his patient editing of footnotes and tables and to Ms Morgane Durdu for completing the tables. I would also like to thank the staff at OUP, particularly Kathryn Plunkett, for the care they have shown in producing this book.

I would also like to acknowledge the financial support of the Research Council and the European Institute of my home university. Finally, thanks to the possibilities offered by several EU chairs, I have had the opportunity to organize a number of seminars and conferences on the topics discussed in this book and found new areas for research in an ever-developing field. My hope is that this book will be the most evident outcome of my new Jean Monnet Chair on a Right to a Clean Environment.

Nicolas de Sadeleer
Brussels, 27 August 2020

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1974

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1976

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1977

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1979

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1980

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1981

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1982

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1985

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1986

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1987

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1991

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1992

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1993

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List of Abbreviations

AAT	Australian Administrative Appeal Tribunal
AB	WTO Appellate Body of the WTO Dispute Settlement Body
ABRvS	<i>Afdeling Bestuursrechtspraak van de Raad van State</i>
AC	Appeal Cases Law Reports
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
ACP	African, Caribbean, and Pacific Group of States
AEWA	1995 Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AFSSA	French Food Safety Agency
AG	Advocate General at the CJEU
AJDA	Actualité juridique—Droit administratif (a French law review)
AJIL	American Journal of International Law
ALARA	As low as is reasonably achievable
All ER	All England Law Reports (UK)
ALR	Australian Law Reports
Amén. -Env.	Aménagement-Environnement (a Belgian environmental law journal)
AMOC	Atlantic meridional overturning circulation
AO	Advisory Opinion
APA	Administrative Protection Act (US)
Arch Ph Dr	Archives de philosophie du droit
ARIEL	Austrian Review of International and European Law
AtG	<i>Atomgesetz</i> (Atomic Energy Act)
Awb	Algemene Wet Bestuursrecht (Dutch General Administrative Law Act)
BAT	Best available technologies
BGB	Bürgerliches Gesetzbuch (German Civil Code)
Bg CCt	Belgian Constitutional Court
BGH	Bundesgerichtshof (German Federal Supreme Court)
BImSchG	Bundes-Immissionsschutzgesetz (German Act for Protection against Harmful Environmental Effects on Air Pollution, Noise, Vibrations, and Similar Processes)
Boston CILR	Boston College International Comparative Law Review
BPR	EU Biocides Product Regulation
BSE	Bovine spongiform encephalopathy
BVerfG	Bundesverfassungsgericht (German Federal Constitutional Court)
BVerwG	Bundesverwaltungsgericht (German Federal Administrative Court)
BW	Burgelijk Wetboek (Civil Code—Netherlands, Belgium)
BYbIL	British Yearbook of International Law

CAA	Cour administrative d'appel (French High Appellate Administrative Court)
CAA	Clean Air Act (US)
Camb Yb EU L Cass. b.	Cambridge Yearbook of EU Studies Cour de cassation (Belgium)
Cass. b.	Cour de cassation (Belgium)
Cass. fr.	Cour de cassation (France)
Cass. it.	Corte Costituzionale (Italy)
CAP	EU Common Agriculture Policy
CBA	Cost–benefit analysis
CBD	Convention on Biological Diversity
CC	Climate change
CCAMLR	1980 Convention on the Conservation of Antarctic Marine Living Resources
CCP	Common Commercial Policy
C.civ.	Code civil (Civil Code—France, Belgium)
CE b.	Conseil d'État (High Administrative Court—Belgium)
CE fr.	Conseil d'État (High Administrative Court—France)
CEN	Comité Européen de Normalisation
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (US)
CETA	Comprehensive Economic and Trade Agreement
CFC	Chlorofluorocarbons
CFI	Court of First Instance of the European Communities
CFP	Common Fisheries Policy
CITES	Convention on International Trade in Endangered Species
CJEU	Court of justice of the EU
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
CLRTAP	Convention on Long-range Transboundary Air Pollution
CMLR	Common Market Law Review
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CO2	Carbon dioxide
Colo J Int'l Env L & Pol'y	Colorado Journal of International Environmental Law and Policy
Colum J Transnat'l L	Columbia Journal of Transnational Law
Colum LR	Columbia Law Review
Conn Ins LJ	Connecticut Insurance Law Journal
Cornell ILJ	Cornell International Law Journal
CPB	Cartagena Protocol on Biosafety
CUP	Cambridge University Press
CWA	Clean Water Act
DC	District Court (USA)
DS	Recueil Dalloz et Sirey (France)

DSBs	(WTO) Dispute settlement bodies
Duke LJ	Duke Law Journal
ECHA	European Chemicals Agency
ECR	Reports of Cases before the Court of Justice of the European Communities and the Court of First Instance
ECHR	European Convention on Human Rights
ECtHR	European Court of Human Rights
EDC	Endocrine Disruptive Chemical
EEA	European Economic Area
EEA	(EU) European Environmental Agency
EEELR	European Energy and Environmental Law Review
EEZ	Exclusive Economic Zone
EFLR	European Food Law Review
EFSA	European Food Safety Agency
EFTA	European Free Trade Association
EIA	Environmental Impact Assessment
ELNI Newsletter	Environmental Law Network International Newsletter
ELD	EU Environmental Liability Directive
ELQ	Ecology Law Quarterly
EJRR	European Journal of Risk Regulation
ELJ	European Law Journal
ELNI Rev	Environmental Law Network International Review
ELR	Environmental Law Review
EMA	Community and eco-management audit scheme
Env and Planning LJ	Environmental and Planning Law Journal
Env L Rep	Environmental Law Reporter
EQS	Environmental Quality Standards
Env P&L	Environment Policy and Law
EPA	Environmental Protection Agency (US)
EPIL	Encyclopedia of Public International Law
EPR	Extended producer responsibility
ESA	Endangered Species Act (US)
ESCAP	UN Economic and Social Commission for Asia and the Pacific
ESD	Australian national strategy for Ecologically Sustainable Development
Espoo CEIATC	Espoo Convention on Environmental Impact Assessment in a Transboundary Context
ETS	European Trading Scheme
EU	European Union
EUCFR	EU Charter of Fundamental Rights
EuR	Europa Recht (a German journal of European law)
EURATOM	European Atomic Energy Community
Eur J Int'l L	European Journal of International Law
EurLR	European Law Review
EuZW	Europäische Zeitschrift für Wirtschaftsrecht (a German law journal)

F.	Federal Reporter (US)
FAO	Food and Agriculture Organization
FFDCA	Federal Food and Drug Act (US)
Fr CCT	French Constitutional Court
GATT	General Agreement on Tariffs and Trade
Gaz Pal	Gazette du Palais (France)
GBER	General Block Exemption Regulation
GCt	General Court (EU)
Gen T	Gesetz zur Regelung der Gentechnik (German Act on the Regulation of Genetic Engineering)
GESAMP	IMO/FAO/Unesco/WMO/WHO/IAEA/UN/ UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Pollution
GFL	General Food Regulation governed by Regulation (EC) No 178/2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety
GHGs	Greenhouse gases
G Int'l Env LR	Georgetown International Environmental Law Review
GM	Genetically modified
GMO	Genetically modified organism
GYbIL	German Yearbook of International Law
Harv Env LR	Harvard Environmental Law Review
HELCOM	Baltic Marine Environment Protection Commission
HL	House of Lords
HR	Hoge Raad (High Court, Netherlands)
HRC	Human Rights Commission
HRLJ	Human Rights Law Journal
Hum Ecol Risk Ass	Human and Ecological Risk Assessment
Harvard UP	Harvard University Press
IA	Impact Assessment
IAEA	International Atomic Energy Agency
IARC	WHO Agency for Research on Cancer
ICES	International Council of the Exploration of the Sea
ICJ	International Court of Justice
ICJ Rep	Reports of Judgments, Advisory Opinions, and Orders (International Court of Justice)
ICLQ	International and Comparative Law Quarterly
ICRP	International Commission on Radiological Protection
IED	Industrial Emission Directive 2010/75/EC
IEL	International environmental law
IGAE	Australian Intergovernmental Agreement on the Environment
IISD	International Institute for Sustainable Development
ILA	International Law Association
ILC	International Law Commission
ILM	International Legal Materials

IMO	International Maritime Organization
Int'l Env LR	International Environmental Law Review
Int'l Env Rep	International Environment Reporter
Int'l J Estuarine & Coastal L	International Journal for Estuarine and Coastal Law
Int'l J Marine & Coastal Law	International Journal of Marine and Coastal Law
IPCC	Intergovernmental panel on climate change
IOPC	International Oil Pollution Compensation Fund
IPPC	Integrated Pollution Prevention and Control
ISDS	Investor state dispute settlement
ISO	International Standard Organization
ITLOS	International Tribunal for the Law of the Sea
IUU	Illegal, Unregulated and Unreported fishing
IUCN	International Union for the Conservation of Nature
IWC	International Whaling Commission
JEL	Journal of Environmental Law
J Env L & Practice	Journal of Environmental Law and Practice
JEEPL	Journal of European Environmental & Planning Law
J Int'l Econ L	Journal of International Economic Law
J Int'l Wildlife L & Pol'y	Journal of International Wildlife Law and Policy
J L & Econ	Journal of Law and Economics
JWT	Journal of World Trade
KemI	Swedish chemicals agency
L & EA	Law and European Affairs
LGDJ	Librairie générale de droit et de jurisprudence
LGERA	Local Government and Environmental Reports of Australia
LMO	Living modified organism
LQR	Law Quarterly Review
LRP	Limit Reference Point
McGill LJ	McGill Law Journal
MEA	Multilateral environmental agreement
M en R	Tijdschrift voor Milieu en Recht (a Dutch law journal)
MFN	Most favoured nation rule
Mich J Int'l L	Michigan Journal of International Law
Mich LR	Michigan Law Review
MJE&CL	Maastricht Journal of European & Comparative Law
MLR	Modern Law Review
MMPA	Marine Mammal Protection Act (US)
MOU	Memorandum of Understanding
MPB	Marine Pollution Bulletin
M en R	Milieu en Recht
MSY	Maximum Sustainable Yield
MULR	Melbourne University Law Review
NAAQs	National ambient air quality standards (US)
NAFTA	North American Free Trade Agreement (NAFTA)
NEPA	National Environmental Policy Act (US)

NGO	Non-governmental organization
NILR	Netherlands International Law Review
NJ	Nederlandse Jurisprudentie (Dutch Law Reports)
N J of Env L	Nordic Journal of Environmental Law
N J of Intl L	Nordic Journal of International Law
NRC	US National Research Council
NRJ	National Resources Journal
NSWLEC	New South Wales Land and Environment Court
NVwZ	Neue Zeitschrift für Verwaltungsrecht (a German law journal)
NYIL	Netherlands Yearbook of International Law
NYU LR	New York University Law Review
OAU	Organization of African Unity
ODS	Ozone-depleting substances
OECD	Organization for Economic Co-operation and Development
OJ	Official Journal of the European Communities
OJLS	Oxford Journal of Legal Studies
OPRC	London International Convention on Oil Pollution Preparedness, Response, and Co-operation
OSCOM	Commission, 1972 Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircrafts
OSHA	Occupational Safety and Health Act (US)
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OUP	Oxford University Press
OVG	Oberverwaltungsgericht (German Administrative Court of Appeal)
PA	Precautionary approach
PAH	Polycyclic aromatic hydrocarbons
PARCOM	Commission, 1972 Convention for the Prevention of Marine Pollution from Land-Based Resources
PCA	Permanent Court of Arbitration
PCBs	Polychlorinated biphenyls
PIC	Prior informed consent
PMN	TSCA 1976 Pre-Manufacture Notification
POPs	Persistent organic pollutants
PP	Precautionary principle
PPA	US Pollution Prevention Act
PPM	Part per million
PPP	Polluter-pays principle
PPPR	Regulation (EC) 1107/2009 concerning the placing of plant protection products on the market
PRP	Precautionary Reference Point
RCADI	Recueil de l'Académie de droit international
RCJB	Revue critique de jurisprudence belge
RDP	Revue de droit public
REACH	Registration, Evaluation, Authorisation and Restriction on Chemicals

RECIEL	Review of European and International Environmental Law
RFD Adm.	Revue française de droit administratif (a French administrative law journal)
RFMOs	Regional Fisheries Management Organizations
RFR	Radio frequency radiation
RGDIP	Revue générale de droit international public
RIAA	Report of International Arbitral Awards
Riv Giur Amb	Rivista Giuridica dell'Ambiente (an Italian law journal)
RJE	Revue juridique de l'environnement (a French environmental law journal)
RSDIE	Revue Suisse de Droit International et de Droit Européen
RTD Civ.	Revue Trimestrielle de Droit Civil (a French civil law journal)
RTDE	Revue Trimestrielle de Droit Communautaire (a French journal of European law)
RTDH	Revue Trimestrielle de Droits de l'Homme
RvS	Raad van State (Dutch/Belgian Council of State)
SAEDRC	South Australian Environment, Resources, and Development Court
Sct C	Supreme Court of Canada
SCt	Supreme Court
SEA	Single European Act
SPREMO	Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean
SPS	Sanitary and Phytosanitary Agreement
STECF	Scientific, Technical and Economic Committee for Fisheries
SVHC	Substances of very high concern
TA	Tribunal administratif (Administrative Court, France)
TAC	Total allowable catches
TBT	Technical Barriers to Trade
TBT antifoulant	Tributyltin
TEL	Transnational Environmental Law
TEU	Treaty on the European Union
TFEU	Treaty on the Functioning of the European Union
TMA	Tijdschrift voor Milieu-Aansprakelijkheid/ Environmental Liability Law Review (a Dutch environmental civil liability law journal)
TMR	Tijdschrift voor Milieu
TPR	Tijdschrift voor Privaatrecht (a Belgian civil law journal)
TREMs	Trade-related environmental measures
TRP	Target Reference Point
TSCA	Toxic Substances Control Act (US)
Tulane Env LJ	Tulane Environmental Law Journal
UK	United Kingdom
UmweltHG	Umwelthaftungsgesetz (German Liability Act)
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNECE	United Nations Economic Commission for Europe

I LIST OF ABBREVIATIONS

UNECE Water Convention	1992 Convention on the Protection and Use of Transboundary Water courses and International Lakes
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFSA	1995 UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks
UNGA	United Nations General Assembly
Univ of Illinois LR	University of Illinois Law Review
UN Watercourse Convention	1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses
UPR	Umwelt und Planungsrecht (a German law journal)
Va Env't LJ	Virginia Environment Law Journal
Vand J Transnat'l L	Vanderbilt Journal of Transnational Law
VGH	Verwaltungsferischthof (German Administrative Court)
VCIT	Vienna Convention on the Interpretation of Treaties
VOCs	Volatile Organic Compounds
Wash & Lee LR	Washington and Lee Law Review
Waste FD	Waste Framework Directive
Water FD	Water Framework Directive
WCPCFC	Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean
WGBU	German Advisory Council on Global Change
WHO	World Health Organization
WTO	World Trade Organization
WTO DSU	World Trade Organization Dispute Settlement Understanding
Yale LJ	Yale Law Journal
YbEEL	Yearbook of European Environmental Law
YbIEL	Yearbook of International Environmental Law
YEL	Yearbook of European Law
Z. Umweltrecht	Zeitschrift für Umweltrecht (a German law journal)

General Introduction

1. Fundamental issues

1.1 Environmental protection as a fundamental value

Although environmental protection has been gaining momentum within legal discourse since the late 1960s, it took at least three decades for international lawyers to acknowledge its essential nature. Subsequently, in a swath of landmark cases the International Court of Justice (ICJ),¹ the Court of Justice of the EU (CJEU),² and a number of constitutional courts throughout the Western world in Europe, the United States,³ and Australia⁴ have acknowledged the importance that must be afforded to environmental protection. In the 1990s, other supreme courts—notably in the Philippines,⁵ India,⁶ and Brazil⁷—followed suit. The link between environmental protection and human rights was later stressed by the European Court of Human Rights (ECtHR),⁸ the African Commission on Human and People's Rights,⁹ as well as the Inter-American Court of Human Rights.¹⁰ Against this background, a right to environmental protection was enshrined in a number of constitutions across Europe and Latin America.

As far as international law is concerned, the increase of environmental multilateral agreements (MEAs) in the 1980–1990s went hand in hand with the obligation

¹ *Gabčíkovo-Nagymaros* (Hungary v Slovakia) [1997] Judgment ICJ Rep 7, para 33; *Pulp Mills on the River Uruguay* (Argentina v Uruguay) [2010] Judgment ICJ Rep, para 72.

² Case 302/86, *Commission v Denmark* [1988] ECR 4607. It is settled case law that the objective of protecting the environment constitutes one of the essential objectives pursued by this international organization and is 'both fundamental and inter-disciplinary in nature' (see, Case C-41/11 *Inter-Environnement Wallonie and Terre wallonne* [2012] C:2012:103, para 57).

³ *Tennessee Valley Authority v Hill et al*, 437 US 153, 180 (1978).

⁴ *The Commonwealth of Australia v State of Tasmania* [1983] HCA 21.

⁵ *Oposa v Factoran* GR No. 101083 (SC 30 July 1993).

⁶ *Vellore Citizens' Welfare Forum v Union of India* (1996) 5 SCC 647.

⁷ The obligation of restoring the environment is imprescriptible. See STJ, REsp 1, 367,923/RJ, 2nd Panel; REsp 1, 145,083/MJ, 2nd Panel.

⁸ Case *Lopez Ostra v Spain*, 16798/90, 9 December 1994.

⁹ *Social and Economic Rights Action Center and the Center for Economic and Social Rights v Nigeria*, Communication No. 155/96, 27 May 2002, paras 52–5.

¹⁰ The Environment and Human Rights (State Obligations in Relation to the Environment in the Context of the Protection and Guarantee of the Rights to Life and to Personal Integrity (Interpretation and Scope of Articles 4(1) and 5(1) of the American Convention on Human Rights), AO OC-23/18, (Ser A) No. 23, 15 November 2017.

imposed by the ICJ on the Parties when interpreting and implementing treaties to take into account new environmental protection standards.¹¹

Having initially been viewed as a technical-scientific discipline, over time environmental law came to be accepted as a legal branch in its own right. Major textbooks were published and law faculties began to teach this new legal subject. That said, this branch can still be a little disconcerting as it straddles private and public law, overlaps with consumer and health law, and interacts with a swath of other legal branches that had previously been impervious to environmental concerns.

By and large, in many parts of the world the state of the environment has improved thanks to better environmental regulation. In particular, in a number of Western countries environmental law has led to the restoration of much degraded ecosystems and has curbed pollution. However, improvements often arise out of fortuitous technical, economic, and social factors that are unrelated to legal developments. Moreover, these successes may often only become apparent through reduced rates of ecosystem degradation.

Furthermore, at a time when traditional environmental pressures have far from abated, new challenges are constantly arising. According to many scientists, we are on course for ecological Armageddon. With rising temperatures, climate change is morphing quickly into a climate crisis. Biodiversity is facing an unprecedented rate of destruction, which will soon lead to a sixth extinction. Half of all fish stocks are depleted.¹² The spread of chemical substances is widespread. Moreover, continued population growth and the related consumption of natural resources compound environmental pressures as the carrying capacity of ecosystems is simply exceeded. The latest signs of climate change in 2019 are unprecedented (peat fires in the Arctic, drought in the Amazon basin, Australian bushfires, and record-breaking heatwaves across the planet). When tipping-points are passed, the destruction will start to feed off itself; ecosystems will keep shrinking regardless of anything that humans might do to prevent it. As a result of these dramatic changes, we have entered squarely into the Anthropocene. This evolution encroaches on fundamental rights (access to clean water and air among others) and raises issues of environmental justice as the poorest populations are likely to bear the brunt of the degradation of natural resources.

To avoid further degradation, more ambitious environmental policies have to be implemented quickly. However, environmental law cannot achieve its objectives on its own for five obvious reasons.

First, at the root of the environmental crisis lies the recurrent tension between the exploitation of environmental resources as economic resources and their safeguarding from a conservationist perspective. Neither environmental law nor the sustainable development agenda has thus far addressed the root causes of the

¹¹ *Gabčíkovo-Nagymaros* (n 1) para 85.

¹² See Chapter 3, Subsection 3.2.

socio (mass consumption) and economic (linear economic development and high-carbon economy) factors compounding the degradation of the environment. Simply put, we consume far more than our planet can deliver, and we exploit natural resources at a much higher rate than nature's capacity to regenerate. Whilst the welfare amenities of economic growth are immediate, conservation provides only long-term advantages, which are not always quantifiable in monetary terms. Consequently, absent a radical paradigmatic shift, the path towards a circular de-carbonized economy remains strewn with pitfalls.

Secondly, as in many other areas of law, in the environmental sphere law displays its conservative nature. Thus the proclamation of an array of principles—mostly elaborated within the literature—has largely helped to secure recognition for environmental law as a genuine legal discipline. However, environmental protection enshrined as a new constitutional value and the principles underpinning it will remain toothless unless and until they are fleshed out into more concrete legal instruments. This is a long, cumbersome, and indeed tedious process. For instance, it took nearly half a century for many environmental law regimes to become more preventive and slightly more anticipatory. As regards the polluter-pays principle (PPP), environmental taxes and strict liability regimes are still in their infancy.

Thirdly, since the first edition of this book, environmental law has come under pressure. Many regulators have been promoting a deregulatory agenda either in the form of gold-plating or the rolling back of controversial environmental statutes (restrictions on public participation and standing, simplification of administrative procedures, etc.), rather than raising protective standards.

Fourthly, environmental law will remain a paper tiger until its principles and standards have been integrated into every public policy. In a nutshell, trade and investment related law, tax law, tort law, administrative law, energy law, and trade law need to contribute to a new socio-economic model that enables natural resources to be conserved whilst preventing further climate change. A systemic rather than a sectoral change is urgently needed. Sadly however, most public policies have thus far paid only lip service to environmental concerns.

Fifthly, a technical or an engineering approach cannot solve the environmental crisis. Given the significance of the environmental and climate crisis, a right to a clean environment has to be elevated to the apex of the legal order and placed on equal footing with other fundamental rights. In fact, such a right has been laid down in nearly a hundred constitutions. It is usually akin to a policy principle or a constitutional objective, rather than a traditional individual right. Indeed, thus far there is no 'obligation' for the authorities to intervene. Moreover, that right is subject to a high level of scrutiny given that restrictions placed on the marketing and use of products or the exploitation of natural resources interfere with economic rights. In effect, regulators and courts alike are still struggling to strike the right balance between public intervention in the area of the environment and other rights and interests. Against this backdrop, both treaties and constitutions must impose

a duty of due diligence on the authorities to flesh out this right into concrete rules. Accordingly, the environmental principles that flesh out the constitutional right to a clean environment should not be seen as merely interpretative tools; they must be considered as meta-rules.

To sum up, the fundamental premises upon which the first edition of this book was predicated are exacerbated.

1.2 An anthology of principles

Principles are far more widely in evidence in environmental law than in any other field of law. International environmental law (IEL) provides a particularly propitious breeding ground for principles, for while it is difficult to agree on fixed and precise rules at the international level, it is far easier to come to a public understanding about indefinite principles that can progressively be given more concrete form. The 1972 Stockholm Declaration on the Human Environment, the 1982 World Charter for Nature, and the 1992 Rio Declaration on Environment and Development are replete with principles. These principles have been taken up, and often refined, by scores of MEAs adopted in their wake, who have been implementing them through a number of arrangements ranging from protocols to guidance documents.

However, unlike the United Nations Convention on the Law of the Sea (UNCLOS), which codified in 1982 the principles and rules concerning the use of oceans and seas, IEL must engage with a variety of legal sources as there is no overarching framework convention that sets out its key principles. The absence of a single legal source compounds the fragmentation of this branch of the law. It follows that core environmental principles are dispersed across a wide number of MEAs, whilst some have achieved customary status. Recently however, the idea of a Global Pact for the Environment to synthesize and codify the principles of IEL has been discussed at UN level.¹³ The aim of the Pact is to unify IEL's current sectoral approach.

As far as European Union (EU) law is concerned, the Treaty on the Functioning of the EU (TFEU) contains a Title that expressly sets out the principles meant to guide policy on the environment. Its Article 191(2) provides that the policy on the environment shall be based on 'the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay'. Those principles

¹³ The Global Pact for the Environment aims to gather in a single international treaty the major principles of IEL. It has its origins in an initiative launched by an international network of jurists. On 10 May 2018, the UNGA Adopted Resolution 72/277, and requested that the Secretary-General submit a report that identifies and assesses possible gaps in IEL.

have exercised considerable influence on the drafting of secondary EU legislation, as can be seen from their frequent inclusion in recitals; they have led to advances in national legislation owing to the interplay between EU and national legal orders. They have also had a decisive influence on hard case rulings handed down by the CJEU.

Environmental principles subsequently became influential beyond the spheres of international and EU law. For instance, British, German, French, Belgian, Italian, Finnish, Swedish, Hungarian, and Slovenian legislators, among others, followed in the footsteps of the international institutions and set forth principles in their domestic legal systems in the process of attempting to codify their environmental law. Several Member States merely copy and paste the Article 191(2) TFEU principles¹⁴ whilst others have been more innovative, for example the French Environmental Code and the Constitutional Charter for the Environment that enshrine a set of new principles. Despite their reluctance to embrace principles, common law countries such as Australia and Canada have also embedded various principles within their environmental statutes.¹⁵ Developing countries are also following suit.¹⁶

Since there is no exhaustive list of environmental principles, one could propose the following list drawn from treaty law, soft law, case law, and doctrinal works:

- principle of common but differentiated responsibilities;¹⁷
- principle of ecological integrity;¹⁸
- common heritage of mankind;¹⁹
- ecological solidarity;²⁰
- principle of equitable and reasonable utilization;²¹
- principle of sustainable use;²²
- principle of inter-generational equity;²³

¹⁴ In the course of the negotiation of the Environment Bill, the choice as to which principles to include was subject to much controversy. The Environment Bill 2020 took over the traditional TFEU principles listed in TFEU, Art 191(2). In so doing, the law-maker discarded more modern principles such as non-regression or substitution which might be more suited to deal with future environmental issues.

¹⁵ See Chapter 3, Section 2.

¹⁶ Togolese Framework law on the environment, Art 5, lists seven environmental principles.

¹⁷ Rio Declaration, Principle 7; 2002 New Delhi ILA's Principles of International law relating to Sustainable Development, Principle 3; UN Framework Convention on Climate Change (UNFCCC), Art 3(1); Convention on Biodiversity (CBD), Art 20(4); Paris Agreement, Art 2(2).

¹⁸ 1999 Australian Environment Protection and Biodiversity Act, Section 3A(d).

¹⁹ Wild Birds Directive 2009/147, Recital 4; Habitats Directive 92/43, Recital 11.

²⁰ Portuguese Constitution, Art 66; French Law on Biodiversity no. 2018-1087 modifying Art L 110-1 d of the Environmental Code.

²¹ 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses, Art 5 (UN Watercourses Convention).

²² 1997 UN Watercourses Convention (n 21), Art 5.

²³ 1947 International Whaling Convention, Preamble; 1972 World Heritage Convention, Art 4; UNFCCC, Art 3(1); 1999 Belgian Law on the Marine Environment, Art 4(4). With respect to Australian law, see *Taragala Landscape Guardians Inc v Minister for planning* [2007] 161 LGERA 1. In Indian law, see *Jan Chetna v Ministry of Environment* (NGT, 9 February 2012), para 19.

- high level of environmental protection;²⁴
- principle of integration;²⁵
- non-regression or stand-still principle,²⁶ and its corollary principle of progression;²⁷
- *in dubio pro natura*;²⁸
- the ecological function of the property;
- co-operation principle;²⁹
- remediation for environmental damage³⁰ or recovery principle;³¹
- principle of proximity³² and self-sufficiency;³³
- principle of waste minimization;³⁴
- principle of protection and preservation of the marine environment;³⁵ and
- principle of 'As Low As Reasonable Achievable'.³⁶

In addition, these substantive principles are supported by an array of procedural principles:

- notification, co-operation;³⁷
- Environment Impact Assessment; and³⁸
- information,³⁹ participation,⁴⁰ and access to justice.

Their disparity leads to perplexity and prompts a number of observations:

- *Heterogeneity of legal orders.* These various principles form a heterogeneous group given that their legal status, level of normativity, functions,

²⁴ TFEU, Arts 114(3), 168(1), 169(3), and 191(2); EU Charter for Fundamental Rights (EUCFR), Art 37.

²⁵ TFEU, Art 11; EUCFR, Art 37; 1999 Australian Environment Protection and Biodiversity Act, Section 3A(a); 2002 New Delhi ILA's Principles of International law relating to Sustainable Development, Principle 7.

²⁶ 1992 UNECE Watercourses Convention, Art 2(7); French Law on Biodiversity no. 2018-1087 modifying Art L 110-1 9° of the Environmental Code; Belgian Constitution, Art 23.

²⁷ Paris Agreement, Art 4(3).

²⁸ STJ, *State Public Prosecutor's Office of Minas Gerais v Pedro Paulo Pereira* (2012).

²⁹ 1990 German Unification Treaty, Art 7.

³⁰ French Constitutional Charter, Art 4. See also Cass. crim, 25 September 2012, no. 10-82938.

³¹ 1999 Belgian Law on the Marine Environment, Art 4(6); Portuguese Basic Environmental Law, Art 3.

³² Regulation 1013/2006 on shipments of waste, Art 11(1)(a).

³³ Basel Convention, Preamble.

³⁴ Basel Convention, Art 4(2)(a); Waste Framework Directive 2008/98 (hereinafter Waste FD), Art 4.

³⁵ Sub-Regional Fisheries Commission [2015] ITLOS Rep 21, AO, para 216.

³⁶ Convention on Nuclear Safety, Art 15.

³⁷ Chapter 2, Section 4.3.

³⁸ Rio Declaration, Principle 17; *Pulp Mills* (n 1), paras 72, 204. The EIA may also be seen as a mechanism operationalizing other environmental principles.

³⁹ French Environmental Code, Art L 110-1 4°.

⁴⁰ *Ibid*, Art L. 110-1 5°.

and role in the case law differ tremendously from one legal order to another. Methodological problems are aggravated by the co-existence of an enormous number of entangled rules as well as by the fact that different legal systems have recognized almost identical principles in varying ways. What is more, while the principles I discuss in this book are widely enshrined in MEAs and applied by international courts and tribunals, a number of other principles (such as ecological solidarity) are still in their infancy.

- *Diversity of sources.* Formulated at the international, national, and regional levels, principles are set out in extremely disparate legal instruments, ranging from ‘soft law’⁴¹ to legally binding texts. Sometimes they are recognized by the law-maker, sometimes doctrine calls for them to be applied, sometimes the courts discover them or simply create them.⁴² They have been subject to so much doctrinal attention that they are discussed in every environmental law textbook. Some principles have attracted the approval of the legal community on the basis of the values, ideals, and presumptions they bring together rather than for their theoretical rigour.
- *Terminology.* It is never simple to approach, comment on, and analyse legal principles: the concept changes from one legal culture to another and from one discipline to another. The task becomes even more daunting when it involves a wide range of legal regimes, each of which deals with principles in its own way. Nor is the work made easier by the knowledge that principles constitute a special link between legal science and non-legal spheres such as ethics and policy. Having been branded as ‘general principles’, ‘customary principles’, ‘approaches’, ‘objectives’, ‘concepts’, etc., these classifications mirror the lack of consensus regarding their legal status.⁴³
- *Scope.* Principles are at times confined to a very specific area of environment law (e.g. the proximity and self-sufficiency principles used in waste legislation); at other times they are applied in a horizontal manner, cutting across all political sectors (as is the case for the polluter-pays, preventive, and precautionary principles). In addition, principles can be situated along a sliding scale. At one extreme, a number of them can be characterized by their high level of abstraction (e.g. the meta-principle of sustainable development), whilst at the other extreme when intertwined with more tangible rules (e.g. principle of cost recovery of water services) they are likely to be less abstract.⁴⁴
- *Legal status.* The legal status of each of the principles listed above varies considerably: some principles are more firmly established in IEL, while others are

⁴¹ Although they affirm and reaffirm a number of key principles, the Stockholm and Rio Declarations are not binding.

⁴² For instance, courts as well as doctrinal works contributed to their recognition of the principles enshrined in TFEU, Art 191(2).

⁴³ L Krämer and E Orlando, ‘Introduction’, in L Krämer and E Orlando (eds), *Elgar Encyclopedia of Environmental Law. Principles of Environmental Law* (E Elgar, 2018) 4.

⁴⁴ J Verschuuren, *Principles of Environmental Law* (Nomos, 2003) 29, 32.

only in the process of gaining relevance in international law.⁴⁵ The fact that an array of principles are put forward in the recitals and preambles of MEAs, EU acts, and national environmental codes, commented on in textbooks and other specialist analyses, and set out in case law does not mean that all of them have achieved their full legal effect. Some mirror emerging international obligations, and yet the status of others is still undetermined.⁴⁶ Customary law principles and general principles of law are binding although they offer leeway to the authorities. Other principles have either indirect binding effects when fleshed out into more precise substantive rules or an interpretative function that reinforces the strength of environmental rules when conflicting with other rules. Finally, policy principles that are not embodied within agreements or statutes are not likely to have any effects, although they can contribute to securing recognition for customary rules.

- *Cross-fertilization with other norms.* None of these environmental principles is likely to operate in clinical isolation; in each case, other general principles of law must be complied with. By way of illustration, the restrictive measures that the precautionary principle (PP) can prompt must be consistent with the principle of proportionality. Likewise, the eco-taxes adopted in the name of the PPP must be consistent with the general principle of non-discrimination. Moreover, most of these principles buttress sustainable development, which has become an established concept with normative status in international law, as is exemplified by codification works,⁴⁷ its incorporation into treaty law, and its recognition within the ICJ's case law.⁴⁸

Disparaged or praised, the principles of environmental law are not likely to lose their relevance. That said, does this success really represent a *significant advance* for environment law, or is it purely cosmetic, with no real legal effect? A question also arises as to whether there is any need to ascertain additional principles in order to safeguard the environment or whether we should satisfy ourselves with existing principles on the grounds that they have sufficient authoritative backing. It is a classic example of the quantity-versus-quality argument.

⁴⁵ On that connection, see the Final Report of the Experts Group Workshop on International Environmental Law for Sustainable Development, UN DOC.E/CN.17 (1996).

⁴⁶ UNGA, *Gaps in international environmental law and Environment-related instruments: towards a global pact for the environment* (A/73/419, 2018); IUCN Commission on Environmental Law, Art 6.

⁴⁷ The ILA's Committee on International Law sees the 'precautionary approach' as 'central to sustainable development': 2002 New Delhi ILA's Principles of International Law Relating to Sustainable Development, Principle 4.1.

⁴⁸ In *Gabčíkovo-Nagymaros* (n 1), for instance, the ICJ referred to the notion of concept, and not principle, giving it a lower status than a principle of international law or a rule of customary law. In his Dissenting Opinion, Judge Weeramantry qualified the concept a 'principle of normative value' that is likely to play a major role in determining important environmental disputes of the future. There is still doubt that sustainable development can morph into a principle of international law. The doctrine is divided on this issue.

- *The scholarship influence on the legal sources.* The principles have been described as the cornerstone of environmental law by a significant number of scholars. The considerable weight given to the recognition of environmental principles both by scholars as well as by codification bodies such as the International Law Commission (ILC) and the International Law Association has recently been criticized. However, these criticisms focus mainly on the doctrinal works that have engaged with and commented on the recognition of a number of principles.⁴⁹ In other words, those debates amount to an academic discourse about the environmental narrative. Given that such an analysis is sociological in nature rather than legal, it prompts two observations. First of all, the importance of environmental law scholarship is nothing extraordinary when one considers developments in other areas of the law. Over the course of the twentieth century, legal scholars played a role in the emergence of landmark principles of civil, criminal, and administrative law. Secondly, these criticisms fail to stress that doctrine is not a source of law, at least not in Western legal systems. In fact, nowadays scholars embrace a swath of environmental principles because law-makers have enshrined them within their statutes and agreements, and courts have been applying them in order to adjudicate hard cases. Both legislation and case law are primary sources of law while doctrine is a secondary source.

1.3 The focus on three legal principles

Instead of trying to demonstrate how the numerous principles found in environmental statutes and international conventions have had a positive effect on the dynamics of environment law, this book focuses on the specific contribution made by three environmental law principles: the polluter-pays, prevention, and precaution principles. One might criticize this choice on the grounds that it disregards a number of other relevant principles. The working hypothesis in this book is that—looking beyond the wide diversity of environmental principles, which are likely to be applied differently depending upon the specificities of each sector and each legal order—it is possible to discern a matrix of landmark principles which have cross-fertilized each other and in some sense constitute the foundation for environmental law. One might also raise objections against this approach on the grounds that these principles are endorsed in different ways as legal concepts throughout a broad range of jurisdictions that do not share the same legal culture. I have chosen these three principles for the following reasons.

⁴⁹ E Scottford, *Environmental Principles and the Evolution of Environmental Law* (Hart, 2016).

First, these three principles are of particular interest because they are, unlike many other principles, explicitly or implicitly recognized in international and EU environment law, as well as in various national statutes, generally in the overarching provisions of environmental codes. For instance, under the auspices of the Council of Europe, many Central and Eastern European countries have endorsed these three principles under the influence of the Model Environmental Act. In particular, they have gained constitutional status in several legal orders.⁵⁰ In some cases, supreme courts have embraced these principles together at the same time, classifying them as being ‘essential features of sustainable development’⁵¹ or ‘imperatives for preserving ecology’.⁵²

Above all, they have been acclaimed for more than forty years in a range of international declarations, such as:

- the 1972 Stockholm Declaration on the Human Environment;
- the 1980 ECE Declaration on Water Pollution, 1990 Bergen Declaration on Sustainable Development;
- the 1991 Esbjerg Declaration on the Wadden Sea;
- the 1991 Hague Declaration on International Environment Law;
- the 1992 Rio Declaration on Environment and Development;
- the 1995 IUCN Draft International Covenant on Environment and Development;⁵³
- the 1997 Alta Declaration on the Arctic Environment Protection Strategy; and
- the 2002 New Delhi ILA’s Declaration of Principles of International Law relating to Sustainable Development.

Secondly, these three principles have been proclaimed alongside one other in a number of MEAs and environmental statutes within provisions that are either binding on or guide the authorities. They have also been described by international bodies as key environmental principles, which are becoming increasingly common and legally relevant throughout international and domestic legal systems.⁵⁴ As set out in substantive texts, they have become linked to *sources of binding law*.

⁵⁰ The French Constitutional Charter for the Environment affords constitutional status to the three principles. Accordingly, they ‘are binding on public authorities and administrative agencies’ (CC, 19 June 2008, n° 2008-54). According to German scholars, the PPP, the PP, and the co-operation principle should have constitutional status. Belgian scholars take the view that the PP stems from the right to a clean environment enshrined in Art 21 of the Belgian Constitution. The Brazilian Supreme Court has ruled that environmental protection ‘is based, among other principles, on prevention, the PPP, and full redress’ STJ, REsp 605,323/MG. See AH Benjamin and N Bryner, ‘Brazil’, in E Lees and J. Viñuales (eds), *The Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 90.

⁵¹ *Vellore Citizens’ Welfare Forum* (n 6) para 11.

⁵² *Karnataka Industrial Areas Development Board v C. Kenchappa and Others* (2006) 6 SCC 371, para 32.

⁵³ Arts 6 and 7.

⁵⁴ UNEP, *Judicial Handbook on Environmental Law* (2005) 19–20.

Accordingly, they are specifically intended to impose obligations on public authorities by providing guidance concerning choices and methods in relation to measures to limit environmental risks with the aim of guaranteeing citizens the right to enjoy a healthy environment.⁵⁵ For that reason, they are sometimes characterized as *directing principles*, as opposed to *instrumental principles* that aim to grant procedural rights to those being administered.

Finally, analysis of these principles is justified by the fact that they are linked to models of thought that complement one other. This analysis can be extrapolated in order to understand the legal status and function of other environmental principles that are not considered in any depth in this study. These principles thus offer uniform terminology for identifying catalysts for change within environmental law.

The objective of this book is thus to *determine the status* of and *evaluate the contribution* made by the three foremost environmental principles—the polluter-pays, prevention, and precautionary principles—to the construction of environmental law at the international, EU, and national levels. Analysing the theoretical foundations, legal status, and implementation of these three principles allows us to understand the underpinnings of a broad range of more sophisticated regimes, ranging from eco-taxation to strict liability.

2. Analytical background

Given the numerous legal orders potentially covered by the analysis, I consider it useful to explain briefly the two analytical threads that will guide discussions in this book: post-industrial risk and post-modernity. The principles of the polluter-pays, prevention, and precaution form the meeting ground of tremendous tensions: between supranational and national legal orders, between the global and the local, between law and science, and between modernity and post-modernity. We will have ample opportunity in the following Chapters to study the ecological, political, economic, and philosophical aspects of each of the three principles in the light of those tensions.

2.1 The ascendancy of post-industrial risk

It will become clear in the course of this book that the concept of risk has developed into the activating concept of modern environmental law. In addition to natural risks, humanity is today exposed to a growing number of risks arising from modern technological development. While it is true that socio-economic

⁵⁵ Part II, Chapter 5.

development inevitably entails taking risks, it is also the case that the accumulation of these risks may threaten some areas of the environment, and even humankind itself. Therefore, the concept of risk has become a dominant organizing principle in late twentieth-century societies. Of course, different people tend to have very different concepts of what constitutes risk. In our analysis, risks are associated with the possibility that adverse effects may occur as a result of human activity. As we will see in Part I, however, the risks threatening our environment are not all of one type, but rather represent a succession of various categories of risk.

Most of the environmental risks produced by industrial society have been the subject of preventive regulatory measures. The most important criteria for assessing risks—probability of occurrence and damage—are therefore relatively well known. Science is able to determine thresholds intended to avoid detrimental effects. Listed installations, waste facilities, and water discharges are typical of this first generation of risks. Damage may also occur as the result of an accident, but such damages are known to be reversible. In either case, the use of funds provided by taxes by virtue of the PPP makes it possible to restore the environment to its state prior to damage (e.g. by reforestation or decontamination of polluted soils). While the potential for damage is sometimes very high, the probability of occurrence in such cases remains low (e.g. nuclear facility accidents, bursting of dams).⁵⁶

However, more recently, issues such as the dissemination of genetically modified organisms (GMOs), ozone depletion, loss of biodiversity, and the discovery of latent health and environmental hazards such as endocrine disrupting substances (EDS) and persistent organic pollutants (POPs) have come to symbolize the ascendancy of a new generation of risks. Those risks, particular to a post-industrial society, are characterized on one hand by the general inability of scientists to make reliable predictions about hazards due to uncertainties (identifiable, but not quantifiable) or insufficient knowledge (ignorance) and, on the other hand, by the impossibility of assessing the character of damage that might occur. Uncertainties can be related to the geographical scope of the potential for damage (e.g. chemical pollutants in the marine environment), to its temporal duration (e.g. persistence of chemicals or of radiation in the natural environment), to a delay in its manifestation (e.g. the impact of greenhouse gases (GHG) on climate), or to its reversibility or irreversibility (e.g. ozone layer depletion, species damage due to cross-breeding between genetically modified (GM) plants and wild plants). In particular, this new generation of risks is characterized by the difficulty of identifying and quantifying causal links between a multitude of potential hazards (such as various types of emissions) and specific adverse effects (e.g. sea-level rise, desertification). At this stage, science is largely dependent upon analogies or computer simulations to assess suspected risks. Furthermore, many of the adverse effects of these risks are

⁵⁶ However, an accident can lead to a policy change. For instance, following Fukujima, Germany decided to terminate nuclear energy.

global in nature (e.g. climate change). In contrast to natural, accidental risks and to those risks which industrial society can prevent by clear-cut preventive measures, this new generation of risks has given rise to a general attitude of disillusionment with scientific research and distrust of risk management and communication techniques. Researchers today therefore emphasize the central importance of intrinsically subjective value judgements in their assessments and the need to consider the benefits that might result from taking risks in order to create a dialogue with societal groups.⁵⁷

I finished writing this book at the height of the Covid-19 crisis. The spread of this virus, which has a zoonotic origin has taught us two lessons that are in line with the thesis defended in this book. First, environmental changes, as well as the intemperate trade in fauna such as the reduction in habitats for wild fauna, create new interfaces that facilitate the transmission of pathogens from an animal reservoir to man. Secondly, within an increasingly interdependent world, environmental crises will become ever more intertwined with health crises. Questions relating to public health will no longer be confined to the secrecy of the physician's consulting room or the sanitized environment of the hospital; they are now being played out in the arena of international trade, ports and airports, distribution. Over the centuries, pandemics have laid down markers between different eras of human society. But we must not wait for this new health crisis to be resolved before thinking about a radically new society.

2.2 The pressure of post-modernity

Law has traditionally been represented as an autonomous system made up of general and abstract rules, which is both complete and coherent (modern law model). However, individualized complex legal fields open to other societal spheres have recently emerged (post-modern law model), among them environment law. The complexity of environmental issues in both social terms (acceptance of risks by populations) and scientific terms (ascendancy of a new generation of risks) means that the law-maker is confronted with the following alternatives: either to be prolix and regulate everything in a *pointilliste* manner, or to have recourse to more open concepts, particularly those principles for which no fixed definition can be found. The variety of regulatory approaches is striking and many legal systems combine both approaches. Nevertheless, it is this second approach—both original and baffling—which we have chosen to focus on in this book, in the form of the polluter-pays, preventive, and precautionary principles. Because environmental law mirrors features of post-modern law where the clarity, rigidity, rationality, and

⁵⁷ See the discussion in Chapter 3, Section 5.3.2.2.

certainty is giving way to fragmentation, flexibility, and dispersion, the principles of this legal branch provide a degree of underlying coherence and stability. In this way, they act as a bridge between modern and post-modern law. Accordingly, these three principles contain within themselves all the ambiguities that characterize the shift from modernity to post-modernity.

3. General outline

3.1 The structure of the book

The aim of Part I of this book is to shed light on the origins, formulation, and application of the principles of the polluter-pays, prevention, and precaution in international, EU, and various national legal orders. I devote particular attention to the difficulty of interpreting their definitions owing to their evolution within different legal systems. Throughout Part I, which comprises the empirical basis for our research, I consider a number of theoretical and practical questions raised by the relationship between these principles, which are at once harmonious and conflictual. I shall also determine whether it is already possible to draw precise legal consequences from these principles. This initial analysis serves as a basis for my first thesis, that a subtle shift has occurred in the battle against ecological risk: with the emergence of the principle of precaution, the battle against environmental risk has moved from its earlier position of *a posteriori* control (civil liability or tort law as a curative tool) to the level of *a priori* control (anticipatory measures). In particular, I shall show how this paradigmatic shift translates into a rather radical transformation of classical legal regimes: a duty of care replaces scientific and technical certainties; fault liability is transformed into strict liability; environmental taxes aim to encourage certain types of behaviour rather than to achieve a redistributive objective; continuous monitoring replaces long-term authorizations; and end-of-pipe solutions give way to best available technology (BAT).

In considering this empirical evidence, Part II concentrates on *how these principles contribute to the balance and dynamics of environmental law and their legal character*. In particular, I concentrate on my second thesis: that principles constitute the interface in the *shift from modern to post-modern law*. Part II examines the role and legal status of these principles in a horizontal manner. This theoretical analysis will apply to both international and EU law, as well as to national legal systems. In its introductory section, I recall the substance of modern and post-modern law and the principles related to each; Chapter 5 explains more precisely how the three principles lend support to a number of ongoing legal developments, notably by enriching the instruments used by public authorities, such as the constitutional right to protection of the environment, codification, and the principle of proportionality. In Chapter 6 presents further evidence of the specificity of these

three environmental law principles as they pass beyond the stage of simple guiding ideals to become true legal rules. Chapter 7 illustrates more particularly how environmental principles can reshape the ‘trade-environment’ debate at the international and EU levels.

3.2 Methodology

The complexity of the concepts we consider in this book requires methodological choices to be made. They are briefly described in the following Subsections.

3.2.1 The polymorph character of the environment

The protean nature of the concept of environment means that it is difficult to define its boundaries exactly. Although everyone may agree on what is meant by this concept, there is some dispute regarding the boundaries surrounding this core content. If there is any catch-all concept, then this is it. Immune to all efforts at legal classification, this chameleon-like concept may be limited under a narrow reading to nimby factors, whilst read more broadly it may be coterminous with the biosphere. Furthermore, it continuously overlaps with other concepts, such as ecology, nature, biodiversity, public health, workers’ protection, land-planning, living surroundings, or sustainable development. Moreover, the speed with which the scope of environmental law has been expanding is itself revealing broader transformation in scientific understanding of our relationship with the natural world. Last, many of the components of the environment are not regarded as having legal rights and are consequently devoid of legal protection. As a result, we endorse a rather broad and evolutive interpretation of this concept.

3.2.2 Consideration of international, EU, and national legal systems

In the context of growing globalization, we have approached the issue of the legal status and function of these three environmental principles by jointly considering several legal systems that are not really comparable. We have tried to avoid confining ourselves to the logic of a single legal system for several reasons. First, there are a great number of studies on the role of the principles within international law and within national legal systems. Generally, however, such studies do not sufficiently consider the interactions between various legal regimes and their underlying principles. Thanks to the theory of direct effect, EU law and the European Convention on Human Rights (ECHR) have come to occupy a central role in legal reasoning in several European countries. As a result, it has become difficult to deal with environment law in Europe through a purely national approach, without taking into account the requirements of international and EU law; the latter, according to the doctrine of supremacy, comprises an integral part of Member State legal systems, which national courts are bound to apply. Conversely, we cannot

consider EU law without understanding the principles at work in national law, even though the former constitutes an autonomous legal system. In addition, the CJEU attaches particular importance to the ECHR as a main source of fundamental EU rights. These elements may encourage lawyers from various European countries to rely more heavily on shared environmental principles. Secondly, it is not possible to overlook the fact that some courts rule not only on the basis of their own laws, but also base their decisions on developments within other legal systems. Consequently, we have tried to demonstrate that different legal spheres (international, EU, and national) engage in far greater interaction when they share a common set of principles. There are indeed pathways of reciprocal influence which enable individual legal systems to be decompartmentalized.⁵⁸ Our analysis therefore refers to case law from WTO dispute settlement bodies (DSB), the ICJ, the International Tribunal of the Law of the Sea (ITLOS), the ECtHR, the EU courts, and civil, administrative, and constitutional courts of various States. Nor have we limited our analysis to a continental European perspective; we also consider the most interesting elements of other jurisdictions such as the United States, Canada, Australia, and Brazil. In a world where ecological problems and our responses to them are undergoing ‘globalization’, leading to an increasing number of trade conflicts, jurists must bring to their analyses an understanding of developments in legal fields other than their own. Thus, rather than carry out an exercise in rigorous comparative analysis between national levels, we have chosen to focus—primarily but not exclusively—on international, EU, and selected national systems, in order to provide a global understanding of environmental law today.

3.2.3 The civil and common law families

The added value of this legal analysis comes from its sheer breadth as it covers legal systems belonging to both the civil law and the common law families. The challenge however lies in the significant difference between the roles that legal principles play within these two families.

Civil law jurisdictions are guided largely by statute law, whilst common law jurisdictions also recognize judge-made law as binding. Within civil law systems, judges are not allowed to create rules.⁵⁹ When adjudicating on a case, common law judges are firmly guided by the need to adhere to the doctrine of precedent, whilst civil law judges are not bound to follow precedents. For instance, in contrast to the approach followed by common law courts, a number of civil law courts apply

⁵⁸ A demonstration of this may be found in *Tătar*. In this case (*Tătar v Romania*, 67021/01, 27 January 2009), the ECtHR drew on long-standing developments within international practice, basing its decision on a variety of EU texts in concluding that the PP applies in relation to the right to privacy (ECHR, Art 8). Along the same lines, the NSW Land and Environment Court quoted extensively in *Telstra* the EU *Pfizer* case (Case T-13/99, *Pfizer* [2002] T:2002:209) with a view to supporting scientific rationality over a purely hypothetical approach to the risks of electromagnetic radiation. See *Telstra* (2006) 1456 LGERA 10, 38.

⁵⁹ See French C. civ., Art 5.

teleological rather than historical methods of interpretation in relation to treaties; they seek to give effect to what they 'conceive to be the spirit rather than the letter of the Treaties'.⁶⁰ This distinction has significant consequences for the concept of principles in both families. The concept of principles is analysed differently from civil and common law perspectives. Common law lawyers do not generally take legal principles as their starting point, but proceed by reference to specific cases. Conversely, civil law lawyers tend to start with principles before focusing on the individual facts of the case.

3.2.4 Monism and dualism

Since many of the principles analysed here are proclaimed in treaties concluded between States Parties, our analysis encounters a further difficulty. International law may have primacy over national law, or vice versa, depending upon whether the state in question embraces a monist or a dualist approach. For supporters of the dualist theory, only domestic provisions can apply within the national legal order, whereas on an international level there is international law, which stands alone. Since the two legal orders are separate, it is not possible to consider one to be superior to the other. On the other hand, if the monist approach of the unity of national and international law is embraced, the primacy of international law naturally follows. This gives rise to problems in terms of the hierarchical relationship between national and internal rules.

3.2.5 Environmental law and other legal branches

Environmental law cannot be understood in clinical isolation. For that reason, I was led to consider legal fields other than environmental law in order to respond to the emergence of the concept of sustainable development and the integration principle. We must not forget that environment law did not take root in virgin soil. Its areas of concern are widely shared, including by health, food, energy, land use, and consumer law. My analysis therefore accords wide scope to the concept of environmental protection, including aspects linked to natural resource management within a framework of sustainable development, as well as concepts linked to human protection (health, safety). I believe that contemporary political developments amply justify our approach. Indeed, given the growing importance of the PP, it is becoming increasingly difficult to separate problems of environment, food safety, and public health. Let us consider one example of this interaction: that of dioxins emitted by the incineration of household waste. This is a problem typical of waste disposal giving rise to atmospheric pollution; the environment thus becomes an issue early on. In addition, such dioxins are taken up by vegetation that is subsequently eaten by domestic animals, which are themselves a source of food.

⁶⁰ *Henn & Darby v DPP* (1981) AC 850, at 905 (per Lord Dipock).

At that point, concern about environmental management becomes a food concern, which in turn becomes a health problem. This example demonstrates the extent to which traditional boundaries between the legal disciplines of consumer protection, health, and the environment are breaking down.

3.2.6 Public law and private law

Dichotomy between public and private law in the field of environmental pollution is becoming increasingly outdated. Accordingly, our analysis is not limited itself to regulatory instruments (public law) but also devotes attention to the subject of civil liability (private law).

3.2.7 Hard law, soft law, and case law

I have sometimes emphasized instruments of soft law (e.g. the polluter-pays principle), at other times normative instruments or customary rules (e.g. the preventive principle), and at yet other times case law (e.g. the precautionary principle). There are a number of reasons for this. While it is difficult to understand the scope of the PPP without considering the various recommendations that define its application, it is impossible to form a precise idea of the impact of the precautionary principle without also examining the relevant case law. Of course, this study of how the three principles are used in different legal orders does not pretend to be exhaustive; our purpose is to provide the basis for analysing how they tackle ecological risk.

3.2.8 Human rights

Thus far, many scholars have failed to establish any link between environmental principles and a right to a clean environment. Obviously, this right is buttressed by policy guidelines expressed in the form of directing principles. Moreover, the implementation of these directing principles touches upon environmental justice, a theme that has made headway in the United States, but is still largely ignored in Europe. When environmental regulation is implemented or enforced, all people should be treated fairly regardless of race, colour, or income. As a result, no group of people should have to bear a disproportionate share of the adverse environmental impacts resulting from public policy choices. In doing this, structural injustice has to be properly accounted for (e.g. social redistribution of environmental tax revenues or progressive tax rates).

3.2.9 The relative importance accorded to each principle

At first glance, the manner in which we approach these three principles may appear somewhat unbalanced, as we consider the PPP largely within the context of the Organization for Economic Co-operation and Development (OECD) and the EU; the principle of prevention primarily in the framework of international law (duty diligence) and EU law (Environmental Impact Assessment (EIA), notification

procedures); and the PP much more broadly. Our reasons for this are as follows. These three principles did not arise simultaneously; nor did they appear with the same force in international law, EU law, and national legal regimes. Both OECD and EU institutions worked to disseminate the PPP from the early 1970s, with the goal of economic integration. The precautionary principle, on the other hand, did not appear until the late 1980s, when it found its way into a few international conventions and subsequently crept into EU law and the law of several EU Member States. The principle of prevention, for its part, appears at the international, EU, and national levels in a far more straightforward manner. Nevertheless, I have tried in Part I to follow the same structural approach for each principle, considering its origin, definition, and legal applications.

3.2.10 From positive law to legal theory: the need to blaze new trails

While environment law has been in existence for almost three decades, most legal studies display only a modest interest in theoretical questions. Taken up with the task of commenting on a truly impressive number of texts, environmental law experts have had little time to reflect upon the fundamental nature of a subject that has not yet reached maturity. I have tried, albeit imperfectly, to fill that gap by straying from the beaten path. I attempt to offer a vision of environmental law that is at once both comprehensive and critical. Faced with a multitude of texts, it is necessary to keep some distance by combining the critical consideration of the theoretician and the positivist view of the practitioner. In addition to considering the contribution made by three legal principles—the polluter-pays, prevention, and precaution principles—to the balance and dynamics of public policy, the first Part of this book develops a critical analysis of the epistemological bases of environment law, its relationship to science and technology, and its impact on the evolution of the concept of risk. This young legal discipline is both structurally complex and highly technical, in a state of rapid change yet applicable to a wide range of issues. On that basis, I seek in Part I to determine its essence using a multidisciplinary approach in which elements of ecology, economy, political science, legal theory, and positive law continuously interact.

The present work looks also to the future of both positive law and legal theory in an attempt to contribute to the understanding of the processes of rule-making in use today and, more fundamentally, to analyse deep and often contradictory changes that will have a profound effect on the development of our entire legal system. For this reason, Part II puts to the test several speculative analyses formulated in the context of general legal theory and seeks to assess an entire series of legal instruments used by environmental jurists, such as teleological methods of interpretation, a welfare right such as the right to protection of the environment, the principle of proportionality, and the codification of environment law as a branch of law. These instruments challenge classical doctrinal thinking in order to confront the problems being thrown up by a discipline that is nothing if not original.

Finally, scholars are deeply divided as regards the legal status of these principles. Whilst some scholars argue that they have no legal effect, others stress their revolutionary content. It goes without saying that many analyses are ideologically biased. To avoid these biases, it is important for a positivist to consider their status and legal effects through a positivist analysis.

PART I

THE POLLUTER-PAYS,
PREVENTION, AND
PRECAUTIONARY PRINCIPLES:
THREE APPROACHES
TO ENVIRONMENTAL RISK

Part I Introduction

The following chapters examine the origins, formulations, and applications of the three environmental law principles with the greatest relevance for international, European Union (EU), and national legal regimes: the polluter-pays, prevention, and precautionary principles. We then consider how these three legal principles can alter the dynamics of public policy and decision-making. Part I aims to clarify when and how these principles co-exist: complementing, enriching, and in some cases contradicting each other. To that end, we first describe each principle individually, followed by a comprehensive analysis of the close links among them. We give particular consideration to the difficulty of interpreting these principles as they have evolved within very different legal regimes.

Our consideration of international law, in addition to assessing multilateral conventions, also examines recent legal developments in the context of the World Trade Organization (WTO) and the European Convention on Human Rights (ECHR). In looking at the EU we give careful consideration to the case law of the Court of Justice of the EU (CJEU) and its General Court, which are particularly relevant. In the context of national law, we consider examples taken primarily from Western European legislation. Concomitantly, we evaluate a broad variety of legal instruments (civil liability regimes, environmental taxes, standards) used to implement these principles, and carefully assess the relevant case law in order to gauge their practical legal impact.

We have not, however, limited our analysis to an exclusively European perspective. A growing number of trade conflicts between the United States and Europe have the precautionary principle (PP) at their core. Thus we have also been at pains to demonstrate how US law, without explicitly declaring the PP, as some European States and the EU have done, may implicitly have recourse to this type of norm. Just as U.S. legal experts could become better acquainted with certain specific aspects of European law—which, except in the United Kingdom, is strongly marked by the presence of principles—so European jurists could usefully examine the way in which the applicable US law takes scientific uncertainty into account.

As a first step, we must consider the polluter-pays, prevention, and precautionary principles as driving forces behind the processes shaping environment policy and confronting environmental risk. As every principle represents a first step in ordering ideas, it must be considered from an epistemological perspective before it can be systematically analysed. In fact, these principles represent differing (but in many ways complementary) models of thought, each with its own historical

and sociological perspective and system of values. But before introducing those models we must first recall the profound changes in human thinking that have taken place during the twentieth century, when for the first time a temporal chasm opened between natural history and human history.

1. The Epistemological Break

For over a century industrial societies have viewed nature both as a rich reserve of resources and as a dump for the refuse produced by resource exploitation. Natural resources appeared inexhaustible, following Lavoisier's law: 'Nothing is lost.' Nature seemed to be endowed with an almost limitless capacity to assimilate and purify the waste produced by human societies. As Anglo-Saxon decision-makers are fond of stating, 'The solution to pollution is dilution.' Natural phenomena, taking their course, would eliminate production and consumption residues. Nature thus provided for all of humanity's needs and mitigated the excesses committed in the name of development. Perpetually renewed, it could patiently bear the errors of human activity. Cleared forests grew again; polluting substances were borne away by wind and water. And if for some reason pollution could not be absorbed immediately, there was always the possibility of eventual regeneration. Failing that, clean-ups could be carried out in the future, using the increased wealth and improved technical means which would be an inevitable consequence of growth. Thanks to progress, environmental degradation seemed not merely a necessary but also a correctable evil.

Now that human time has caught up with natural time, however, this beatific vision is outdated. It took five million years for *Homo sapiens* to make their appearance, but only five thousand years for them to create civilization and only one century for them to metamorphize into *Homo economicus*. Scientific and technical progress have allowed man rapidly to dominate nature, a veritable Prometheus Unbound. That domination is reflected in an economic system based on head-long growth, accompanied by accelerated ecosystem degradation. But at the same time a series of environmental catastrophes has begun to make clear that nature cannot continue to endure unbridled development. Ecosystems retain their age-old rhythms, cycles, and periodicities; the lightning progress of the twentieth century has shaken these systems to their foundations. We are now bearing witness to a collision between a timeless and imperturbable, but increasingly threatened, natural order and a system of human activity which is undergoing dramatic changes. There is no question which system will be the final victor.

The public authorities have, after a fashion, tried to stem the threats posed by this precipitous rush to growth. Interventionist in several other areas, the State could not continue to ignore ecological imbalances that threaten not just the quality of life, but life itself. Environmental policy thus developed as a reaction to

the excesses that accompany progress. But policy-makers intervened even before they saw catastrophe looming. Their intervention took place in stages, reflecting three successive models of thought.

A *curative model* of nature characterized the early stages of environment policy: nature could no longer cure itself; it should be helped to repair the damage inflicted upon it. For reasons of equity and feasibility, the authorities sought to apportion the economic cost of such intervention by requiring polluters to pay the cost of pollution. It soon became apparent, however, that this model was practicable only if accompanied by a *preventive policy* intended to limit reparation to what could be compensated. This marks the second stage of State action for environmental protection, during which risks are still predictable. The emergence of increasingly unpredictable risks is at present causing the authorities to base their policy on a third, *anticipatory model*. Although still in its early stages, this model should make it possible to slow the pace at which we are approaching major, but still uncertain, risks.

2. The Curative Model

The curative model counters the concept of nature as an inexhaustible resource reservoir. Its perspective is that natural resources are scarce and the wounds inflicted upon them will not heal without help. This model aims to eliminate the deleterious effects of over-exploitation, by decontaminating, re-introducing, cleaning up, restoring. If such actions are technically impossible, the destruction wrought in the name of progress must instead be compensated by providing or improving the protection accorded to as yet undamaged assets.

In this model, everything is seen as capable of being indemnified, replaced, repaid, compensated. Thus what has been polluted can be cleaned up; what has been destroyed can be restored; what cannot be safeguarded can be replaced, either by natural processes or through human action. Having proved unable to protect some resources, humans can always compensate for losses by protecting other resources.

Within this model, the intervention of State authorities is rather limited. The notion of environmental damages reparation is individualistic rather than collective. The principle of liability is central: the party responsible for damage must pay for its repair. Liability is clearly linked to the polluter-pays principle, since the person responsible for pollution is made to pay the cost of the resulting damage. By requiring the polluter to compensate the community for damage caused, the principle creates the economic conditions for reparation. It also allows the authorities to obtain the necessary financial resources in cases where they must substitute for defaulting polluters.

This model is inevitably open to criticism, which in effect says 'Pollute, then clean up.' It is merely an *a posteriori* response to a social problem. Considered in

isolation, it rapidly reaches its limits: the logic of compensation comes up against the difficulty of assigning clean-up costs to liable parties. As soon as environmental effects become too diffuse or reparation proves too costly, public authorities find it difficult to identify responsible individuals or to require them to reimburse the costs they have incurred.

The legal institutions typical of this first model are also characterized by serious ambiguities. These are clearly brought out in the theory of good neighbourliness (*théorie des troubles de voisinage*), the precursor to environmental law. According to this theory, those responsible for damage are liable for reparation even though they have been granted the authorizations needed to carry out polluting activities. Compared to the measures typical of a preventive policy, this theory has the attraction of setting few constraints on production activities, since pollution is tolerated as long as it does not cause abnormal damage. In other words, the polluter only compensates victims after damage has occurred and been seen to be excessive. That being the case, in the absence of individual victims the environment becomes the victim.

3. The Preventive Model

To be practicable, the curative model must be complemented by an administrative policy that sets standards aimed at preventing damage. Relying on the adage 'prevention is better than cure' seems simply a return to good sense. The physical repair of environmental harm is an uncertain operation, given the technical and economic possibilities currently available. Often, moreover, repair proves to be more expensive than prevention. Good sense therefore dictates that problems should be prevented from occurring in the first place and, once they have occurred, should be prevented from spreading. The preventive model becomes essential in cases where damage could be irreversible.

In reality nature is not the perpetually renewed, inexhaustible fount of riches imagined by nineteenth-century liberalism—an irresistible force which always returns to its pristine state. Numerous actions give rise to consequences that cannot be remedied: a tropical forest that has been cleared is permanently destroyed; an endemic species that has become extinct cannot be replaced, because it is unique; the irradiation of the ground around Chernobyl will not dissipate for thousands of years... In each of these cases, the reversal of destruction is definitively excluded. If some form of compensation can generally be envisaged (e.g. protecting one forest in the place of another which has been cleared) such remedies are always uncertain and makeshift, as well as expensive: the loss of any given ecosystem cannot be made good. Moreover, there is no guarantee that future generations will possess the means to efface the scars of the price paid for progress. 'Avoid the irreparable' must be the catchphrase.

Although it breaks down into a mosaic of general and special policies, the preventive model claims to be effective in minimizing risk while at the same time tolerating a certain degree of nuisance. Even though nature is vulnerable, it should be possible under the preventive model to exploit it without abusing it. This requires the prudent exploitation of natural resources in order to avoid the risk of unexpected damage that might be irreparable, owing either to its irreversible character or the limits inherent in compensation regimes. Within the preventive model, ecological damage should no longer be able to occur except accidentally—the dark side of scientific and technological progress. Being a rare occurrence, damage should be easy to remedy. Even if preventive measures do not totally avoid ecological damage, they at least have the merit of reducing risk to controllable levels.

In an effort to limit damage as far as possible, the preventive model must rely heavily on science and scientific expertise in order to establish some type of objective assessment of the risks being run. This schema is squarely grounded in the notion that science can determine with certainty and precision what level of damage will not compromise the restoration of ecosystems and their species. Under this ‘assimilative’ approach, the renewal of natural resources can be assured even while exploitation continues; loss would only occur once the self-cleaning capacity of ecosystems was exceeded. If one cannot eliminate all risks, they will at least have been reduced to the point where they may be dealt with collectively through indemnification funds.

Yet if prevention draws its force from scientific knowledge, it also comes up against the limits inherent therein. Where a risk is known preventive measures may be reasonably effective, since they address cause. However, we can only prevent what we understand; it is difficult to prevent a problem that is not understood, and even more difficult to prevent the unknown. And there, precisely, is the rub. The preventive model has a blind faith in science; for that reason it cannot prevent environmental degradation.

4. The Anticipatory Model

The emergence of a third model can be traced to the disenchantment with classical scientific culture, which, convinced of the linear nature of the universe, as predictable as the path of a cannon-ball, can find a remedy for any problem. Scientific predictability comes up against staggering limits in the field of environment.

The destructive effects of chemical substances, such as DDT and PCBs on wildlife or CFCs on the ozone layer, for example, could not be understood until these substances had been discovered. In many cases, moreover, scientists can only admit to ignorance. As the science of climatology advances, it becomes increasingly difficult to explain trends in global warming; as scientists discover new facts about how ecosystems operate, they find it increasingly difficult precisely to evaluate the scope

and tempo of biodiversity loss. Contemporary science cannot deliver certainty; at the end of the day it throws up more questions than it solves. To some extent, the more science learns, the more it understands the limits to its knowledge.

Eventually, the only certainty is uncertainty. What was true in the past is not necessarily true any longer; what is accurate at the local level is not necessarily so at the global level; today's predictions will not necessarily come to pass. Metamorphosed into a 'factor for revealing uncertainty', science raises suspicions and doubts as often as it offers knowledge. In any case, our understanding of the environment is no longer able to keep pace with our ability to modify it, and this gap widens when it comes to controlling environmental impacts. The entire foundation of the 'assimilative' approach, which rests upon a blind confidence in science, is thus crumbling under the pressure of uncertainty.

This new model of conduct only came into effect once environmental damage had become planetary in scope. Lulled by promises of an increasingly certain world, Western civilization was brutally awakened at the beginning of the 1980s by the proof of unexpected vulnerability. Since then global threats have taken on a clearer, more precise form. Serious and irreversible damage that could have been avoided has occurred. Changes are unparalleled in their severity. The litany is alarming: climate change, destruction of the stratospheric ozone layer, sea-level rise, poisoning of freshwater resources, ecosystem acidification, destruction of biological diversity, overexploitation of marine resources, increased technological risks, overpopulation, desertification . . . Scientific hypotheses until recently, these effects have in the space of a few years become the subject of global concern.

The fear we thought we could throw off by adopting a preventive approach combined with guarantee mechanisms has returned in a new guise. The threat is no longer local, but global; it is not individual, but collective and inescapable. Human history disrupted natural history; now the latter—rewritten by the hand of catastrophe—may in turn modify the course of human history. The certainty that we would witness the dawn of a radiant age where risks have been completely mastered has been succeeded by the spectre of a precarious future. Doubt clouds the positivist dream of a society governed by certainty of what is true and what false. The contemporary world is discovering the age of risk.

The mere possibility of rapid and possibly irreversible modifications to the physical environment justifies the demand that such risks need to be anticipated. This is the context in which a new anticipatory model based on the PP is emerging. In future, uncertainty should no longer delay the adoption of measures intended to anticipate environmental degradation. Precaution serves to prevent delay under the pretext that the true nature of risks is not known. Inversely, it serves to brake precipitate action, by urging delay in executing projects whose risks have not been sufficiently well identified. Precaution thus takes the form of an injunction against action when the nature of risk has not been clearly identified and of an obligation to refrain from action when such action might threaten the environment. This is a

true Copernican revolution, whereby uncertainty becomes a central element of a decision-making process which formerly only recognized certainties.

By considering an uncertain future, the PP situates itself within a time dimension that has been conspicuously absent from earlier models. Yet this element is crucial; decisions taken today can no longer disregard ecological consequences, whose complexity is becoming increasingly clear as our knowledge advances. Environmental management decisions taken today will have effects beyond the boundaries of a political mandate, legislature, or human life. To regulate environmental effects in the present thus in fact amounts to regulating in haste. Recourse to the PP is therefore justified by consideration of the long term. From now on, time must be given time. This change in our perception of time will of course be reflected in a change of style: today's choices must also reflect a still uncertain future.

The three principles examined in the first part of this book correspond to the three models described above. However, the chronological order in which we present them here does not necessarily tally with their historical evolution, which is not cut and dried. In fact, the process could more precisely be termed superposition rather than succession, to the extent that the appearance of a new model does not lead to the elimination of earlier models. We are therefore describing ideal types rather than clearly defined empirical structures. Nevertheless, these models have a heuristic value, allowing us to discern the evolution in thinking which has inspired the appearance of major environmental law principles.

1

The Polluter-Pays Principle

1. Introductory remarks

The use of environmental goods typically gives rise to what economists call externalities, which may be either positive or negative.

Farmers living near a well-maintained forest benefit from reduced erosion and flooding and from wells that do not run dry. Yet the owner of the forest cannot charge for these benefits. The farmers are thus enjoying positive externalities.

On the other hand, negative externalities arise when the production or consumption of goods or services damages environmental goods without that damage being reflected in their price. For example, excessive use of fertilizers and pesticides, run-off of these into water, and over-abstraction of groundwater are not reflected in the price of agricultural produce. In this case, consumers benefit from market prices that do not reflect the true cost of their economic activity, becoming free riders at the expense of the environment.

The English economist Pigou argued that such external costs should be ‘internalized’: that is, integrated into the price of the goods or services in question, by charging those responsible for them. As long as these costs remain hidden, markets will react to distorted price signals and make inefficient economic choices.¹

The polluter-pays principle (PPP) is an economic rule of cost allocation whose source lies precisely in the theory of externalities. It requires the polluter to take responsibility for the external costs arising from his pollution. Internalization is complete when the polluter takes responsibility for all the costs arising from pollution; it is incomplete when part of the cost is shifted to the community as a whole. In all cases, the principle involves intervention by the public authorities. There are two ways to ensure that prices reflect the true cost of production and consumption: taxation that corresponds to the estimated economic value of the environmental damage, and regulatory standards to prohibit or limit the damage associated with an economic activity.

While the theory of externalities is a traditional subject of economics, the PPP is rarely acknowledged or recognized outside of the Organisation for Economic Co-operation and Development (OECD) and European Union (EU) texts which we consider below.

¹ AC Pigou, *The Economics of Welfare*, 2nd ed (Macmillan, 1924). For an application of this thesis in the ecofiscal area, see A Paulus, *The Feasibility of Ecological Taxation* (Maklu, 1997) 27.

On the other hand, the Coase theorem—which excludes polluter-pays elements—has been the subject of much recent debate. It states that under certain assumptions, such as low or zero transaction costs resulting from the availability of information to parties, it is as efficient to allow the victim of pollution a right to compensation as it is to recognize the polluter's right to pollute.²

Given that the polluter and the user compete for the same limited natural resources, there is no reason why the interests of one should outweigh that of the other. To the extent that each is ready to pay for use of a resource, they will naturally be inclined to conclude a transaction with a view to reducing pollution in order to reach optimal economic efficiency. For Coase, the question of externalities may thus be resolved through the attribution of ownership rights over natural resources.

If the polluter holds a right to pollute, it will be up to the victims to pay him to cease or reduce his activity. On the other hand, the polluter will have to compensate any party suffering from the pollution that has been assigned exploitation rights if he is to benefit from the resource in question. The attribution of ownership rights over a natural resource modifies the allocation of revenues without affecting the final result in terms of efficiency.

By rejecting intervention by public authorities in favour of free negotiation, the Coase theorem constitutes an apology for the liberal doctrine of *laissez-faire*. However, its practical significance is limited by a set of prerequisites: negotiation can only succeed if the rights of the parties are clearly defined, information is complete and reciprocal, and transaction costs remain negligible.³ As Coase himself recognized, these conditions are rarely fulfilled.⁴

In any case, the theorem raises considerable difficulties of both a theoretical and a practical nature. By focusing on the compensation due to victims, it eclipses the preventive dimension of Pigou's theory of externalities. It also neglects the important role played by the public authorities that authorize access to natural resources. Given that the theorem presupposes a limited number of identifiable parties, it becomes impractical when it comes to products that are widely marketed.⁵ Finally, by failing to recognize that much environmental damage is independent of time, it ignores the needs of future generations.

With its origins in economic theory, the PPP has progressively moved beyond the sphere of good intentions and scholarly commentary to become a frame of reference for law-makers. It is the essential conceptual basis for a range of legal

² R Coase, 'The Problem of Social Cost' III (1960) *JL & Econ* 1–44.

³ H-C Bugge, 'The Principle of Polluter-Pays in Economics and Law', in E Eide and R Van den Bergh (ed), *Law and Economics of the Environment* (Juridisk Forlag, 1996) 63.

⁴ R Coase, *The Firm, the Market and the Law* (University of Chicago Press, 1988).

⁵ H-C Bugge, C Dalhammar, and E Maitre-Ekern, 'Developing Legislation to Prevent Environmental Damage from Products', in H-C Bugge, C Dalhammar, and E Maitre-Ekern (eds), *Preventing Environmental Damage from Products* (CUP, 2018) 12.

instruments at the core of environmental legislation and has been used as an element of interpretation by the courts. We review its background below (Section 2) and detail various aspects of its content (Section 3) and analyse its effects on positive law, particularly from the perspective of taxation and civil liability (Section 4).

2. Origin of the principle

Following a brief summary of the form the principle takes in international law (Subsection 2.1) we consider in greater detail its progressive acceptance in the work of two economic organizations: the OECD and the EU (Subsection 2.2). This section ends with a brief description of the principle's role in national legal regimes (Subsection 2.3).

2.1 International law

Besides having been adopted by the OECD and the EU, the PPP has been expressly recognized in a number of multilateral environment agreements (MEAs). Nevertheless, a distinction should be drawn between those conventions that proclaim the principle in their preambles (in this case, the role of the PPP is merely to interpret the more precise norms contained in the convention) and those conventions that affirm the principle in an operative provision (in which case the principle is binding).

The principle is found in the preambles of the 1980 Athens Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (as amended in Syracuse on 7 March 1996); the 1990 OPRC Convention; the 1992 Helsinki Convention on the Transboundary Effects of Industrial Accidents; the 1993 Lugano Convention on Civil Liability for Damage Resulting From Activities Dangerous to the Environment; and the 2000 London Protocol on Preparedness, Response, and Co-operation to Pollution Incidents by Hazardous and Noxious Substances.

In its binding form, the principle is found in the operative provisions of the 1985 ASEAN Agreement on the Conservation of Nature and Natural Resources;⁶ the 1991 Convention on the Protection of the Alps (hereinafter the Alps Convention);⁷ the 1992 Porto Agreement to establish the European Economic Area (EEA);⁸ the 1992 OSPAR Convention;⁹ the 1992 Helsinki Convention on the Protection and

⁶ Art 10(d).

⁷ Art 2(1).

⁸ Art 73.

⁹ Art 2.2(b).

Use of Transboundary Watercourses and International Lakes;¹⁰ the 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area (hereinafter the Baltic Sea Convention);¹¹ the 1994 Agreements concerning the Protection of the Scheldt and Meuse Rivers (hereinafter the Scheldt and Meuse Conventions);¹² the 1994 Convention on Co-operation for the Protection and Sustainable Use of the Danube River (hereinafter the Danube Convention);¹³ the 1976 Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (as amended in 1995);¹⁴ the 1996 London Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter;¹⁵ and the 1998 Rotterdam Convention on the Protection of the Rhine (hereinafter the Rhine Convention).¹⁶

Unlike the principles of precaution and prevention, the costs to be internalized under the PPP are not qualified by any specific threshold.¹⁷

In addition, according to other treaties,¹⁸ the polluter has primary responsibility for environmental harm and is directly accountable in national law. Liability conventions represent a sophisticated attempt to minimize resort to principles of State responsibility: applying the PPP in private law, they must be seen as an alternative to State responsibility in international law.¹⁹ By way of illustration, pursuant to the International Law Commission (ILC) Principles on Allocation of Loss, the obligation to compensate victims lies with operators of hazardous activities rather than source States, regardless of the fact that the State authorities have fulfilled their obligation of due diligence under international law. However, the victim may not obtain compensation, or may not obtain it in full, if the liability of the operator cannot be established or has been limited. In order to give full effect to the PPP with a view to enhancing the protection of victims, the source State should *de lege feranda* be held liable on a residual basis. The contribution to compensation of victims by States other than the source State or through the creation of an inter-State compensation arrangement must therefore be rejected, as such regimes find no support

¹⁰ Art 2.5(b).

¹¹ Art 2(5).

¹² Art 3(2)(d).

¹³ Art 4(4).

¹⁴ Art 4(3)(a).

¹⁵ Art 3(2).

¹⁶ Art 4.

¹⁷ J Viñuales, 'The Rio Declaration on Environment and Development', in J Viñuales (ed), *The Rio Declaration on Environment and Development* (OUP, 2015) 41.

¹⁸ For example, Annex III, Art 22 of the 1977 London Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources (not in force); Art 8 of the 1998 Wellington Convention on the Regulation of Antarctic Mineral Resource Activities (not in force).

¹⁹ A Boyle, 'Making the Polluter Pay?', in Fr Franzioni and T Scovazzi (eds), *International Responsibility for Environmental Harm* (Graham & Trotman, 1991) 363.

in the PPP. If the source State is held liable on a residual basis, it could always seek redress from the operator.²⁰

At the 1992 Rio Conference, the principle was incorporated into Agenda 21²¹ and the Rio Declaration on Environment and Development. The Declaration's Principle 16 states that:

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Yet this soft-law definition which is expressed 'in aspirational rather than obligatory terms'²² is much less progressive than those previously set out by the OECD and the EU or contained in the 1992 Baltic Sea Convention or the 1992 OSPAR Convention.²³ Devoid of any precise normative content ('should endeavour to promote', 'in principle'), Principle 16 is also dependent upon economic requirements for its application, since it may not 'distort international trade and investment' and is only applicable in a national context by reference to national authorities.

The fact that these treaty obligations and soft-law instruments which have expressly recognized the PPP are relatively recent and generally limited to a purely regional application has led some authors to question whether, in the current state of international law, the PPP may be considered to constitute a rule of customary international law.²⁴

That said, the principle should nonetheless generate renewed interest as awareness of the close relation between development and environmental protection grows in light of the concept of sustainable development. In addition, the need for recourse to economic instruments is increasingly being felt, and these are largely justified by the PPP. From a theoretical standpoint, generalization of the principle offers an ideal response to concerns that countries which apply lower protection standards will derive competitive advantage therefrom. If all countries were to

²⁰ R Lefevre, *Transboundary Environmental Interference and the Origin of State Liability* (Kluwer Law Int'l, 1996) 299–311, 322–3, 310.

²¹ Paras 30.3 and 2.14 of Agenda 21 endorse the PPP at least implicitly by requiring that the price of goods and services should reflect environmental costs.

²² A Boyle and D Freestone, *International Law and Sustainable Development* (OUP, 1999) 4.

²³ Moreover, the Rio Declaration provision refers to the polluter-pays as an approach rather than a principle.

²⁴ Boyle, 'Making the Polluter Pay?' (n 19) 376. The arbitral tribunal in the *Rhine Chlorides* case held that the PPP 'operates at various levels of effectiveness' and is not currently part of 'general international law'. See *Case Concerning the Auditing of Accounts Between the Kingdom of the Netherlands and the French Republic pursuant to the Additional Protocol of 25 September 1991 to the Convention on the Protection of the Rhine Against Pollution by Chlorides of 3 December 1976 (Netherlands v France)* PCA [2004].

ensure that environmental costs are fully reflected in industrial production costs, environmental cost differentials among nations would exclusively and legitimately reflect differences in local conditions.²⁵ Yet the implementation of the principle at a global level entails serious practical problems.

Finally, we would recall that General Agreement on Tariffs and Trade (GATT) provisions are *a priori* neutral concerning adoption of the principle. In the *US Chemicals* case, the EU argued that a US tax on certain chemicals was not eligible for border tax adjustment because the taxation regime was contrary to the PPP, as it was designed to finance environmental programmes which benefited only US producers. Since it was US production that was causing pollution in North America, the EU believed that the principle required the US to tax domestic products only. The Panel found that since the tax was directly imposed on products, it was eligible for border tax adjustment independent of its purpose. The Panel further noted that States were free to tax the sale of domestic products that are harmful to the environment and to exempt competing foreign products that would be less harmful. Thus, GATT rules on tax adjustment 'give the contracting party ... the possibility to follow the polluter-pays principle, but they do not oblige it to do so'.²⁶

2.2 Regional economic integration organizations

The fact that the presence of the PPP in a series of international conventions is a relatively recent phenomenon should not disguise the importance of the work undertaken within the OECD and the EU over the past three decades, which has transformed a mere economic rule into a true legal principle, as it gradually shifts from soft law (OECD and EU recommendations) to hard law (treaties and EU secondary law).

2.2.1 The Organization for Economic Co-operation and Development (OECD)

The PPP was first adopted at international level in the 1972 OECD Council Recommendation on Guiding Principles concerning International Aspects of Environmental Policies.²⁷ In its 1974 Council Recommendation on the Implementation of the PPP, the Council recommends Member countries 'not to assist the polluters in bearing the costs of pollution control whether by means

²⁵ D Esty and D Gerardin, 'Environmental Protection and International Competitiveness: A Conceptual Framework' 32 (1998) JWT 44-5. However, the Preambles of the 1990 OPRC Convention, the 1992 Convention on the Transboundary Effects of Industrial Accidents, and the 2000 Protocol on Preparedness, Response, and Co-operation to Pollution Incidents by Hazardous and Noxious Substances describe the PPP as a 'general principle of international law'.

²⁶ *United States-Chemicals Tax* GATT BISD 34S/136 (1987).

²⁷ C (72) 128 (final), OECD, 1972.

of subsidies, tax or advantages.²⁸ While it was meant to help do away with State aids by establishing a mechanism ‘for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources’, it was not intended to eliminate all forms of pollution. Indeed, according to both Recommendations, the polluter should only ‘bear the expenses of carrying out the above mentioned measures decided by public authorities to ensure that the environment is in an acceptable state.’²⁹ The PPP thus guaranteed only partial internalization of environmental costs; it was not intended to oblige polluters to assume the full consequences of their acts.

After a long period of calm—it was not until the end of the 1980s that the principle experienced a revival within the OECD—a new advance occurred when the OECD Council decided, in a 1989 Recommendation on the Application of the PPP to Accidental Pollution, that the principle would no longer be limited to chronic pollution.³⁰ Henceforth, the cost of measures to prevent and combat acts of accidental pollution should be charged to all potential agents, regardless of their actual contribution to the pollution. However, internalization of the cost of accidental pollution was still not complete; the polluter was only required to bear the cost of ‘reasonable measures’ taken by the authorities. This was nevertheless a significant advance in that it obliged potential polluters to cover the expense of remedying accidental pollution, which traditionally fell to public authorities.³¹

An additional step forward was taken in 1991, when the OECD Council admitted, in its Recommendation on the Uses of Economic Instruments in Environmental Policy, that ‘a sustainable and economically efficient management of environmental resources’ requires internalization of the costs of pollution prevention and control measures as well as damage costs.³² Again, this represents an important step forward: the polluter must henceforth take responsibility not only for measures to prevent and control pollution (e.g. treatment plant construction) as well as the associated administrative costs (such as monitoring) but also the cost of damage arising from the pollution (for instance, clean-up costs). Even if the principle’s evolution is not yet complete, we can see it moving in the direction of full internalization of pollution costs.

2.2.2 The European Union (EU)

The PPP has gradually commanded recognition as one of the pillars of the EU’s environment policy; the EU has rapidly fallen into step with the Recommendations adopted by the OECD Council, clarifying the principle in a series of

²⁸ C (74) 223 (final), OECD, 1974.

²⁹ 1972 Recommendation, Annex A (a)(4); 1974 Recommendation, I(2).

³⁰ C (89) 88 (final), OECD, 1989.

³¹ S Gaines, ‘The Polluter-Pays Principle: From Economic Equity to Environmental Ethos’ 26 (1991) *Texas Int’l LJ* 463.

³² C (90) 177 (final), OECD, 1991.

recommendations and resolutions and subsequently granting it legal effect. A brief review of that evolution is in order at this point.

The procedures for applying the principle were specified in Recommendation 75/436/ Euratom, ECSC, EEC of 3 March 1975 regarding cost allocation and action by public authorities on environmental matters, which broadly takes up the rules elaborated by the OECD (hereinafter Recommendation 75/436). Forty-five years later, this Recommendation remains indispensable for understanding the significance of the PPP. National courts are bound to take that Recommendation into consideration in order to decide disputes submitted to them, in particular where the recommendation casts light on the interpretation of national measures adopted in order to implement the PPP.³³

According to Recommendation 75/436:

natural or legal persons governed by public or private law who are responsible for pollution must pay the costs of such measures as are necessary to eliminate that pollution or to reduce it so as to comply with the standards or equivalent measures which enable quality objectives to be met or, where there are no such objectives, so as to comply with the standards or equivalent measures laid down by the public authorities.

The polluter is defined as whoever 'directly or indirectly damages the environment or who creates conditions leading to such damage'. The main instruments available to the public authorities for putting the PPP into effect are *standards* and *charges*.

Typically, *standards* are policy measures of a preventive nature which have no direct link *a priori* with the theory of externalities that guides the principle under which the polluter pays. The Recommendation distinguishes between standards relating to environmental quality, procedure, and products. The first type of standards prescribes, through legally binding means, the levels of pollution and nuisance that may not be exceeded for a given medium. The second group refers to the operations and discharges of polluting installations. The last group sets out the ecological characteristics of products. These standards will be related to the principle of prevention in the following chapter.

By contrast, *charges* implement the theory of externalities to the extent that they include any type of financial instrument that requires the polluter to assume his share of the costs in controlling the pollution he has caused.³⁴

Charges also have a preventive dimension, since they are primarily intended to 'encourage the polluter to take the necessary measures to reduce the pollution he

³³ Case C-322/88 *Grimaldi* [1989] ECR I-4407, para 18.

³⁴ It should be noted that this definition of charges has its basis in economic science; positive law assigns it a much more restricted scope. For instance, in EU law a *charge* is recompense for a service actually rendered to the importer or exporter of a product, which falls outside the scope of the prohibitions contained in TFEU, Art 28.

is causing as cheaply as possible'. It is only as a secondary consideration that they may have a redistributive character, which consists in making the polluter bear 'his share of the costs of collective measures'.

Finally, we should note that the principle does not have absolute effect since it is subject to several exceptions analogous to those allowed within the OECD. Where the application of charges or overly stringent standards gives rise to serious economic disturbances, polluters may be granted limited aid by the public authorities, as well as transition periods to allow them to adapt their products or production processes.

Subsequent to the Recommendation of 3 March 1975, the PPP recurred in all Environmental Action Programmes, with minor variations in meaning.

Since 1987, the PPP is enshrined in Article 191(2) of the Treaty on the Functioning of the European Union (TFEU), which states that 'action by the Union relating to the environment shall be based on the principle that the polluter should pay'.³⁵ Like its fellow principles of prevention and precaution, the PPP is meant to guide the definition and implementation of EU environment policy. The Treaty confirms its essential role by recalling in Article 192 that the PPP continues to apply even when the law-maker uses its power to grant a temporary derogation to rules it has enacted on behalf of Member States for whom EU measures would involve costs that are judged disproportionate. The 1992 Porto Agreement creating the EEA also states that 'action by the Contracting Parties relating to the environment shall be based on the principle that the polluter should pay'.

In addition, several secondary law provisions have given concrete expression to the PPP, in particular in the field of waste³⁶ and water management,³⁷ landfilling,³⁸ as well as the combat against alien species.³⁹ As Directive 2004/35/EC on environmental liability (ELD) is 'founded' on both the PPP⁴⁰ and the precautionary principle (PP),⁴¹ the former principle has been invoked to justify a strict liability

³⁵ In contrast to the English version, the other linguistic versions of the TFEU emphasize the binding nature of the PPP.

³⁶ Pursuant to Art 14 of the 2008/18 Waste Framework Directive (hereinafter the Waste FD), 'in accordance with the PPP, the costs of waste management are to be borne by the original waste producer or by the current or previous waste holders'. By the same token, the PPP 'implies that the operator of a hazardous installation should bear the costs'. See OECD Council, *Recommendation Concerning the Application of the PPP to Accidental Pollution*, 1989, para 4.

³⁷ 'Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs ... in accordance in particular with the PPP' (Framework Directive 2000/60/EC on water (hereinafter the Water FD), Art 9(1)).

³⁸ The cost of waste disposal include all operation costs, including financial guarantees and restoration of the site once it ceases to be used for disposal (Directive 1999/31/EC on the landfill of waste, Art 10).

³⁹ State authorities are called on, in accordance with the PPP, 'to recover the costs of the measures needed to prevent, minimize or mitigate the adverse impact of invasive alien species, as well as the restoration cost' (Regulation 1143/2014 on the prevention and management of the introduction and spread of invasive alien species, Art 21).

⁴⁰ Art 1. See also Recitals 2 and 18 of the preamble.

⁴¹ Case C-129/16 *TTKft* [2017] C:2017:547, para 53.

regime. It must be noted that the ELD does not establish a genuine liability regime given that, first of all, compensation for private parties is expressly excluded⁴² and, secondly, it straddles the divide between civil and administrative law. Since the ELD ventures into ‘highly sophisticated national legal and doctrinal traditions,’ it will come as no surprise that, despite a lengthy gestation period, it has left a variety of unresolved conceptual puzzles.⁴³

However, the principle can have only limited application in other areas, such as nature conservation.⁴⁴ Moreover, it cannot override general principles of EU law, such as the free movement of goods.⁴⁵

2.2.3 The World Bank and the International Monetary Fund (IMF)

The PPP is likely to experience a revival thanks to the development of climate change policies. In October 2019, fifty Finance Ministers committed to endorsing a fiscal policy grounded in the PPP with the aim of making polluters pay for carbon emissions through taxes, trading schemes, and reduced fossil-fuel subsidies.⁴⁶

2.3 National laws

The PPP exercises a significant influence on the evolution of national laws, given that many law-makers have expressly recognized it as a guiding norm of environment policy. This is particularly the case for Belgian⁴⁷ and French law,⁴⁸ which define the principle as that ‘according to which the costs resulting from measures to prevent, reduce and control pollution should be borne by the polluter.’ In requiring that ‘everyone shall be required, in the conditions provided for by law, to contribute to the making good of any damage he or she may have caused to the environment,’ the French Constitutional Charter for the Environment does implicitly refer to the PPP.⁴⁹ Sometimes the principle takes a slightly different form. In German law, as well as in the German version of the TFEU, it is translated as the

⁴² Arts 2(1) and 3.

⁴³ G Winter et al, ‘Weighing up the EC Environmental Liability Directive’ 20:2 (2008) JEL 163.

⁴⁴ Habitats Directive 92/46, Preamble.

⁴⁵ In condemning a prohibition on the export of waste oils outside of France as incompatible with Art 34 TFEU, the Court of Justice of the EU (CJEU) rejected the economic argument invoked by the French authorities that an export ban was needed to avoid bankrupting recycling firms, since under the Waste Oils Directive Member States ‘may, without placing restrictions on exports, grant to such undertakings “indemnities” financed in accordance with the PPP’ (Case C-172/82 *Inter-Huiles* [1983] ECR 555, para 18).

⁴⁶ Coalition of Finance Ministers for Climate Action. Helsinki Principle 3 (World Bank Group, Washington, 2019).

⁴⁷ 1995 Flemish Act containing general provisions concerning environmental policy, Art 1.2.1, §2; Walloon Environmental Code, Art D.3(2); 1999 Federal Act concerning protection of the marine environment in marine areas under Belgian jurisdiction, Art 4.

⁴⁸ Environmental Code, Art L 100-1.

⁴⁹ Art 4.

causality principle (*Verursacherprinzip*),⁵⁰ the *Verursacher* is the responsible party, and not necessarily the polluter as such.⁵¹ In the Swiss legal system, the federal law on environmental protection envisages a causality principle by virtue of which 'the costs resulting from measures required under this law are to be borne by the person who has caused the damage.'⁵² German doctrine considers that, in conformity with Article 20(a) of the Federal Constitution, the principle of collective burden sharing (*Gemeinlastprinzip*) deduced from the principle of the social State should give way to the PPP (*Verursacherprinzip*) in the field of environment policy, whereby those responsible for pollution finance public policies in this area. Communities should not have to bear the responsibility for the costs of pollution, except in cases where the PPP cannot be implemented owing to practical circumstances.⁵³ Furthermore, the explanatory memoranda of numerous regulations relating to tax arrangements, civil liability, waste management, company subsidies, and economic instruments confirm the growing success of the PPP at the national level.

Other States have enacted legislation to put the PPP on a statutory footing. The law in Canada obliges the courts to order polluters to pay for the cost of environmental harm, irrespective of the lawfulness of the polluting activity at issue.⁵⁴ In *Imperial Oil*, the Supreme Court (SCt) of Canada held that the Quebec Environment Quality Act, which sets out the PPP, allows for the exercise of broad discretion by the Minister for the Environment, who may order a site characterization study that may also include appropriate decontamination measures.⁵⁵ During the 1990s, the principle was also specifically addressed in several judgments of the Indian SCt.⁵⁶ In particular, that court held that a principle of absolute liability could be inferred from the PPP.⁵⁷ As 'the law of the land', the PPP requires that if a hazardous activity is carried out by any person, 'then such a person is liable to make good for the loss caused to the other person, irrespective of the fact whether he took reasonable care while carrying on his activity.'⁵⁸

⁵⁰ This principle has been the subject of much doctrinal analysis. See M Kloepfer, 'Die Prinzipien im einzelnen', in *Umweltrecht* (Munich, 1989) 83; B Bender, R Sparwasser, and R Engel, *Umweltrecht: Grundzüge des öffentlichen Umweltschutzrechts* (R. Müller) 27.

⁵¹ L Krämer, 'The Polluter-Pays Principle in EC Law', in L Krämer (ed), *Focus on European Law* (Graham & Trotman, 1997) 1.

⁵² 1983 Federal Law on environmental protection, Art 2.

⁵³ D Murswiek, 'Der Bund und die Länder: Schutz der natürlichen Lebensgrundlagen', in M Sachs (ed), *Grundgesetz Kommentar* (Beck'sche Verlagsbuchhandlung, 1996) 661.

⁵⁴ *Imperial Oil Ltd v Quebec (Minister of the Environment)* [2003] 2 SCR 624, 2003 SCC 58; *St Lawrence Cement Inc* 2008 SCC 64.

⁵⁵ *Imperial Oil Ltd* (n 54).

⁵⁶ The PPP has become 'part of the environmental law' of India (*Vellore Citizens Welfare Forum v Union of India* (1996) 5 SCC 647. See L Kurukulasuriga, 'UNEP Regional Symposia on the Role of Judiciary in Promoting the Rule of Law in the Area of Sustainable Development' 10 (1999) YbIEL 761.

⁵⁷ *M.C. Mehta v Union of India; Indian Council for Enviro-legal Action and Others v Union of India* (1996) 3 SCC 212.

⁵⁸ *Ibid.*

3. Systematic analysis

The apparent simplicity of the PPP masks a number of ambiguities and its outlines continue to be poorly defined at the legal level. In this section we synthesize the main analytical controversies concerning the principle. These are twofold: they concern, on one hand, the function of the principle, and on the other hand, identification of the polluter and what he must pay.⁵⁹

3.1 The functions of the principle

The history of the PPP reflects a gradual shift in meaning. At first, the Recommendations of the OECD and the EU referred to the principle as a means of preventing the distortion of competition (instrument of harmonization intended to ensure the smooth functioning of the internal market); later it formed the basis both for internalizing chronic pollution (instrument of redistribution) and preventing it (instrument of prevention); finally, it served to guarantee the integrated repairation of damage (curative instrument). In fact, the PPP can fulfil a number of functions in embracing the costs of 'remediating pollution', the costs 'arising from the implementation of a policy of prevention', as well as the administrative costs related to the control of the polluting activity.⁶⁰ These various functions are at times complementary and at other times mutually exclusive.

3.1.1 The function of economic integration

Since the early 1970s the OECD and the EU have justified recourse to the PPP to prohibit State aids from being used to finance antipollution investments. The 1972 OECD Recommendation on Guiding Principles Concerning International Economic Aspects of Environmental Policies stated that the principle was to be used 'to avoid distortions in international trade and investment'. In addition, according to the Community Environmental Action Programmes of the 1970s, exceptions to the PPP must 'cause no significant distortion to international trade and investment'. Allowing private enterprises to benefit from public assistance in financing such investments would obviously have run counter to the doctrine of

⁵⁹ Several analyses have been devoted to the legal effect of the polluter-pays principle. See M Meli, 'Le origini del principio "chi inquina paga" e il suo accoglimento da parte della comunità europea' 2 (1989) Riv Giur Amb 217; U Kettlewell, 'The Answer to Global Pollution? A Critical Examination of the Problems and Potential of the Polluter-Pays Principle' 3 (1992) Colo J Int'l Env L & Pol'y 431; H Smets, 'The PPP in the Early 1990s', in L Campiglio et al (eds), *The Environment after Rio: International Law and Economics* (Graham & Trotman, 1994) 131; X Thunis and N de Sadeleer, 'Le principe du pollueur-payeur: idéal régulateur ou règle de droit positif?' (1995) Amén-Env 3; JE Hoitink, 'Het beginsel de vervuiler betaalt: "revival" van een milieubeginsel', in P Gilhuis and AHJ Van den Biesen (eds), *Beginselen in het milieurecht* (Kluwer, 2001) 41–54.

⁶⁰ Opinion of AG Léger in Case C-293/97 *Standley* [1999] ECR I-2603, paras 93, 97.

free trade promoted by both economic organizations, since such aids distort competition between beneficiary firms and their competitors. Consequently, exceptions to this prohibition were authorized only in exceptional circumstances and on the condition that precise criteria were respected: aids could only be granted for a transitional period, to undertakings facing serious difficulties, and were not to give rise to serious distortions of commercial trade and international investment. The initial desire to eliminate all public aids related to the environment by recourse to the principle was tempered by the different guidelines relating to State aids for the protection of the environment.⁶¹

Despite these conditions, this first function merely ensured a partial internalization of the costs arising from chronic and continuous pollution. In fact, only investments required by the public authorities fell under the terms of the principle, since there is as yet no question of forcing polluters to bear the full costs of their activities.⁶² We should recall that Pigou, in contrast, wanted to encourage subsidies for positive externalities through revenues from a tax on negative externalities.⁶³ This aspect of the theory of externalities seems to have been forgotten by the two economic institutions that originally promoted the PPP.

This neo-liberal philosophy continues to be put forward, although it has to some extent been called into question by the most recent EU framework on State aids for protection of the environment. This has not, however, prevented the principle from progressively evolving within these two international organizations in the direction of a more complete internalization of pollution costs.

3.1.2 The redistribution function

The main function of the PPP is to internalize the social costs borne by the public authorities for pollution prevention and control. The principle may thus take the form that ‘in return for the payment of a charge, the polluter is authorized to carry out a polluting activity’.⁶⁴ At this stage it serves as an economic rule according to which a portion of the profits accruing to polluters as the result of their activities must be returned to the public authorities responsible for inspecting, monitoring, and controlling the pollution these activities produce.

This function has attracted criticisms that are not entirely unfounded. It attaches a price to the right to pollute. Consequently, it is seen as accepting environmental degradation as inevitable provided that the agent pays: ‘I pay, therefore I pollute.’ For the polluting firm, however, a charge merely represents a supplementary tax. The result is to perpetuate pollution as long as its ‘product’—the resultant

⁶¹ N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014) 435–67.

⁶² The PPP ‘is no more than an efficiency principle for allocating costs and does not involve bringing pollution down to an optimum level of any type’. See Note by the OECD Environment Committee on the PPP, Appendix to Recommendation adopted on 7th July, 1989 C (89) 99 (final).

⁶³ AC Pigou, *A Study in Public Finance* (Macmillan, 1947) 101.

⁶⁴ Opinion of AG Léger in Case C-293/97 *Standley* (n 60), para 97.

charges—pays for the administrative authorities to carry out their regulatory tasks. Moreover, the purely distributive function may be subject to an even more fundamental criticism. To speak of a polluter is to evoke environmental harm, which in turn means that such damage has already taken place: that is, prevention is no longer of any use.

Moreover, the significant damages caused by transboundary pollution beyond the bounds of what is considered tolerable should not be a matter of cost internalization but of prevention. If it were not the case there would be no limit to pollution in as much as the polluter is willing to pay.⁶⁵

Of course, such criticisms must be nuanced. As we shall presently see, the PPP can also contribute to reducing pollution (preventive function) and speeding up the process by which those responsible for pollution accept responsibility for ecological damage (curative function).

3.1.3 The preventive function

State financing of pollution control has no dissuasive value. On the contrary, it encourages polluters to pass their costs on to the community, with the aim of making the price of their goods and services more competitive. Recommendation 75/463 regarding cost allocation and action by public authorities on environmental matters was intended precisely to counter that tendency. The Recommendation stresses early on that the principle should demonstrate a preventive dimension.⁶⁶ The adoption of pollution control measures, and particularly the charges associated with these, should according to the Recommendation ‘encourage the polluter to take the necessary measures to reduce the pollution he is causing as cheaply as possible.’

This preventive function of the PPP makes it possible to counter the criticisms levelled at it. Moreover, that function is justified on both the economic and legal levels. From the legal perspective, the PPP should be consistent with the principle of prevention, which it complements; it would be absurd if principles intended to ensure a coherent environment policy could contradict one another.⁶⁷ From the economic point of view, polluters are encouraged to reduce pollution as soon as the costs they must bear are seen to be greater than the benefits they anticipate from continuing nuisances.⁶⁸

⁶⁵ PM Dupuy and J Viñuales, *International Environmental Law*, 2nd ed (CUP, 2018) 82.

⁶⁶ In spite of their different legal status the PPP (general principle) has been merged with the principle of prevention (customary rule). See ILC, Draft Articles on Prevention of Transboundary Harm from Hazardous Activities (with commentaries) *Yearbook of the International Law Commission* (vol. II, part 2) 148, Art 6; IUCN Draft Covenant on Environment and Development, Art 6.

⁶⁷ L-A Duvic-Paoli, *The Prevention Principle in International Environmental Law* (CUP, 2018) 262.

⁶⁸ The failure, in cases such as that of asbestos, to reflect the full market price of environmental and health costs gave these products an unjustifiable advantage in the market-place and delayed the adoption of preventive measures (warning signs that arose as early in 1898–1906 in the United Kingdom and France were not followed up with regulatory measures before the 1980s). E.g. D Gee and M Greenber, ‘Asbestos: From magic to malevolent mineral’, in European Environmental Agency, *Late Lessons from Early Warnings: The Precautionary Principle 1896–2000* (Report No. 22, 2001) 57.

To the extent that charges increase in proportion to the seriousness of the pollution, it will be in the interest of operators to reduce their emissions. Moreover, charges are clearly superior to quality, process, and product standards because those paying the charge may reduce their discharges to what they consider an optimal level; polluters therefore view economic instruments as a flexible replacement for what they consider rigid binding rules.

Put at the service of prevention, the PPP should no longer be interpreted as allowing a polluter who pays to continue polluting with impunity. The true aim of the principle would henceforth be to institute a policy of pollution abatement by encouraging polluters to reduce their emissions instead of being content to pay charges. In this way, the polluter-pays and preventive principles would constitute two complementary aspects of a single reality.

But we should not deceive ourselves: the distributive function for the most part remains more important than the preventive function.⁶⁹ There are two explanations for this. First, hortatory mechanisms rest on the assumption that the polluter is behaving rationally, which is far from always being the case. Secondly, the dissuasive effect depends on the price charged to the polluter—which is generally too low to encourage substantial reductions in pollution.

3.1.4 The curative function

Whatever the importance or quality of preventive measures, the risk of environmental harm remains. Indeed, setting emission thresholds necessarily leads to degradation of water, soil, and air. It could undoubtedly be argued that most pollution effects, being relatively weak, do not compromise the regenerative capacity of ecosystems. However, this is a theoretical argument; from a scientific point of view, degradation relates more closely to introducing a polluting substance into the ecosystem than to crossing a threshold of irreversibility. The PPP should therefore also give rise to liability for residual damage which occurs because of the inadequacy of discharge thresholds established by the public authorities.⁷⁰

Running like Ariane's thread throughout the corpus of environmental law, civil liability (or tort law) provides fertile ground for encouraging development of the curative dimension of the principle. By stressing the curative dimension, the PPP could represent a further step forward; instead of simply obliging the polluter to pay for restoration carried out by the public authorities, it would also ensure that victims could obtain compensation from polluters, including for damage resulting from authorized activities. If civil liability guarantees a form of redistribution *ex post*, it differs from the classical distributive function in that it is more individual than collective in character. Nevertheless, to the extent that the obligation to repair damage is likely to modify individual and collective behaviour, civil liability

⁶⁹ de Sadeleer, *EU Environmental Law* (n 61) 238–40.

⁷⁰ See Chapter 2, Section 3.

also pursues a preventive objective which is not necessarily part of the distributive function.

In any case, there is an increasing tendency in international circles to ascribe a curative dimension to the PPP. In a 1991 Recommendation on the Use of Economic Instruments in Environment Policy, the OECD Council admitted that a 'sustainable and economically efficient development of environmental resources' required internalizing the costs of preventing and controlling pollution as well as of the damage itself.⁷¹ At EU level, this line of reasoning according to which environmental liability results in accordance with the PPP in internalization of environmental costs, found an echo in the ELD with regard to the prevention and remedying of environmental damage.

3.2 The ambivalence of the concepts of 'polluter' and 'payer'

The PPP juxtaposes two terms whose meanings appear self-evident at first glance but become more elusive as one attempts to define them.

The act of definition is thus best approached from two different angles. First: who is the polluter, and secondly: how much must the polluter pay?

3.2.1 Who is the polluter?

Before determining what the polluter must pay, we should define who the polluter actually is: a thorny question that the work of the OECD has never tackled.

Discussions relating to the identification of the polluter for the most part hold to a precise notion of pollution; yet two contrasting concepts of pollution exist. According to the first, emission of a substance occurs when a threshold established to avoid the occurrence of ecological damage is exceeded (see Subsection 3.2.1.1). The second approach sees pollution as independent of this administrative technique and determined by the mere presence of damage (Subsection 3.2.1.2). The results of this conflict are not purely doctrinal. Were the theory that the mere existence of damage is sufficient to gain the upper hand, the person responsible for environmental damage would be obliged to bear all the consequences of his pollution, even if he had scrupulously respected the measures laid down by the public authorities. A further debate takes account of the difficulties that accompany the thesis linking pollution to the existence of damage (Subsection 3.2.1.3).

Finally, leaving aside the issue of what constitutes pollution, it remains to determine legally who will have to respect the obligations flowing from the PPP. The scope of the discretion reserved to the law-maker to regulate this question forms the topic of a fourth discussion (Subsection 3.2.1.4).

⁷¹ C (90) 177 (final), OECD, 1991.

3.2.1.1 *The definition of pollution arising from unlawful acts*

According to one theory, an emission does not necessarily constitute pollution. In order to be considered pollution, the substance released to the environment must exceed discharge or quality standards (EQS) set for the receiving environment by the public authorities.⁷² The concept of pollution is thus dependent on exceeding a threshold. As long as the thresholds fixed by the authorities are respected, the discharger is not subject to the PPP. Following this reasoning, environmental impacts authorized by the public authorities do not give rise to financial compensation. This interpretation of what constitutes a polluter is based on the traditional view, according to which changes to the environment are only recognized as injurious when they exceed a certain threshold.⁷³

3.2.1.2 *The definition of pollution based on emission impacts*

According to the opposite thesis, the definition of pollution depends less on violation of a discharge threshold than on the impact of the substance in question on the environment or its victims. This interpretation is found in both binding and non-binding instruments of international and EU legal systems.

Recommendation 75/436 already defined the polluter as being the person who 'directly or indirectly damages the environment or who creates conditions leading to such damage'. Despite its relatively vague character, this definition emphasizes that in order for there to be a polluter, there must be 'damage'. Similarly, a distinction may be drawn between contamination of the environment and pollution: contaminants are only regarded as pollutants when they cause damage.⁷⁴

The definitions given to the term 'pollution' in international law tend to follow this reasoning. They generally comprise the following elements: the introduction by man, directly or indirectly, into a specific environment, of substances or energy giving rise or able to give rise to deleterious effects that could endanger human health, damage biological resources, or disturb the functioning of ecosystems, cause deterioration of material goods, or injure or damage amenities and other legitimate uses of the environment.⁷⁵ Convention definitions vary according

⁷² Krämer supports this interpretation, arguing that the distinction between 'impairment' and 'pollution' is found in several places in secondary law. See Krämer, 'The Polluter-Pays Principle in EC Law' (n 51) 248.

⁷³ Ibid.

⁷⁴ Gesamp, *The Status of the Marine Environment* (1990), UNEP Regional Seas Reports and Studies, no. 115.

⁷⁵ See, in this regard, the relatively similar formulations contained in the following MEAs provisions: 1969 Brussels International Convention on Civil Liability for Oil Pollution Damage, Art 1(6); 1976 Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution, Art 2; 1977 London International Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources (not in force), Art 1(6); 1979 CLRTAP, Art 1(a); UNCLOS, Art 1(1)(4); 1997 New York Convention on the Law relating to the Uses of International Watercourses for Purposes other than Navigation, Art 21(1); 1992 OSPAR Convention, Art 1(d); Directive 2010/75/EC on Industrial Emissions (hereinafter IED), Art 3(2).

to: the origin or source of the pollution being regulated (dumping or discharge, releases into the atmosphere, exploitation of the ocean bed, etc.); the polluting agent (petrol, waste, nuclear materials, chemicals, etc.); the environment affected by the pollution (atmosphere, international watercourse, marine environment, etc.); the nature and perception of nuisances; and the threshold of risk that is considered acceptable.

Under EU waste law, any disposal of waste that results in environmental harm must be regarded as environmental pollution. In the German version of Article 191(2) of the TFEU the concept of pollution does not even occur, as the principle applies only to 'acts which impair the environment' (*Verursacherprinzip*).⁷⁶ By the same token, environmental tax law supports that interpretation: discharges of pollutants are being taxed according to the quantities being released regardless of whether they exceed emission thresholds or not.

While the first concept defines pollution solely by reference to passage beyond a threshold, without consideration of the damage produced, each of the definitions set out above defines pollution by reference to environmental impact, regardless of whether it is lawful or unlawful. In other words, pollution only exists as a function of an emission's impact on the environment; the effect is more important than the cause.

This definition of pollution should be welcomed for reasons of fairness, appropriateness, and legal coherence. First, it is justified from the perspective of fairness. To limit claims for financial compensation purely to cases of pollution caused by unlawful discharges, as proposed by those who defend the first definition, burdens the community with the cost of clean-up measures for damage caused by authorized discharges. This limitation on the internalization of pollution costs clearly runs counter to the evolution of the PPP described above.

This second definition is also more acceptable for reasons of appropriateness. Limiting the application of the PPP to unlawful impairment will not encourage polluters who are in compliance with emission standards to reduce the harmfulness or quantity of their polluting emissions even further. The principle of prevention will remain ill served as long as that of the polluter-pays does not cover every impairment of the environment.

Finally, at the level of civil liability, which is equally likely to be influenced by the PPP, nothing prevents an act of wrongful pollution being evaluated from the perspective of the requirement for duty of care owed by the liable party, whether or not he respected the standards incumbent upon him. In fact, the granting of an administrative authorization does not automatically absolve its holder from liability.

⁷⁶ Krämer, 'The Polluter-Pays Principle in EC Law' (n 51) 248–9.

3.2.1.3 *The difficulties inherent in defining pollution through impact*

Defining pollution as a function of the environmental impact of an emission does not, however, solve all the problems raised above. We may ask, for instance, whether the existence of damage is an essential condition for the PPP to apply. During the 1970s conventions for protection of the marine environment defined marine pollution in a more restrictive manner, by considering that 'pollution' existed only when it had been demonstrated that the introduction into the sea of substances or energy had given rise to harmful effects.⁷⁷ Since then the definition of pollution has evolved under the influence of the PP and now encompasses the risk of degradation. For example, under the Industrial Emission Directive, pollution exists when the introduction of a substance 'may be harmful to human health or the quality of the environment ...'.⁷⁸ Consequently, operators of hazardous activities might, on the basis of the PPP, have to pay fees to guarantee the control and monitoring of tasks carried out by the authorities, even if they have not damaged the environment. Moreover, the OECD Recommendation of 5 July 1989 on the Application of the PPP to Accidental Pollution confirms the intention to apply the principle to accidental as well as chronic pollution and thereby to require potential polluters to contribute financially to preventive measures adopted by public authorities.

Even if the PPP were to be applied as soon as the environment had suffered or was at risk of suffering degradation, it would still be necessary to determine what constitutes degradation. Can any disturbance of ecosystem functioning give rise to compensation? Does the PPP include damage to future generations caused by the loss of potential scientific discoveries? There seems little doubt that a solution by which the agent of any disturbance would be considered a polluter could give rise to nonsensical situations.

Must we instead limit environmental damage to disturbances that are considered abnormal? This would imply using thresholds to define what categories of 'normal' damage do not give rise to compensation.⁷⁹ However, the normal or abnormal character of damage is highly relative, as it tends to be a function of time, place, and the persons affected. A decibel level that would drive a musician mad would leave a deaf person unruffled; an oil slick that would devastate a fish farm presents less of a danger when it is spread over the high seas.

In addition, the very concept of abnormality is completely anti-ecological. Ecotoxicology shows us that notions of threshold are radically incorrect, being of almost no use when doses accumulate in living organisms. Moreover, the act of

⁷⁷ See the formulation set out in the 1974 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea (replaced); 1974 Paris Convention for the Prevention of Marine Pollution from Land-Based Sources (replaced), Art 1(1).

⁷⁸ Art 3(2).

⁷⁹ For instance, pursuant to Art 2(1)(a) of the ELD the damage caused to protected species and natural habitats must have 'significant adverse effects' on their conservation status.

setting a threshold tends to reinforce the idea that some types of damage are acceptable and thus forces communities to accept a certain level of damage without being able to claim compensation. The PPP of course provides no answers to the question of how to define damage; that must follow from a legislative choice.

3.2.1.4 *Identifying the polluter*

It goes without saying that the ‘polluter’ should be the person who causes pollution.⁸⁰

Traditionally, operators have been considered as polluters. By way of illustration, according to the 2004 ILC Principles on Allocation of Loss, it is the operator of the hazardous activity and not the source State that is obliged to compensate the victims of transboundary environmental damage. Given that the source State is not the polluter, it is only required to take the necessary action to ensure that prompt and adequate compensation is paid. Moreover, under sector-specific conventional schemes, since liability is imposed on the operator, the State only plays a secondary role in providing additional funding where necessary. This approach clearly departs from long-standing principles of international law that recognize exclusively the role of the State.⁸¹

Now, even in the case of a specific installation, it is not always easy to identify who has actually caused pollution. The operator of the installation or his representatives, the manufacturer of the defective product, the holder of the hazardous waste may all be liable for pollution. This question becomes even more complex in the case of diffuse pollution, where multiple causes produce single effects and single causes produce multiple effects. For reasons of economic efficiency and administrative simplicity, law need not necessarily adhere to reality, and it is sometimes preferable to apply this qualification to a single person rather than a number of people. For instance, Recommendation 75/436 provides that the costs of pollution could be charged ‘at the point at which the number of economic operators is least and control is easiest’. Consequently, the polluter may be the agent who plays a determining role in producing the pollution rather than the person actually causing the pollution (e.g. the producer of pesticides rather than the farm worker). By way of illustration, enshrined in Article 8 of the 2008/18 Waste Framework Directive (hereinafter the Waste FD), the extended producer responsibility (EPR) assigns responsibility to producers for collection and recycling schemes of discarded products.

A question arose as to whether an economic operator that placed packaged products on the national market but did not alter their packaging was required

⁸⁰ The obligation placed by C. civ. Fr., Art 1246 on ‘everyone’, be it a poacher or the operator of a listed installation, to repair the environmental damage he caused mirrors the PPP that is enshrined in the French Environmental Charter, Art 4.

⁸¹ C Foster, ‘The ILC Draft Principles on the Allocation of Loss in Case of Transboundary Harm Arising out of Hazardous Activities: Privatizing Risk?’ 14:3 (2005) RECIEL 272.

to finance a waste packaging fund. The CJEU held that the contribution at issue did not breach the PPP, which was referred to in Directive 94/62 on packaging waste, irrespective of whether the economic operator makes any changes to the packaging. That Directive has a broader scope: it does not only cover the operators that are directly responsible for producing waste, but also extends to importers and distributors of packaged products, irrespective of whether they make any changes to the packaging.⁸² Accordingly, to construe broadly the class of operators that are subject to the take back obligations does not amount to a breach of the PPP.

With respect to the scope of Article 10 of Directive 1999/31/EC on the landfill of waste, the Court held in *Pontina Ambiente* that all the costs of operating a landfill must be borne by the holders of the waste deposited in the site for disposal. Although nothing precludes a Member State from introducing a levy on waste to be paid by the landfill operator, it can do so only on condition that the fiscal provision in question is accompanied by measures to ensure that the levy is actually reimbursed by the holders of the waste ‘within a short time so as not to impose excessive operating costs on the operator on account of late payment’ by those holders, thereby undermining the PPP.⁸³

We may ask ourselves, however, about the relevance of recourse to the concept of ‘polluter’ to ensure the implementation of a policy favouring sustainable development. Acts of pollution are not the only cause of today’s ecological crisis: the unbridled consumption of natural resources is also a problem, even if it is not a source of pollution properly speaking. We are probably all contributing to pollution as individuals.⁸⁴

The official positions of the OECD indicate a growing awareness of the need for prices to reflect the ‘true’ costs of natural resource use.⁸⁵ According to the OECD, a ‘user-pays’ principle should complement the PPP in order to guarantee more prudent resource management. By attributing a price to the consumption of natural resources, such a principle could contribute to sustainable development—a concept whose scope far exceeds that of mere pollution control. The main difference between these two principles is that the ‘user-pays’ principle would apply to resources and their users, while the PPP applies entirely to discharges of pollutants, and consequently only to polluters. Other than that, these two principles arise from a single economic logic of internalizing external costs. By not making the slightest reference to the notion of pollution, the formulations of the PPP in German law (*Verursacherprinzip*) and in Swiss law (*principe de causalité*) seem to correspond to this new principle.

⁸² Case C-104/17 *SC Cali Esprou SRL* [2018] C:2018:188, paras 22, 32.

⁸³ Case C-172/08 *Pontina Ambiente* [2010] C:2010:87, paras 37–8.

⁸⁴ M Lee, *EU Environmental Law* (Hart, 2014) 14.

⁸⁵ The user-pays principle is being seen in more and more OECD decisions. See the OECD Council Recommendation of 31 January 1991 Concerning the Use of Economic Instruments in Environmental Policy (C(90) 177 (final)).

3.2.2 How much must the polluter pay?

Once identified, the polluter will have to pay, but it still remains to agree on a price. At this point it is necessary to distinguish between the PPP in the strict sense, which is limited to a partial internalization of costs, and the principle defined in a wider sense, which corresponds to a full internalization of externalities.⁸⁶

The PPP was originally defined strictly in order to exclude subsidies for pollution prevention and control measures financed by polluters. Consequently polluters had no expenses other than those linked to financing prevention and control measures put in place by the authorities. This narrow perception of negative externalities, however, neglected the question of hidden debt: in other words, of environmental liability which must be borne by future generations when not immediately discharged by responsible parties.

On the other hand, in its widest sense the PPP implies complete internalization. In addition to the cost of pollution prevention and control measures, it also covers ecological damage in its entirety.

This interpretation should be retained to the extent that it conforms to Principle 16 of the 1992 Rio Declaration, on one hand, according to which the polluter should 'bear the cost of pollution' rather than merely assume the cost of measures adopted by the public authorities, and on the other hand to the 1991 OECD Recommendation, wherein the OECD Council stated that: 'a sustainable and economically efficient management of environmental resources requires, *inter alia*, the internalization of pollution prevention, control and damages costs.'⁸⁷

Within EU law this interpretation can be seen in Article 10 of Directive 1999/31/EC on the landfill of waste, which provides for the full incorporation of all costs relating to the management and control of a landfill into the price charged for the disposal of waste. Following this line of reasoning, the recent Directive 2019/904 on the reduction of the impact of certain plastic products on the environment requires the producers of food and beverage containers to cover not only the traditional environmental costs of waste collection but also those associated with awareness-raising measures and the cleaning up of litter caused by these containers.⁸⁸

Nonetheless, internalization is not always absolute. Although Article 9 of the Water FD enshrines the principle of recovery of the costs of water services, the CJEU has ruled that it cannot impose a generalized obligation to price all water uses. Given that water pricing is only one of the instruments available in order to

⁸⁶ Pezzey distinguishes between the 'Standard PPP' (the polluter pays only for measures intended to bring the pollution to an acceptable level) and the 'Extended PPP' (the polluter also pays to cover the social damages resulting from pollution at an acceptable level). E.g. J Pezzey, 'Market Mechanisms of Pollution Control: "Polluter-pays", Economic and Practical Aspects' in R Kerri Turner (ed), *Sustainable Environmental Management: Principles and Practice* (Boulder, 1988) 190.

⁸⁷ OECD Council Recommendation Concerning the Use of Economic Instruments in Environmental Policy, C (90) (117) final, OECD, 1991.

⁸⁸ Art 8.

achieve the objectives of this Directive,⁸⁹ the PPP could not play a role as an interpretative principle.⁹⁰ On another note, the PPP enshrined in Article 191(2) of the TFEU can be relied on as such by individuals in order to exclude the application of national legislation in as much as there is an EU legislation adopted on the basis of Article 192 TFEU that specifically covers the situation in question. Accordingly, a national energy tax which does not provide incentives for the efficient use of water can be reviewed against the PPP grounded in Article 191(2) of the TFEU, and Article 9(1) of the WFD, which lays down the principle of the recovery of costs for water services.⁹¹

Full compensation for ecological damage raises the question of calculating its value, a calculation rendered even more delicate because attribution of a market value to a natural resource has a determining effect on the scope of liability. Of course the damage caused to nature could undoubtedly be valued in terms of forest surface destroyed or the number of animals or plants lost. However, even if such losses were quantifiable it would be difficult to evaluate them in monetary terms. What price can we attach to air, water, plants, and wildlife? Some methods of calculation already make it possible to attach a monetary value to these, based on the efforts that would be needed to restore degraded environments to a pristine condition or to reintroduce animals and plants that have disappeared; but these remain approximate, since the development of species and natural habitats is impossible to master. The difficulty increases when the question of compensation is no longer limited to species or habitats but extends to interactions between biotic and abiotic elements.

Clearly, this is where the shoe pinches. In the natural sciences, in effect, environmental harm is characterized by the disturbance of equilibria and ecological processes far more than by losses brought about by specific, and therefore quantifiable, elements. Now, how is one to calculate these impairments? The destruction of a wild flower population constitutes damage that can reasonably be quantified to the extent that its disappearance is not irreversible. As soon as the disappearance affects the entire species, however, the loss becomes inestimable because it relates to an irreversible phenomenon. Having become extinct, the species becomes irreplaceable. In such a case it is less a question of assessing the economic value of the species than of considering its intrinsic value. We must admit that it is impossible

⁸⁹ Given that the Water FD does not require them to use any specific pricing method, the Member States may adopt other water-pricing methods other than the setting of the price of water services according to the volume of water actually consumed. Nothing precludes thus the combination of a variable component connected with the volume of water actually consumed and a fixed component not connected therewith. Case C-686/15 *Željka Klafurić* [2016] C:2016:927, paras 21–4.

⁹⁰ Case C-525/12 *Commission v Germany* [2014] C:2014:2202, case note by P Lindhout and F van Rijswick (2015) 12 JEEPL 80–94.

⁹¹ However, the principle that the costs of the water services are to be recovered, pursuant to Art 9(1), does not require that each tax on water, taken in isolation, must be in proportion to those costs. Joined Cases C-105/18 to C-113/18 *Asociación Española de la Industria Eléctrica* [2019] C:2019:935, para 43.

to evaluate the irreparable. Under those circumstances, is it reasonable to require a polluter to compensate the public authorities, given that the latter will no longer be able to repair the damage in question?

The PPP thereby leads to another dead end. This merely confirms the relevance of the preventive and anticipatory approaches, which are the only approaches capable of averting the irreparable and consequently limiting the application of the PPP to reversible damages.

4. Applications of the principle

The PPP has successively been invoked to address distortion of competition (objective of economic integration), as a preventive instrument to establish the internalization of chronic pollution (instrument of prevention *ex ante*), and finally to justify the adoption of fiscal measures or strict liability regimes (instrument of prevention *ex post*). We must now consider whether, as its protagonists claim, this principle is really capable of bringing about changes to two redistributive legal instruments: taxation (Subsection 4.1), civil liability (Subsection 4.2), and State aids (Subsection 4.3).

4.1 Environmental taxation

It is generally recognized that the PPP implies setting up a system of charges by which polluters help finance public policy to protect the environment.⁹² This raises a number of questions, however, concerning how to identify who should pay charges (see Subsection 4.1.1 below), the tax base of charges (Subsection 4.1.2), and the allocation of charge revenues (Subsection 4.1.3).

4.1.1 Who should pay pollution charges?

Identifying the person who must pay pollution charges has given rise to a great deal of controversy, since generally more than one identifiable individual contributes to pollution. May we charge each person who has contributed to the harm, no matter how small their share, on the grounds of equity? Or, for the sake of efficiency, is it preferable to charge the person who is best placed to pay? In Recommendation 75/436 the Commission gave as an example the case of motor vehicle emissions, which recurrently give rise to the question whether their costs should be charged to the vehicle manufacturer, the fuel producer, or the owner of the motor vehicle.

⁹² See 1975 Council Recommendation regarding cost allocation and action by public authorities on environmental matters, 1997 Communication on taxes, fees, and environmental charges in the Single Market (COM(97) 9 final).

Similarly, where noise from an airport disturbs those living in its vicinity, should one tax the operator of the airline, the operator of the airport, and the passengers, or only some of the above? If the latter, in what proportion?

Such an exercise would be little better than a lottery, for it is almost impossible to determine with any precision how each of these agents contributes to creating the nuisance. It is therefore necessary to ease the law-maker's task by permitting him to collect a charge at those points in the pollution chain which offer 'the best solution from the administrative and economic points of view and which make the most effective contribution towards improving the environment.'⁹³ 'Simplicity and clarity' of economic instruments have also been emphasized by the OECD in its 1991 Recommendation on the Uses of Economic Instruments: 'there should be a fine balance between undue complexity, which makes the economic instrument hard to apply, and excessive simplicity, which may mean that it is not very efficient.'⁹⁴

Based on this position of principle, imprecise as it is, one can argue that the polluter should be identified by calling on the principles of prevention and of rectification of pollution at source. In conformity with those principles, it is preferable to charge the economic agent who is at the source of a nuisance. In effect, from the perspective of prevention there is no point in acting against a person who has no power over the nuisance. It is far more efficient to go as far upstream as possible, by identifying the economic agent without whose action the nuisance could not have occurred. As the first link in the chain of polluters, the producer of the polluting product is the individual who is best placed to bear the expense of pollution prevention and control. He will thereby make the most effective contribution towards improving the environment when he is obliged to assume responsibility for prevention and elimination costs.

In this perspective, it is not the driver but the manufacturer of the motor vehicle who should pay a charge, to the extent that the latter is the only party able to control the technology that would make possible reductions of CO₂ and NO_x emissions to air.

Of course, this option may appear iniquitous in that it will require someone who has not directly caused pollution to intervene financially, in the place of a multitude of other economic agents. We could also ask in what way the manufacturer of a motor vehicle or the manager of an airport are more responsible than a motorist, a driver, an airline, or its passengers. This point emphasizes the limits of a principle that does not definitively indicate who should be responsible for the cost of pollution when the responsible party is part of a collective phenomenon. The relevance of this criticism should not, however, prevent public authorities from making a

⁹³ Recommendation 75/436, Annex, para 3; OECD, *The PPP. OECD Analyses and Recommendations* (1992, OECD/GD(92)81) 8.

⁹⁴ OECD, *Recommendation on the Uses of Economic Instruments in Environmental Policy* (1991 C(90) 177 (final)), Annex III (14).

single economic operator in the production chain bear the weight of taxation, given that we are discussing taxation and not civil liability, where every individual who is liable must bear the cost for the damage he has caused.

Is it necessary to attach great importance to this question, which may appear highly theoretical? In fact, if the economic operator pays, he is generally merely the first to pay; the consumer ultimately bears the additional cost arising from the charge to the producer. This assertion is accurate for monopolies insofar as a supplementary cost that reflects the charge will always be passed on to the consumer, who in a monopoly situation cannot turn to alternative producers for supplies. On the other hand, it is without foundation where companies are in competition, for the obligation to internalize pollution costs allows firms which pollute the least to gain market share. Required to pay a charge which increases as a function of the seriousness of the pollution caused, the most polluting producers in effect become less competitive. The play of competition thus makes it possible to avoid forcing consumers to bear over the long term the supplementary cost charged to the producer.

As stressed above, environmental charges must comply with the principle of non-discrimination. One of the tenets of the EU transport policy is that costs relating to the use of transport infrastructure should be based on the user-pays and the polluter-pays principles.⁹⁵ An annual infrastructure charge inspired by these principles that applied to all drivers would most likely be payable even by an owner who never used the roads in question. In addition, the owner of a vehicle registered in the country levying the charge is automatically subject to the annual charge and, in contrast to foreigners, does not have the option of choosing to purchase a road toll sticker for a shorter period should this be more convenient given his low usage of the roads in question. German car owners thus cause much less pollution than foreign car owners. Do these difficulties allow Germany to grant a relief to national car owners who use national motorways only occasionally or not at all? The answer is no, as the CJEU invalidated the German infrastructure charge for the following reason. In theory, the tax at issue applies to all drivers without distinction, including the owners and drivers of vehicles registered in other Member States who use that infrastructure; however, the charge *de facto* targets overwhelmingly foreign drivers.⁹⁶ Accordingly, it is deemed to be discriminatory.⁹⁷ In conclusion, exemptions from a tax inspired by the PPP and the user-pays principle cannot breach the principle of non-discrimination.

⁹⁵ Commission, *White Paper, Roadmap to a Single European Transport Area* (COM(2011) 144 final), point 58.

⁹⁶ The German regulation at issue provided individual compensation for that charge to benefit the owners of vehicles registered in Germany, by means of a relief from motor vehicle tax in an amount that was equivalent to the amount paid in respect of that charge.

⁹⁷ Case C-591/17 *Austria v Germany* [2019] C:2019:504, para 69.

Ratione temporis, is it possible immediately to charge every polluter regardless of their respective contribution to pollution? Does the complexity of new regulatory schemes offer some leeway to the law-maker, allowing him to implement the PPP gradually? The answer is in the affirmative. The fact that entire polluting sectors, such as the non-ferrous metal industry, were excluded from the original EU European Trading Scheme (ETS)⁹⁸ did not infringe the principle of equal treatment given that the scheme is a new and complex system.⁹⁹ Accordingly, the EU law-maker could lawfully make use of a step-by-step approach for the introduction of the allowance trading scheme.¹⁰⁰ However, its discretion to exclude other greenhouse gas (GHG) emitting sectors should diminish as the ‘new and complex’ system starts improving. Therefore, in complex technical areas, the PPP should be gradually implemented and the initial narrow scope of the regulation implementing the principle must be enlarged in order to overcome the original deficiencies as quickly as possible.

4.1.2 Determining the basis of charges

The basis of a charge will vary according to the redistributive or incentive function assigned to the PPP. Recommendation 75/436 again serves to define the outlines of a solution.

4.1.2.1 Distributive function

In the case where the charge is fulfilling a redistributive function, the assessment should be proportional to the pollution caused, since the level of the charge should reflect the actual share in causing the pollution in question. In this perspective, Recommendation 75/436 foresees that ‘the charges should be applied, according to the extent of pollution emitted, on the basis of an appropriate administrative procedure’.¹⁰¹

Standley is a case in point. Domestic farmers submitted that the Nitrates Directive infringes the PPP laid down in Article 130R(2) of the EC Treaty (new Article 191(2) of the TFEU), on the grounds that farmers were being singled out to bear the cost of reducing the concentration of nitrates in waters to below the threshold of 50mg/l even though agriculture is acknowledged to be only one source of nitrates, while no financial demands were being made on other sources. Referring to the PPP, the CJEU held that:

the Directive does not mean that farmers must take on burdens for the elimination of pollution to which they have not contributed; ... the Member States are to

⁹⁸ The CJEU held that the allowance trading scheme did not amount to a tax. See Case C-366/10 ATAA [2011] C:2011:864.

⁹⁹ Case C-127/07 *Arcelor* [2008] ECR I-9895, para 69.

¹⁰⁰ *Ibid.*, paras 60–2.

¹⁰¹ Recommendation 75/436/Euratom/ESCC/EEC, para 4(b).

take account of the other sources of pollution when implementing the Directive and, having regard to the circumstances, are not to impose on farmers costs of eliminating pollution that are unnecessary. Viewed in that light, the PPP reflects the principle of proportionality ...¹⁰²

According to this case law, Member States cannot impose on farmers costs of eliminating pollution that are ‘unnecessary’: they must also take into account other sources of pollution.¹⁰³ Following that reasoning, the costs charged to some categories of economic agents arising from the designation of a protected zone should not be superior to the costs of the pollution generated by those agents.¹⁰⁴ This demonstrates clearly how a principle laid down in the EU primary law may influence the interpretation of an act of secondary legislation and consequently determine national administrative practices.

As illustrated in *ATAA*, both principles go hand in hand.¹⁰⁵ In that case, the CJEU reached the conclusion that third-country airlines inclusion within the scope of the ETS was compatible with the territoriality principle. In her Opinion, AG Kokott noted that:

a particular airline may be required, when departing from or arriving at a European aerodrome, to surrender emission allowances that are higher the further the point of departure is from the destination. Taking account of the whole length of the flight is ultimately an expression of the principle of proportionality and reflects the ‘polluter pays’ principle of environmental law.¹⁰⁶

However, applying proportionality in a rigorous manner remains difficult. First, calculating the charge may prove to be a relatively complex operation owing to the multiple parameters which must be taken into account—among them: the nature of the nuisance, the hazards it presents, the means available to remedy its harmful effects, and the cost of meeting an EQS, including the administrative costs directly linked to carrying out antipollution measures. Aware of these difficulties, the authors of Recommendation 75/436 admitted that ‘insofar as the main function of charges is redistribution, they should at least be fixed ... so that the aggregate amount of the charges is equal to the total cost to the Community of eliminating nuisances’.

¹⁰² Case C-293/97 *Standley* (n 60), paras 51–2.

¹⁰³ *Ibid.*, para 52.

¹⁰⁴ According to the Opinion of AG Léger, the Directive had to be interpreted as requiring Member States to impose on farmers only the cost of pollution for which they were responsible, and he explicitly added ‘to the exclusion of any other cost’ (at para 98).

¹⁰⁵ Case C-366/10 *ATAA* [2011] C:2011:864.

¹⁰⁶ At para 153.

Yet while the imperatives of tax law simplicity may lead to some attenuation of the proportionality requirement, it remains the case that a reasonable relationship must exist between the charge and the importance of the nuisance. The charge must, in effect, correspond as closely as possible to the environmental risk created by the hazardous activity.

At the outset, flat-rate tax regimes are likely to breach the principle of proportionality on the grounds that the costs associated with rectifying environmental damage vary according to the pollution load, pollutant profile, and sensitivity of the receiving environment. The following points illustrate ways in which these models are incompatible with the PPP:

- A flat-rate tax charged to households for their production of domestic waste would run counter to the principle, by making each taxpayer subject to an identical tax although waste generation may vary greatly from one household to another.¹⁰⁷
- The fact that the permitting fees include remediation or correction works by the authority is consistent with the PPP 'in that it ensures that the cost is attributed at least in part to those responsible for polluting activities, rather than to the community at large'.¹⁰⁸ Given that different situations have to be treated differently, in order not to breach the PPP a fixed fee structure has to 'be calculated so as to include an element designed to finance future correction activity'.¹⁰⁹
- *Futura Immobiliare* is illustrative of the ways in which the tax basis has to be calculated in accordance with the PPP. The CJEU was asked to decide whether waste management charges could be calculated on the basis of the economic activity or the surface area of the undertaking instead of the amount of waste produced and collected. It held that the principle did not preclude the Member States from varying the contribution of each category of tax payers 'in accordance with their respective capacities to produce urban waste'.¹¹⁰ Accordingly some categories of undertakings (hotels) can be treated less favourably than households provided that this distinction 'is based on objective criteria ... such as their waste-production capacity or the nature of the waste produced'.¹¹¹ Hence, national authorities are endowed with 'broad discretion' when determining the manner in which an environmental charge must be calculated;¹¹² precise cost accounting is therefore not necessary.¹¹³

¹⁰⁷ See the debate in Belgium about the constitutionality of flat-rate tax regimes in the field of household waste management (CA no. 41/93, 3 June 1993).

¹⁰⁸ *Fishermen and Friends of the Sea (Appellant) v The Minister of Planning, Housing and the Environment (Respondent) (Trinidad and Tobago)* 27 November 2017, para 42.

¹⁰⁹ *Ibid*, para 44.

¹¹⁰ Case C-254/08 *Futura Immobiliare* [2009] C:2009:479, para 52.

¹¹¹ *Ibid*, para 54.

¹¹² *Ibid*, para 55.

¹¹³ Opinion of AG Kokott in Case C-254/08 *Futura Immobiliare* (n 110) para 57

- The CJEU has ruled that a fee for the collection and transport of household waste calculated on the basis of an estimate of the volume of waste generated by users of that service, and not on the basis of the quantity of waste actually generated by waste holders, as well as an additional levy intended to finance necessary waste processing investments, was inconsistent with the Waste FD. However, the national court must verify whether the scheme at issue results in the imposition on certain waste ‘holders’ of costs that are manifestly disproportionate, having regard to the volumes or nature of the waste that they are liable to generate. In so doing, the national court may take various criteria into account (type and surface of the property, the productive capacity of the waste holders, the frequency of collection), insofar as these parameters are liable to have a direct impact on the costs of waste management.¹¹⁴

4.1.2.2 *Incentive function*

The incentive character of taxation conforms to the PPP insofar as Recommendation 75/436 strongly urges such an evolution. Environmental taxes are probably the most emblematic instruments of the simultaneous intervention of the polluter-pays and prevention principles: activities that are the most harmful to the environment pay the highest charges. In turn, the higher a charge, the more dissuasive its effect. Using such taxes, the law-maker may be tempted to penalize undesirable behaviour through charges which are distinctly higher than the costs they are intended to cover. In that case the incentive function will overtake the requirement for proportionality. One should keep in mind, however, that the more effectively an eco-tax aims to prevent pollution, the less revenue it will bring in.

As regards this second function, Article 15 of Directive 94/62/EEC concerning waste and waste packaging, which obliges Member States to respect the PPP when adopting economic instruments intended to reduce their quantity of packaging waste, does not oppose the establishment of incentive-type tax regimes, the object of which would be to eliminate certain types of packaging from the market. In *Valev Visnapuu*, the CJEU held that excised duties aiming at promoting reusable packaging on certain beverage was consistent with EU law.¹¹⁵

The incentive function may be illustrated by the ‘indirect taxes on excise goods for specific purposes national’ adopted by Member States in virtue of the general arrangements Directive 92/12.¹¹⁶ The CJEU had to determine the conditions under which States’ authorities could adopt indirect taxes on hydrocarbons subject to the EU’s excise duties regime. In *Transportes Jordi Besora*, the Court dismissed the argument according to which the allocation of tax revenue to

¹¹⁴ Case C-335/16 *VG Čistoća* [2017] C:2017:242.

¹¹⁵ Case C-198/14 *Valev Visnapuu* [2015] C:2015:751, case note by N de Sadeleer 25:2 (2016) RECIEL 261–7.

¹¹⁶ Council Directive 92/12/EEC of 25 February 1992 on the general arrangements for products subject to excise duty and on the holding, movement and monitoring of such products, Art 1(2).

environmental purposes was sufficient to prove that the tax at issue was aiming at an objective ‘other than a purely budgetary objective’. In stressing that the tax must be designed ‘in such a way as to dissuade taxpayers from using mineral oils or to encourage the use of other products that are less harmful to the environment’, the Court emphasized its incentive function.¹¹⁷ By the same token, regarding an Estonian sales tax on liquid fuel, the Court emphasized that the tax should have been ‘designed . . . in such a way as to deter taxpayers from using this fuel or to encourage them to adopt a behaviour whose impact would be less damaging to the environment or public health than that which they would adopt in the absence of the tax’.¹¹⁸

4.1.3 Allocation of charge revenues

Allocating the revenue from charges also gives rise to a number of questions. OECD and EU Recommendations do not indicate whether the sums collected should be set aside in a special fund for financing environmental policy or paid into the general State budget. The redistributive function generally assigned to charges argues in favour of the first option. Since a financial transfer from polluters to the public authorities is intended to spare the community from having to assume environmental liability, the proceeds of charges should primarily be allocated to the tasks of prevention, control, monitoring, and clean-up carried out by public authorities. In the case where charge revenue exceeds total expenditure, Recommendation 75/432 says that ‘the surplus should preferably be used by each government for its national environmental policies’. Allocating charge revenues to a dedicated fund does not, however, conform to the principle of universality, according to which tax revenues should not be used for specific expenditure.

The question also arises whether the public authorities may assign part of the charges back to the polluters themselves. Recommendation 75/432 authorizes such mechanisms under certain conditions. Strictly applied, financial intervention by Member States in support of certain private investments should not be considered contrary to the PPP. Methods for Member State financing have, moreover, been specified in several European Commission Communications.¹¹⁹

4.1.4 Critical assessment

Their greater flexibility compared to preventive standards (EQS and product standards), their incentive character, and the financial resources they procure for the State all argue in favour of setting up charges based on the PPP. As is evident from the explanatory memoranda of several environmental tax laws, the principle has succeeded in compelling recognition in this field, even if it does not resolve the

¹¹⁷ Case C-82/12 *Transportes Jordi Besora* [2014] C:2014:108, para 32.

¹¹⁸ Case C-553/13 *Tallinna Ettevõtlusamet* [2015] C:2015:149, para 46.

¹¹⁹ de Sadeleer, *EU Environmental Law* (n 61) 434–74.

questions of how to identify who should pay pollution charges, how to determine the basis for charges, and how to allocate charge revenues.

However, the difficulties inherent in interpreting the principle—particularly sensitive in relation to determining who should pay charges and the basis for determining them—should not lead to dismissing the principle, but rather to clarifying its meaning. In the past, recourse to other principles (e.g. prevention and rectification at source) has encouraged original approaches such as charging the producer rather than the consumer. Environmental taxation is in any case evolving in a more interventionist direction, with the aim of influencing the behaviour of economic agents by fiscal means. To the extent that the prospect of having to pay dissuades the polluter, the PPP ties in with the principle of prevention. Indeed, what objective does environmental taxation pursue if not to prevent the recurrence of a polluting activity through charges? Despite impressive progress, the rate of charges remains so low that these instruments rarely cover the combined costs of pollution control.

4.2 Environmental liability

The OECD and EU intend the PPP to assume a more curative dimension in future. If the PPP is not applied to covering the costs of restoration of environmental damage, either the environment remains un-restored or the State, and ultimately the taxpayer, has to pay for it. Therefore, a first objective is making the polluter liable for the damage he has caused. If polluters need to pay for damage caused, they will cut back pollution up to the point where the marginal cost of abatement exceeds the compensation avoided. Thus, environmental liability results in prevention of damage and in internalization of environmental costs.¹²⁰ Liability may also lead to the application of more precautions, resulting in avoidance of risk and damage, as well as encouraging investment in research and development to improve knowledge and technologies.¹²¹ We may wonder, however, whether the principle is capable of helping victims to overcome the obstacle course that inevitably confronts attempts to obtain compensation for ecological damage without completely distorting civil liability. It is difficult to draw definitive conclusions about the influence of the principle on the evolution of civil liability. It is nonetheless possible to resort to the principle in order to evaluate the relevance of traditional positive law solutions requiring polluters to compensate the community for damage to the environment. We undertake that exercise in this section. Used as a critical filter for considering current positive law, the PPP here serves to question solutions that have already been challenged by legal doctrine and to suggest improvements to civil liability law, where necessary.

¹²⁰ The Rio Declaration treats the question of liability in a separate principle from the PPP.

¹²¹ COM(2000)66 final, 9 February 2000.

4.2.1 The polluting event

4.2.1.1 *Fault-based liability*

In most European countries civil liability still rests largely on fault giving rise to damage.¹²² Fault occurs when a statutory provision or regulation has not been respected by the liable party, or when the latter has violated a general duty of care.

The need to demonstrate fault has always been considered a substantial obstacle by victims of ecological damage. The victim must prove fault; but what can he do when sophisticated techniques of which he is wholly ignorant are the origin of the injury he has suffered, other than turn to experts to establish the violation of specific standards? If he attempts to prove violation of a general norm of a duty of care, he is necessarily dependent upon the very wide discretion of the courts, which are entitled to define that norm.

The picture is not necessarily as dismal as depicted above, however. The importance of fault should grow in step with the increase in regulations and standards of all types. The more numerous and complex regulations become, the more easily operators will incur liability. In addition, certain traditional provisions are being interpreted in innovative ways which could equally well apply to environmental liability. Moreover, the definition of negligence is being extended as civil liability is increasingly assigned a compensatory objective, and courts are tending to formulate that definition on the basis of damage caused.

4.2.1.2 *Strict liability*

Omitting the concept of fault reduces the time spent discussing the always delicate subject of whether fault has occurred. To ensure adequate compensation for losses, the core of civil liability (fault) will have to give way to its object (compensation for damage).¹²³ In other words, liability will have to break away from the requirement for fault in order to guarantee maximum compensation.

Even if it sometimes results in unfairness to an innocent operator, the basis of the strict liability regime raises few difficulties. Liability independent of fault must be favoured for two reasons: first, it is very difficult for plaintiffs to establish fault in environmental liability cases; and secondly, it is the person who undertakes an inherently hazardous activity, rather than the victim or society in general, who should bear the risk of any damage that might ensue.¹²⁴ Accordingly, the operator

¹²² Most Continental civil liability regimes are fault-based. In France (C. civ., Art 1240) and in Belgium (C. civ., Art 1382) 'everyone is responsible for the damage caused not only by his own act but also by his negligence or carelessness'. Under the Dutch Civil Code (Art 6:162 BW) the tortfeasor must repair the damage another person suffers as a consequence of his act only if there is an unlawful act due to his fault. In Germany, under §823(1) BGB, liability arises when culpably unlawful behaviour has caused injury to a protected interest (*Rechtsgüter*). Like the fault-based regimes in continental codes, those of the three Nordic countries who are members of the EU use fault-based liability regimes.

¹²³ Explanatory report of the 1993 Lugano Convention on Civil Liability for Damage Resulting From Activities Dangerous to the Environment, not yet in force, Recital 7.

¹²⁴ COM(2000) 66 final, 9 February 2000.

responsible for a polluting activity should fully assume all the consequences of his operation, these being the counterpart of operating rights and the ensuing financial advantages.

In treaty practice, the PPP has formed the basis for the establishment of strict liability.¹²⁵ This has been the case for the 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment.¹²⁶ In particular, the ILC Principles on Allocation of Loss provide for a strict liability regime channelled towards the operator of the hazardous activity causing transboundary damage. In fact this is not a new trend in international law.¹²⁷ The main difference with the sector-specific conventional schemes is that the ILC Principles offer a general residual scheme.¹²⁸

This assumption is nevertheless questioned by one theoretical school, which argues that it is not possible to deduce from the PPP that liability for damage exists even in the absence of fault.¹²⁹ The principle would thus not allow one to infer an obligation to establish a strict liability regime for environmental damage. Rather, the law-maker has a free hand to decide whether or not to base liability on fault.

¹²⁵ Convention on Civil Liability for damage resulting from Activities Dangerous to the Environment, preamble; Protocol on Civil Liability and Compensation for Damage caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters, preamble; 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (not in force).

¹²⁶ 1993 Lugano Convention, Recital 6, not yet in force.

¹²⁷ The four nuclear Conventions (the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy, the 1963 Brussels Agreement Supplementary to the Paris Convention of 1960 on Third Party Liability in the Field of Nuclear Energy, the 1963 Vienna Convention on Civil Liability for Nuclear Damage as amended by the 1997 Protocol, and the 1971 Brussels Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material) create a common scheme based on the absolute liability of the operator of a nuclear installation.

The Conventions governing civil liability for oil pollution (the 1969 Brussels Convention on Civil Liability for Oil Pollution Damage (renewed in 1992)), the 1971 Brussels International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (superseded by the 1992 IOPC Protocol), and the 1977 London Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources (not in force) follow a similar pattern, but in a more liberal way, excusing the shipowner in certain cases. The 1991 UN Treaty on Terminal Operator Liability in International Trade (not in force) imposes strict liability on the operator of the terminal. This is also the case for the 1996 International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (not in force) and the 1989 Geneva Convention on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels, which impose strict liability on the carrier (not in force). The first treaty to provide a general and comprehensive regulatory regime in the area of environmental law, the 1993 Lugano Convention on Civil Liability for Damage resulting from Activities Dangerous to the Environment (not yet in force), imposes strict liability on operators in respect of a dangerous activity. The 2000 Basel Protocol on Liability and Compensation for Damage resulting from Transboundary Movements of Hazardous Wastes and their Disposal (not in force) makes the person who notifies the transfer strictly liable until the disposer has taken possession of the wastes. See also the 2003 Protocol on Civil Liability and Compensation for Damage caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters (not in force), Art 1 (c).

¹²⁸ Foster, 'The ILC Draft Principles' (n 81) 266.

¹²⁹ Krämer, 'The Polluter-Pays Principle in EC Law' (n 51) 257.

This controversy expresses a political choice: it is up to the law-maker to decide whether operators must compensate all harmful consequences of their activities even if no fault attaches to them.¹³⁰ Nonetheless, the PPP could influence such a choice. Recent national environmental liability regimes tend to be based on the principle of strict liability, on the assumption that environmental purposes are more effectively achieved in that way.¹³¹

Insofar as the polluter may always avoid liability in the absence of fault, it is clear that a system of fault-based liability guarantees compensation for environmental damage less effectively than a strict liability regime. The PPP is neutral as regards the elements of conscience or intention which should, if only tenuously, characterize a violation, for it is not up to the community to assume financial responsibility for environmental damage caused by individual economic operators, even if the latter are not guilty of any fault or have not been negligent. The cost of reparation of damage should thus be passed to those who caused the damage, insofar as possible; this is more likely under a strict liability regime.

4.2.2 Environmental damage

An environmental impact will only give rise to financial compensation to the extent that it generates damage. For there to be a polluter, there must therefore be damage. From Fukujima to the destruction of a peat bog, from pollution of the seas by hydrocarbons to the poisoning of fish stocks through the discharge of municipal wastewater, a plethora of effects come under the rubric of ecological damage.

Infinitely variable by nature, this notion may cover both damage caused to *res propriae* (people or goods) and that caused to *res communes* (water, air, etc.) or to *res nullius* (wild flora and fauna). The first category of damage, where human beings or their goods are the victims, presents the least difficulty. Relating to elements that may be assessed monetarily, it allows compensation to be envisaged *a priori*.

By contrast, the category comprising 'pure ecological damage' or 'ecological damage *stricto sensu*' does not easily fit into the traditional legal system since the victim of pollution in this second category is the environment. Damage affecting the unowned environment does not have an individual and personal character and consequently does not generally give rise to compensation. Nature does not speak for itself. This requirement prevents the reparation of damage caused to *res communes* or *res nullius*, which may appear unjustified in the light of the PPP.¹³²

¹³⁰ In *Cambridge Water*, Lord Goff stated that Parliament has greater democratic legitimacy than the courts when it comes to imposing a strict liability regime in respect of operations of high risks: *Cambridge Water Co v Eastern Counties Leather plc* [1994] 2 AC 264.

¹³¹ Strict liability is firmly established as the basis for all new national environmental legislation at European level. The Dutch Civil Code, Art 6: 175, and the chapter on liability for contaminated land of the Swedish Environment Code clearly suggest that the PPP calls for the establishment of a strict liability regime.

¹³² A Carette, *Herstel van en vergoeding voor aantasting aan niet-toegeëigende milieubestanddelen* (Intersentia, 1997) 630.

According to the PPP, the responsible party should repair damage to both private goods and non-appropriable goods.¹³³ This is the only reasonable solution, since the very object of the principle is to avoid forcing the community at large to bear the costs of damage to the unowned environment in the place of those truly responsible for such damage. Moreover, the reparation should take place, by priority, in nature.¹³⁴

Furthermore, all costs related to the damage caused by pollution must be compensated. If regional water protection legislation provides that, by virtue of the PPP, the costs of compensating any environmental damage must be borne by the party responsible for the pollution, 'these costs must not ultimately be borne by the public authorities'. The Belgian Court of cassation held that a water protection agency may claim full reimbursement of these costs from the perpetrator of the polluting activity. This covers preventive measures as well as any restorative measures required under regulations, and the costs of staff involved in order to monitor the pollution. The Belgian Court of Cassation also reversed a Court of Appeal judgment which had ruled that no damage had been proven since the regional authority had not provided any evidence in support of the number and location of samples taken and analyses carried out by the water protection agency, given the absence of any resulting pollution. According to the PPP, the costs incurred 'must not ultimately be borne by the water protection agency'.¹³⁵

4.2.3 Causation

Strict liability may alleviate the burden that victims may otherwise have in proving fault or negligence of the tortfeasor. However, it does not eliminate the difficulties involved in establishing the causal connection that is linked to questions of foreseeability and proximity.¹³⁶ This calls for a thorough analysis of the causal link between multiple acts and harm of a variegated nature. This issue will be addressed from two different perspectives: on the one hand, a civil law approach, and on the other, the administrative perspective under the ELD.

4.2.3.1 *Pollution of a diffuse nature generated by multiple acts*

Victims are regularly confronted with pollution of a diffuse nature generated by multiple acts. As far as the causal link is concerned, traditionally there have been two opposing theories (both of German origin) within private law: on the one hand, the theory of adequate causality and, on the other, the theory of

¹³³ Under Indian law, the absolute liability stemming from the PPP encompasses not only the compensation of victims of pollution 'but also the cost of restoring environmental degradation'. See *Vellore* (n 56) para 12.

¹³⁴ French C. civ., Art 1386-22.

¹³⁵ C Cass. b., 1 June 2018, 8 (2019) TBBT/RDGC 450–74, case note by C Borucki.

¹³⁶ ILC draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (hereinafter ILC Principles on Allocation of Loss), commentary to Principle 4 (16).

equivalence of conditions (*théorie de l'équivalence des conditions, bedingungstheorie, or Äquivalenztheorie*).

Belgian and, to a lesser extent, French national courts tend to favour victims by applying the theory of equivalence of conditions, which puts all the acts that contribute to damage on an equal footing.¹³⁷ In other words, each element that is considered a necessary condition of the damage is considered to have caused the damage. Where damage is caused by a plurality of conditions, the parties that caused the damage will be held jointly and severally liable. Legal causality is thus similar to factual causality. This theory enables the victim to recover the whole of his damage from any tortfeasor, regardless of separate contributions to that damage. The person that paid compensation to the victim subsequently has a right of recourse against the other responsible parties in proportion with their responsibility for the harm.

The theory of equivalence of conditions nonetheless reaches its limits in dealing with the environment, for it does not make it possible to impute collective damage caused by the accumulation of many small acts of present or historic pollution to a large number of operators.¹³⁸ Each small polluting act is lawful; thus, escaping fault-based civil liability, such acts can only be controlled and limited through fiscal mechanisms of a preventive nature, which authorize recourse to the PPP.

On the other hand, the theory of adequate causality (*théorie de la causalité directe*) is the most widespread within continental Europe.¹³⁹ It was developed in response to the opposing theory of equivalence of conditions (joint and several liability), on the grounds in particular that it was proving to be excessively rigid. Specifically, the latter theory tends to impose liability on people who have only played a minor role within the chain of events that gave rise to the harm.

For the proponents of this theory, the mere occurrence of the event that gave rise to the damage is not sufficient in order to consider it to be the cause. It is also necessary that, within the ordinary course of events, the occurrence in question is of such a nature as to result systematically in this type of harm.¹⁴⁰ This means that the harm is objectively foreseeable. As a result, any events that are considered to be unforeseen will not be taken into account.

Each theory has its advantages and drawbacks.

Criticism has been directed at joint and several liability on the grounds of the PPP; that is, by holding the most solvent party responsible for damages the system

¹³⁷ The Brazilian Supreme Court held that the traditional requirement of causality must not be applied in a manner that releases polluters from their liability. Accordingly, defendants must be held joint and severally liable. STJ, REsp 650,728/SP, 2nd Panel. See AH Benjamin and N Bryner, 'Brazil', in E Lees and J Viñuales (eds), *The Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 103.

¹³⁸ J van Dunné, 'Legal Aspects of Non-Point Source Pollution of the River Meuse: a Comparative Analysis of Liability in Tort and Multiple Causation', in J van Dunné (ed), *Non-Point Source River Pollution: The Case of the River Meuse* (Kluwer Law Int'l, 1996) 46.

¹³⁹ German and the Swiss courts endorse this theory.

¹⁴⁰ JL Fagnart, *La causalité* (Kluwer, 2008) 10.

in effect encourages a 'deep pocket' approach. Such a scheme is likely to become unjust if the victim seeks redress from the party with the greatest financial resources rather than the party that has caused the greatest amount of damage. Some room might be granted to the court to decide—for instance in cases where the operator who caused the damage can prove that this damage was entirely and exclusively caused by emissions that were explicitly allowed by his permit—that part of the compensation should be borne by the permitting authority, instead of the polluter.

It is true that in a joint and several liability system the most solvent party will have to pay everything, although it may subsequently sue its fellow parties. Opposing this traditional regime, a system of mitigated joint and several liability would make each party liable for all damage unless it can prove it caused only part of the damage. As the party would then only be liable for that part, this system better protects the most solvent party, to the extent that it can prove liability for only a portion of the damage in question.

It would be paradoxical, however, to limit joint and several liability, which is quite favourable to victims, in the name of the PPP at the same time as that principle is being used to ensure that polluters assume exclusive liability for damages. The PPP is a principle for imputing liability. Although it performs a preventive function, the principle must at least guarantee that redress from an economic operator is assured. In particular, it would be unfair to burden society as a whole with the costs of environmental damage for which it is not responsible. For instance, a national provision that holds the owners and possessors of the contaminated land jointly and severally liable is consistent with the ELD in as much as it does not affect the liability in principle of the operator. In effect, this more stringent national regime seeks 'to prevent a lack of care and attention on the part of the owner', as well as to encourage him to minimize the risk of environmental damage. As a result, the national arrangement 'contributes both to the prevention of such damage' and to the attainment of the Directive's objectives.¹⁴¹

On the other hand, the theory of adequate causality has been endorsed by some commentators, who take the view that the foreseeability of harm is essential.¹⁴² Specifically, if any harm is foreseeable for the polluter (as the party that causes the harm), it will take all suitable preventive action in order to avoid the pollution. In our view however, the theory of adequate causality is rather problematic within environmental law as it is based on the foreseeability of harm. In effect, due to the latent uncertainty in this area, it is often difficult to foresee environmental harm in objective terms. So whilst it has been demonstrated scientifically that an oil spill will kill all species of fish, it is not possible to reason by analogy and to conclude that the same source of pollution will kill all shellfish.¹⁴³

¹⁴¹ Case C-129/16 *TTKft* (n 41), paras 57–8.

¹⁴² M Faure, 'Economic Aspects of Environmental Liability' 4 (1996) *European Review of Private Law* 85–109.

¹⁴³ L Bergkamp, *Liability and Environment* (Kluwer Law Int'l, 2001) 293.

Moreover, this theory is not easy to apply in cases involving strict liability, which recur widely throughout environmental law.¹⁴⁴ Finally, this theory is practicable where the pollution has occurred within a limited geographical space over a limited period of time. On the other hand, it is less practicable in relation to more complex forms of pollution.¹⁴⁵

4.2.3.2 *Pollution of a diffuse character under the ELD*

Pursuant to Article 8(3)(a) of the ELD, the operator cannot be required to bear the cost of preventive or remedial actions when he can prove that the environmental damage or imminent threat of such damage ‘was caused by a third party and occurred despite the fact that appropriate safety measures were in place.’ Regarding the scope of that provision, the CJEU held that Member States are endowed with a broad discretion particularly when establishing the causes of pollution of a widespread, diffuse character.¹⁴⁶ The Court has nonetheless placed emphasis upon the competent authority’s obligation to establish a causal link in the context of the system of strict environmental liability of operators.¹⁴⁷ Therefore, the causation between the polluting activities and the damage can be presumed if there is ‘plausible evidence’, such as the fact that the operator’s installation is located close to the pollution found.¹⁴⁸ Practically speaking, a correlation between the environmental damage and the substances used by the operator in connection with his activities is sufficient to demonstrate the causation. In *Raffinerie Méditerranée*, the CJEU held that given that none of the undertakings owning the contaminated sites were engaging in any of the activities listed in Annex III to the ELD, the strict liability scheme was deemed to be inapplicable. As a consequence, only the fault-based liability scheme that applies to damages caused to some protected species and habitats could apply. Along the same lines as the previous cases, the competent authority must establish a causal link between the activity of one or more identifiable operators and concrete and quantifiable damage, irrespective of the type of liability at issue.¹⁴⁹

4.2.3.3 *Break in the causal link*

Finally, in various national laws the costs to the public authorities of intervening to halt accidental pollution may not be recovered from third parties who contributed

¹⁴⁴ Y Mossoux ‘La détermination du pollueur et de la causalité dans le cadre du PPP’ (2010) *Administration publique* 286.

¹⁴⁵ *Ibid.*, 290.

¹⁴⁶ Case C-378/08 *ERG* [2010] C:2010:126, and Joined Cases C-379/08 *ERG* and C-380/08 *ENI SpA* [2010] C:2010:127, para 55.

¹⁴⁷ Joined Cases C-379/08 *ERG* and C-380/08 *ENI SpA* (n 146), paras 63 to 65, and order in *Buzzi Unicem* [2010] C:2010:129, para 45; Case C-534/13 *Fipa Group* [2015] C:2015:140, para 55, case note by N de Sadeleer 24:2 (2015) *RECIEL* 232–7.

¹⁴⁸ Joined Cases C-379/08 *ERG* and C-380/08 *ENI SpA* (n 146), para 55.

¹⁴⁹ *Ibid.*, para 56.

to the damage.¹⁵⁰ This represents a break in the causal link between the loss sustained by the authorities as a result of their intervention and the fault committed by polluters. This case law is contradictory to the PPP, particularly as the OECD Recommendation of 5 July 1989 on the Application of the PPP to Accidental Pollution envisages that clean-up costs for accidental pollution borne by the authorities should be charged to the polluter. In order both to escape the dangers of this case law—which is at the very least unstable—and to conform better to the spirit of the PPP, special laws should expressly require the polluter to reimburse clean-up costs taken on by the public authorities.¹⁵¹

4.2.4 Canalization of liability

Strict liability has both advantages and disadvantages: on one hand, it presents the advantage that the victim may act against a single person who is easily identifiable; on the other hand, it could be disadvantageous for the victim in cases where the designated operator is insolvent.¹⁵² This raises the question as to the identification of the liable party.

4.2.4.1 Identifying the liable party

Even when the source of damage is identified, it is still necessary to determine the person liable for that damage. That task may prove highly complex, given the multiplication of potentially liable parties. Such snags can be avoided only by canalizing liability. The canalization mechanism is linked to the establishment of strict liability regimes. It also provides certainty as to how liability will be assigned. Carrying out a preliminary designation of the operator also encourages the latter to improve safety measures or to choose more reliable operating systems. Canalization of liability therefore responds to the redistributive and preventive functions of the PPP.

Like Directive 85/374/EEC concerning liability for defective products, which considers the producer liable,¹⁵³ several international¹⁵⁴ and national

¹⁵⁰ In Dutch law, as regards pollution caused before 1975, see e.g. A Krusinga and J Lefevre, 'De 30 September arresten: De historische vervuiler opnieuw buiten schot?' (1995) 2 TMR 99. In Belgian law, see Cass. 28 April 1978, (1979) RCJB 275; Cass. 28 June 1984.

¹⁵¹ For instance, see in international law the 1969 Brussels Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Damage.

¹⁵² Strict liability does not amount to absolute liability. In effect, under strict liability regimes exonerating justifications (Act of God, fortuitous event, *force majeure*, etc.) act as limitations which may exonerate the polluter from liability.

¹⁵³ Directive 85/374/EEC, Art 1 concerning liability for defective products tracing liability for damage caused by a product back to its producer, as well as its importer and, under certain circumstances, their suppliers.

¹⁵⁴ According to Art II of the 1969 Brussels Convention on Civil Liability for Oil Pollution Damage, the liable party is the owner of the ship. According to Art s 6(1) and 7 of the 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (not in force), the liable party is the operator in respect of a dangerous activity. In the area of accidental pollution arising from dangerous installations the OECD designates the operator as the polluter. Under the 1999 Basel Protocol on Liability and Compensation for Damage resulting from Transboundary Movements of Hazardous Wastes and their Disposal (not in force) the person notifying the transfer and the

environmental liability regimes stress that the person who has the greatest degree of control over the source of the pollution should be liable. Those regimes usually tend to canalize liability towards the operator of the dangerous activity: the operator of the nuclear installation, or the owner of the ship since in principle he has both knowledge of and control over its installation.

However, determining that a single party is liable under strict liability is as difficult as determining who should pay a charge. In the case of a contaminated site, it is not always easy to identify who has actually caused pollution. The operator of the installation or his representatives, the manufacturer of the defective product, or the owner of the property may be liable for pollution. Is it the person who possesses technical knowledge, or resources, or operational control of the activity at the time when damage occurs? This question becomes even more complex in the case of diffuse pollution, where multiple causes produce single effects and single causes produce multiple effects. The PPP cannot answer that question, though three approaches could be adumbrated. Liability could be imposed either on the operator of the plant causing the damage (Subsection 4.2.4.1.1) or, if the pollution does not originate from a specific operator, on the landowner or occupier of the land where the pollution occurred (Subsection 4.2.4.1.2). In relation to oil spills, the CJEU has held that oil producing companies could be held liable under specific circumstances (Subsection 4.2.4.1.3).

4.2.4.1.1 The operator The strict liability envisioned by the ILC in the case of transboundary harm arising out of hazardous activities primarily attaches to the operator of a hazardous activity.¹⁵⁵ By the same token, the primary importance afforded to the PPP in the ELD lies precisely in the fact that the Directive places operators and not the authorities under a duty both to prevent and to remedy environmental damage.¹⁵⁶ In *Agusta*, the CJEU held that a strict liability regime does not in itself run contrary to the PPP.¹⁵⁷ Nonetheless, reasoning by analogy with *Standley*, the Court expressed the view that in spite of the strict liability regime, operators are not required to bear the costs of remedial actions where they can prove that the environmental damage was caused by a third party and occurred despite the fact that appropriate safety measures were in place. In effect, 'it is not a consequence of the PPP that operators must take on the burden of remedying pollution to which they have not contribute.'¹⁵⁸ In other words, strict liability is not akin to

disposer taking possession of the hazardous wastes is liable for damage. The 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy and the Brussels Supplementary Convention provide for three tiers of liability: the operator of the nuclear plant tier, the installation state tier, and the international tier.

¹⁵⁵ See ILC's Principles on Allocation of Loss, Principle 4(2). This principle aims to ensure that victims suffering harm as a result of an incident involving a hazardous activity obtain prompt and adequate compensation.

¹⁵⁶ Cases C-379/08 and C-380/08 *ERG* (n 146), para 75.

¹⁵⁷ Case C-378/08 *ERG* [2010] C:2010:126, para 70.

¹⁵⁸ Art 11(2).

absolute liability. The duty to establish which operator has caused the damage rests with the competent authority.

4.2.4.1.2 The landowner or occupier For reasons of administrative expediency, the trend at national level has been towards picking the owners rather than the former polluters to implement remedial measures and to bear the incurring costs.¹⁵⁹ Indeed, in the absence of any ‘polluter’, the only person able to take remedial measures, apart from the public authorities, is the landowner or occupier.¹⁶⁰ However, innocent owners of a contaminated land are likely invoke the PPP as a shield against the remediation obligation imposed by the administration.

A distinction should be drawn between three scenarios.

First of all, the owner or occupier of land is considered to be an operator for the purposes of Article 6 of the ELD. According to that provision, he may have a ‘decisive economic power’ over the activity that is operated by the holder of the environmental licence. This imposition of liability is thus consistent with the ELD and the PPP.

Secondly, the owners of the contaminated land on which the pollution occurred are liable for the costs of remedial action because the original polluter cannot be found. In *Raffinerie Mediterranée* and *Fipa Group*, the CJEU ruled that:

operators are not required to bear the costs of remedial actions where they can prove that the environmental damage was caused by a third party and occurred despite the fact that appropriate safety measures were in place, since it is not a consequence of the ‘polluter pays’ principle that operators must take on the burden of remedying pollution to which they have not contributed.¹⁶¹

As a result, it cannot be automatically assumed that the operator using a contaminated site is responsible for having caused the pollution. Indeed, the PPP does not allow the law-maker to impose liability on an operator that has not caused the environmental damage.

Thirdly, the owner or occupier of land may be held liable irrespective of any causal link. However, as they will be held liable solely by virtue of their ownership or occupancy rights over that land, this approach departs from the PPP.¹⁶² Nonetheless, such an outcome can be permissible as the Member States may adopt

¹⁵⁹ On 2 February 2000, the German BVerfGG held that the unlimited nature of the owner’s liability could constitute a breach of the proportionality principle, which the law-maker must take into account when establishing the limits that are to be imposed on rights of ownership.

¹⁶⁰ A Waite, ‘The Quest for Environmental Law Equilibrium’, in G Betlmen and D Brans (eds), *Environmental Liability in the EU* (Cameron May, 2006) 83.

¹⁶¹ Case C-378/08 *ERG* [2010] C:2010:126, para 67; Case C-534/13 *Fipa Group* (n 147), paras 57–8.

¹⁶² Opinion of AG Kokott in Case C-378/08 *ERG* (n 161) para 98.

stricter measures pursuant to Article 16 of the ELD.¹⁶³ The liability on the innocent owner must nevertheless be grounded on the presumption of causation related to plausible evidence.¹⁶⁴ The shifting of the obligation to carry out remedial action from the operator to the owner or occupier with a view to encouraging the latter to endorse a more preventive approach is not inconsistent with EU law. What is more, this residual liability must be approved for the reason that it is impossible to apply the PPP because the polluter cannot be identified.¹⁶⁵

4.2.4.1.3 The producer of the contaminating substance In both *van de Walle* and *Mesquer*, two waste liability cases, the CJEU was asked to rule on whether the producers of oil products from which the waste came might be held liable for the costs of cleaning up the environmental damages resulting from accidental oil spills in accordance with the former Waste Framework Directive (Waste FD) 75/442/EC. These two judgments enhance the enforceability of the PPP when it has been fleshed out into specific EU obligations.¹⁶⁶

It should be pointed out that under the former Waste FD the concept of ‘holder’ embraced both ‘the producer of waste’ and ‘the natural or legal person who is in possession of it’. In order to answer the question whether a petroleum company could be deemed to be a holder of the waste, and consequently liable, the CJEU emphasized the importance of Article 15 of the former Waste FD 75/442/EC, which, in accordance with the PPP, stated that ‘the holder’ of the waste (first indent) or ‘the previous holders or the producer of the product from which the waste came’ (second indent) must bear the cost of disposing the waste.

In *van de Walle*, the Court was asked to decide whether the Waste FD’s obligations were applicable to Texaco which produces hydrocarbons and sells them to a manager operating one of its service stations under a contract of independent management excluding any relationship of subordination to the company.¹⁶⁷ Though it is the service station’s manager who, for the purpose of his operations, had them in stock when they became waste and who may therefore be considered to be the person who ‘produced’ them,¹⁶⁸ the Court took the view that the oil company can,

¹⁶³ In accordance with TFEU, Art 173, ELD, Art 16 allows the Member States to adopt more stringent provisions ‘in relation to the prevention and remedying of environmental damage’. See Case C-129/16 *TTKfi* (n 41), paras 56–61.

¹⁶⁴ Opinion of AG Kokott in Case C-534/13 *Fipa Group* (n 147), para 35.

¹⁶⁵ F Goisis and L Stefani, ‘The Polluter-Pays Principle and Site Ownership: The European Jurisprudential Developments and the Italian Experience’ (2016) 13 *JEEPL* 235.

¹⁶⁶ Though the Waste FD has been amended (see N de Sadeleer, *Le droit des déchets de l’UE* (Larcier, 2016)), this case law is still relevant. Member States are indeed empowered to impose liability on the producer of the product that turned into waste.

¹⁶⁷ Case C-1/03 *van de Walle* [2004] ECR I-7613, case note by N de Sadeleer (2008) 3 *CMLR* 16; McIntyre (2005) 17 *JEL* 109. In reaction to this judgment, the EU law-maker explicitly excluded land and unexcavated contaminated soil from the scope of the new Waste FD (Directive 2008/98/EC, Art (2) (1)(b)). Nonetheless, the Member States, in accordance with TFEU, Art 173, can subject contaminated land to waste law (see, Cass. b., 17 June 2015).

¹⁶⁸ Case C-1/03 *van de Walle* [2004] ECR I-7613, para 59.

in certain circumstances, be considered the holder of the land contaminated by hydrocarbons that accidentally leak from the station's storage tanks, even where the petrol company does not own them.¹⁶⁹ In other words, the 'polluter' should be the person who causes waste and thereby pollution.

In *Mesquer*, the CJEU had to adjudicate the issue of whether an oil company could be charged for the cleaning up of heavy fuel that was accidentally discarded by a tanker. The Court reached the conclusion that, even if it was in principle the ship-owner who held the waste,¹⁷⁰ the producer of heavy fuel oil as well as the seller and the oil tanker charterer could be held liable for waste disposal costs, on the grounds that they could be deemed to have contributed in some way to the causal chain which lead to the shipwreck at the origin of the accidental spillage.¹⁷¹ That financial obligation is thus imposed on the 'previous holders' or the 'producer of the product' from which the waste came 'because of their contribution to the creation of the waste and, in certain cases, to the consequent risk of pollution.'¹⁷² As a result, the liability for damage caused by waste disposal cannot only be channelled to the sole owner of the vessel, who generally speaking is much less solvent than the companies chartering the ship. On the contrary, it is possible, in accordance with the PPP, to regard the seller-charterer as a previous holder of the waste.¹⁷³ That said, the producer may only be made liable, in accordance with the PPP, insofar as the latter has 'contributed by his conduct to the risk that the pollution caused by the shipwreck will occur'.¹⁷⁴

In shifting the channelling of the liability, the CJEU was nonetheless surrounded by opposing norms with, on the one hand, international agreements limiting the liability of oil companies and, on the other hand, Article 15 of the former Waste FD, which does not provide for any limitation on the liability of the waste holder.¹⁷⁵ What deserves attention here is that the international agreements applicable to the compensation for damage caused by the discharge of hydrocarbons are, at first glance, far more favourable to oil companies than to victims. This is because, on the one hand, they channel liability to the oil tanker owner,¹⁷⁶ which has the effect of paralysing any compensation claims for third parties. On the other hand, even if this limitation of liability is countered by the intervention of a compensation fund,¹⁷⁷ this intervention remains limited. The limitation can, therefore, result in neither

¹⁶⁹ *Ibid*, para 60.

¹⁷⁰ Case C-188/07 *Mesquer* [2009] ECR I-4501, para 74; case note by N de Sadeleer (2009) 21:2 JEL 299.

¹⁷¹ *Ibid*, para 78.

¹⁷² *Ibid*, para 77.

¹⁷³ *Ibid*, para 78.

¹⁷⁴ *Ibid*, para 82. The criterion of 'contribution to the risk that the pollution might occur' is somewhat lower than the threshold to be met in *van de Walle*, the direct causal link or the negligent behaviour of the operator.

¹⁷⁵ However, by not concluding these international instruments, the EU was not bound by obligations thereof, whereas the majority of Member States, including France, were parties to them.

¹⁷⁶ International Convention on Civil Liability for Oil Pollution Damage.

¹⁷⁷ International Oil Pollution Compensation Fund.

the shipowner nor the International Fund bearing any part of the costs of waste disposal resulting from damage due to pollution by hydrocarbons at sea. This leads to the financial burden being placed on the general public, which seems contrary to the logic of the PPP.

The CJEU considered that Article 15 did not prohibit Member States, in accordance with these international agreements, from laying down limitations and exemptions of liability in favour of the shipowner or of the charterer.¹⁷⁸ There was therefore no incompatibility between EU waste law and international law.¹⁷⁹ Practically speaking, if the damage caused by the oil spill exceeds the ceiling for compensation provided for under the international regime, the Member State is called on to give precedence to the EU waste liability scheme interpreted in the light of the PPP so as to make sure that the costs are borne by the producer of the oil from which the waste came. EU secondary law obligations interpreted in the light of the PPP may not be emasculated by limitation or exemption systems resulting from international agreements to which the EU is not party.¹⁸⁰

The willingness of the CJEU in these two cases to channel the liability towards the oil producers provided that their conduct has given rise to the waste must be approved of for the following reasons. First, for reasons of economic efficiency and administrative simplicity, the law does not necessarily need to adhere to reality, and it is sometimes preferable to apply the qualification of polluter or waste holder to a single person rather than a number of people. Consequently, the polluter may be the agent who plays a determining role in producing the pollution rather than the person actually causing the pollution.¹⁸¹ Secondly, in shifting the channeling of the liability towards the most solvent party—the oil producing company or the seller-charterer—the Court ensures that the clean-up of the oil spills will take place. Thirdly, given that the liability is not channelled towards the least solvent party—the holder of the waste—all the parties involved in the chain of operations are enticed to monitor closely their respective activities.

4.2.4.2 *Liability for diffuse pollution*

Damage is often caused by one or several unidentified persons who are part of a larger group of economic operators whose identity is known. Such is the case, for

¹⁷⁸ Case C-188/07 *Mesquer* (n 170), para 81. The fact that these limitations and exemptions stemming from international law would have the effect of passing on to the general public a substantial part of the environmental liability was, according to AG Kokott, in accordance with the ‘polluter pays’ principle (Opinion, para 142).

¹⁷⁹ *Ibid.*, para 82. In so doing, the CJEU departed somewhat abruptly from the Opinion of the AG in considering that a correct transposition of Art 15 of the Directive implied that national law must ensure that further costs ‘be borne by the producer of the product from which the waste thus spread came’.

¹⁸⁰ *Ibid.*

¹⁸¹ The fact that the hydrocarbons were accidentally spilled does not preclude that there is no obligation to decontaminate the land in the light of the PPP. Indeed, the OECD Recommendation of 5 July 1989 on the Application of the Polluter-Pays Principle to Accidental Pollution confirms the intention to apply the principle to accidental pollution.

example, when excessive levels of a dangerous substance are discharged into a river by a number of installations specifically authorized to discharge that substance into that body of water. In a fault-based regime only the firm carrying out unauthorized discharges would be held liable, since the other plants would have been operating within their authorized emission limits. Yet it is not certain that the victim will be able to identify which firm carried out the illegal discharge from among a group of installations situated upstream from his property. The classical solution would then be to dismiss the case, sacrificing the interests of the victim on the altar of the principle of causation.

Based on this reasoning, the Paris Court of Appeal judged that when local residents complained about air traffic noise from an airport, they were criticizing isolated acts attributable to different airlines.¹⁸² Since the damage was not indivisible in character, however, the victims were not able to prove which airline had been the cause of any given noise; therefore the companies could not be held liable. Such a solution is not compatible with the PPP, in that it transfers negative externalities to the community.

An argument that is more favourable to the interest of the victims and could find support in the PPP is set out in several legal systems. Some French courts, for instance, have extended joint and several liability to all potential agents of a hunting accident, to the benefit of the victim, even when the fatal shot has been fired by a single hunter who cannot be identified.¹⁸³ If it cannot be established which hunter actually shot a passer-by, all hunters are held liable. In a different case, faced with the impossibility of identifying the agricultural firm that had polluted fish farms through wastewater discharges, the German *Bundesgerichtshof* ruled that the two installations which had discharged a dangerous substance were both liable since no damage would have occurred had they not carried out those discharges.¹⁸⁴ In the latter case, in order for there to be a presumption of causation, the victim merely needs to prove that the substances that provoked the damage were discharged by an installation operated by the defendant; it is no longer necessary to demonstrate that a specific emission was the cause of the damage.

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) is also a case in point as US courts have interpreted this Act as providing for joint and several liability. It follows that the EPA may recover from any responsible party or parties all the costs of responding to a given release or threatened release of hazardous substances, even if one or more other responsible

¹⁸² Paris, 19 March 1979, (1979) DS 429.

¹⁸³ H Aberkane, 'Du dommage causé par une personne indéterminée dans un groupe déterminé de personnes' (1958) RTD Civ 516.

¹⁸⁴ BGH, 22 November 1971, 52 BGHZ 257. On this point, see the commentary by P Von Wilmsowski and G Roller, *Civil Liability for Waste* (Peter Lang, 1992) 56.

parties exist.¹⁸⁵ According to some authors, the Act is an excellent illustration of the PPP in action.¹⁸⁶

Taking these reflections a step further, the appearance of large-scale damage caused by substances that have been commercialized by several large firms (DES, thalidomide, PCP, asbestos, etc.) raises the question of collective liability of all those who might have been responsible for those damages. In contrast to the preceding examples, we are no longer dealing with a limited group of persons. Moreover, the potentially liable firms produce or place on the market substances that have been the subject of complaints over a period of time. Here as well, the PPP could support the concept of collective fault based on the fact that each party produces the same risk. The cases that brought into question the damaging effects on foetuses of the drug DES when taken by pregnant women illustrates this argument. The victims sued a number of pharmaceutical companies in several US states; those firms marketed 90 per cent of all DES at the time of the events in question. Although the causal link between the product and the birth defect had been clearly demonstrated, the victims were nevertheless unable to prove exactly what make of medicine their mothers had taken during pregnancy. They were therefore unable to prove which firm was responsible for their illness, given that each of the defendants had placed the same substance on the market under different names. The plaintiffs were thus unable to establish the requisite causal connection owing to the existence of multiple tortfeasors.¹⁸⁷ The Supreme Court of California accepted in 1980 that each firm was liable for the damages caused to the victims according to its respective market share.¹⁸⁸

Twelve years later a far more satisfactory solution was provided by the Dutch *Hoge Raad*, which judged that the eleven firms that had commercialized DES in the Netherlands were jointly and severally liable for damages to the victims.¹⁸⁹ Differently put, any one producer can be held liable for the full damage suffered by a large number of victims. As Jan van Dunné has noted, this decision has important implications for cases of diffuse pollution caused by a group of economic agents producing a homogeneous risk.¹⁹⁰ The market-share theory has been rejected by the *Hoge Raad*, which did not consider that the market share of each producer had to be established in the lawsuit. This case law may be of some assistance to plaintiffs

¹⁸⁵ See, e.g., *O'Neill v Picillo*, 883 F 2d 176 (1st Cir. 1989), *cert denied sub nom, American Cyanimid Co v O'Neill*, 493 US 1071 (1990), at 178–9; *United States v Chem-Dyne Corp*, 572 F Supp 802 (SD Ohio 1983), at 808.

¹⁸⁶ PA Barresi, 'The Polluter Pays Principle as an Instrument of Municipal and Global Environmental Governance in Climate Change Mitigation Law: Lessons from China, India, and the United States' 20:1 (2020) *Climate Law* 50–93.

¹⁸⁷ G Betlem, *Civil Liability for Transfrontier Pollution* (Graham & Trotman/Martinus Nijhoff, 1993) 474.

¹⁸⁸ *Sindell v Abbott Laboratories*, 26 Cal 3d 588; 607 P 2d 924 (1980).

¹⁸⁹ HR, 9 October 1992; (1993) 1 TMA 15, comment by J van Dunné.

¹⁹⁰ van Dunné, 'Non-point Source Pollution' (n 138) 46.

facing the probatory problem of identifying multiple tortfeasors of environmental damage.

According to van Dunné, this case law has recently been extended to the area of ecological damage through the Dutch *Hoge Raad* transposing this solution to a case of water pollution. It judged that even if 'others than the designated parties had probably contributed to the pollution, it is established that the former are liable for an act which could have produced all the damage suffered by the victim.'¹⁹¹

Full internalization of pollution costs would appear to be the determining factor, since: 'the damage should not be borne entirely or partially by the victim, on the grounds that others could have caused part of the damage and that the victim has not been able to prove that all the damage he suffered stems from the act in question.'

This has interesting implications for the use of the PPP in the field of civil liability, since the concept of the polluter—previously individual in character—here takes on a collective dimension.

The situation is easier when pollution has been caused by the accumulation of substances discharged by several installations, each of which holds a permit to discharge. In that case it is the accumulation that gives rise to damage rather than the substance per se. When the theory of *l'équivalence des conditions* applies, the victim has the right to engage the joint and several liability of each of the discharging installations. However, the operators must have acted unlawfully at the time of the release of the harmful substances without a strict liability regime.¹⁹²

Accordingly, a number of authors have taken to emphasizing the need to elaborate a system of collective liability for such cumulative damages. Under such a system, all hazardous installations operating in the area affected by the pollution in question would be held jointly and severally liable for damages.¹⁹³

4.2.5 Critical assessment

Use of the PPP in the field of environmental taxation gives rise to a number of uncertainties and ambiguities. The question of how the principle should be applied becomes even more difficult when we attempt to describe exactly how it will affect civil liability. Will such liability derive from the concept of fault, or of risk? Must the 'polluter' always be a private person, or may it be the State as well? Is ecological damage included among those losses that can be compensated?

¹⁹¹ HR, 17 January 1997, NJ 1997/230; (1997) 2 TMA 49, J van Dunné. *Contra* E Baun, 'Alternative causaliteit en milieuschade: Enkele opmerkingen naar aanleiding van het arrest Moerman-Baak' 2 (1998) TMA 30.

¹⁹² For a widely criticized judgment of the Dutch *Hoge Raad*, where a polluter escaped liability, see HR, 30 September 1994, NJ 1996/197.

¹⁹³ G Teubner, 'The Invisible Cupola: from Causal to Collective Attribution in Ecological Liability', in G Teubner and Farmer (eds), *Environmental Law and Ecological Responsibility* (Kluwer Law Int'l, 1994) 17; G Brüggermeier, 'The Control of Corporate Conduct and Reduction of Uncertainty by Tort Law', in R Baldwin (ed), *Law and Uncertainty: Risk and Legal Processes* (Kluwer Law Int'l, 1997) 71.

Purists will perhaps conclude that these difficulties doom the principle to failure. Yet despite its rather vague outlines and its inability to settle all the questions raised in connection with civil liability, the PPP has the merit of clarifying criticisms that have been made of certain controversial doctrinal and legal solutions as well as strengthening arguments relevant for the purpose of environmental protection. We should not reject the PPP in its entirety merely because it continues to present difficulties of interpretation and application. Such a general principle cannot, in fact, satisfactorily meet all objections and questions.

Although it is generally presented in the field of environmental protection as a law of 'failure', coming into play when it is too late, civil liability does to some extent contribute to preventing the repetition of injurious behaviour in future. This preventive orientation can only become significant, however, if compensation is set at a level that encourages the liable party to take adequate measures to avoid recurrence of the damage.

This analysis indicates that civil liability cannot on its own assume the compensatory and preventive function of the PPP, for the victim always runs the risk that the agent may be unidentifiable or insolvent. Solutions must thus be sought outside of civil liability. Public authorities and hazardous installations have for many years been turning towards alternative mechanisms, such as collective compensation that guarantees automatic reparation. The notion of liability is totally absent from such compensation funds, which are based on solidarity rather than liability. These funds also have a subsidiary use in that they come into play when the person at the origin of the damage is unknown or insolvent. By assigning a charge to an industrial risk that has caused environmental damage, funds respond, at first glance, to the logic of the PPP. On the other hand, by playing down risks these compensation mechanisms are likely to distort preventive measures. Both negligence aspects and the objectionable nature of environmental damage, as well as respect for the standard of *bonus pater familias*, may be weakened by the interposition of funds that provide immediate indemnification. A charge paid into a fund does not produce a strong impression and thus has little effect in encouraging potential polluters to exercise care, as shown in the 1999 Erika oil-spill case. The semi-automatic payment of a fee takes the place of the right to pollute. According to Boyle, the limit of liability regimes in spreading the burden of serious accidents indicates how far removed from the PPP the schemes found in conventions concerning civil liability for oil pollution and nuclear installations remain.¹⁹⁴ Thus it can be said that by putting a ceiling on the damages recoverable, none of these civil liability conventions fully implements this environmental principle.

¹⁹⁴ A Boyle, 'Making the Polluter Pay? Alternatives to State Responsibility in the Allocation of Transboundary Environmental Cost' in Fr Franzioni and T Scovazzi (eds), *International Responsibility for Environmental Harm* (Graham & Trotman/Martinus Nijhoff, 1991) 363.

Funds also present other disadvantages. They are generally limited in the extent to which they cover third parties, thus preventing integral reparation of ecological damages. In addition, it weakens the PPP when the parties asked to participate in a fund are those that present the greatest certainty of solvency rather than those really responsible for pollution.

4.3 Environmental State aids

At first sight, State aids run counter not only to competition law but also to the PPP. In fact, thanks to the granting of aid to cover investments to combat pollution, the recipient undertaking will not incorporate into its costs the externalities relating to environmental degradation and will transfer responsibility of these on to society. As a result, the polluter would be relieved of bearing the burden of paying the costs of his pollution. The TFEU provides no guidance for resolving this conflict. However, there are some reasons to consider that granting State aids is likely to be compatible with the PPP for the following reasons.

First, an over-zealous application of this environmental principle is not acceptable. Indeed, since 1975 the Commission has recognized the difficulties in an immediate and wholesale application of this principle.¹⁹⁵ Recognizing the limits this principle is subject to, the Commission accepts that it does not prevent the granting of State aids.¹⁹⁶

Secondly, certain categories of aids make it possible to rectify market failures, where the market does not allow for the incorporation of negative externalities into the price of goods and services. This affirmative action will prevent the best pupils from being penalized. For example, given the competitive advantage that the producers of energy from fuel or coal gain over the producers of energy from renewable sources, there will be a case for the public authorities to correct this failure. In this regard, tax regimes favourable to undertakings which develop more environmentally friendly production methods are compatible with the PPP. Similarly, State aids which satisfy the criteria contained in the 2008 guidelines or the General Block Exemption Regulation (GBER) are considered to be compatible with the PPP.¹⁹⁷

Thirdly, the ability to grant State aids may also permit the Member States to adopt standards that are more stringent than EU standards by lowering unsustainable burdens incumbent upon certain undertakings.¹⁹⁸

¹⁹⁵ In its Recommendation 75/436, the Council had already recognized that the granting of State aids was deemed to be transitory.

¹⁹⁶ Community guidelines on State aid for environmental protection (hereinafter 2008 Guidelines), OJ C 82, paras 6 to 9.

¹⁹⁷ M Stoczkiewicz, 'The PPP and State Aid for Environmental Protection' 6:2 (2009) JEELP 171–96.

¹⁹⁸ Guidelines on State aid for environmental protection and energy 2014–2020 OJ C 200, 28 June 2014, 1.

This does not however mean that any form of aid may be admitted, quite the opposite. Since, under the terms of the PPP, the internalization of the costs of pollution must be granted priority, State aids may only be granted sparingly, and especially as incentives for the undertaking to make additional investments which permit it to go beyond mandatory standards, or to invest in renewable energies.¹⁹⁹ The granting of aids is nothing but a ‘last resort’, or a ‘second-best option’²⁰⁰ since the PPP remains the rule.²⁰¹ Some aids are certainly incompatible with this principle. This is the case for aids intended to offer a breath of fresh air for undertakings in order to facilitate their adaptation to new standards, or in order to remain competitive internationally. They serve no purpose in the fight against pollution. By the same token, where allowances are granted free of charge with a view to helping undertakings to meet environmental standards, they are deprived of any incentive effect.

What is more, where the Commission seeks to reconcile competition policy with environmental policy in the light of the PPP, the 2014–20 guidelines only accept State aids that are capable of being justified by the need to apply more stringent environmental protection standards than those provided for under EU law or, where no standards have been adopted by the Union, that are likely to increase the level of protection resulting from the activities of the undertaking.²⁰² The aids must therefore have an incentive effect. Accordingly, they cannot guarantee activities the economic viability of which offers cause for concern. This means that the aids cannot cover investments designed to permit undertakings to deal with the costs resulting from bringing their operations into line with existing EU environmental provisions.

The role played by the PPP has been underscored in *GEMO* by AG Jacobs:

In its State aid practice the Commission uses the polluter-pays principle for two distinct purposes, namely (a) to determine whether a measure constitutes State aid within the meaning of [Article 107(1) and (b) of the TFEU] to decide whether a given aid may be declared compatible with the Treaty under [Article 107(3) of the TFEU].

In the first context, that of [Article 107(1) of the TFEU], the principle is used as an analytical tool to allocate responsibility according to economic criteria for the costs entailed by the pollution in question. A given measure will constitute State aid where it relieves those liable under the polluter-pays principle from their primary responsibility to bear the costs.

In the second context, that of [Article 107(3) of the TFEU], the polluter-pays principle is used by contrast in a prescriptive way as a policy criterion. It is relied

¹⁹⁹ Ibid, para 44.

²⁰⁰ Ibid.

²⁰¹ Ibid.

²⁰² Ibid, para 55.

on to argue that the costs of environmental protection should as a matter of sound environmental and State aid policy ultimately be borne by the polluters themselves rather than by States.²⁰³

Responsible for approving State aids, the European Commission regularly applies the PPP, refusing to allow State aids that infringe Article 107 of the TFEU.²⁰⁴

To conclude, the PPP provides a standard for analysis which makes it possible to determine on whom the costs fall in order to establish whether a given measure constitutes a State aid pursuant to Article 107(1) of the TFEU. A State measure which relieves those actors of those costs is thus to be regarded as an economic advantage capable of constituting State aid. *Kernkraftwerke Lippe-Ems* illustrates the importance of the PPP in EU State aid law with respect to the criterion of selectivity that must be fulfilled in order to qualify a measure as a State aid within the meaning of Article 107(1) of the TFEU. The CJEU held that a German levy on nuclear fuel did not fulfil that criterion.²⁰⁵ In differentiating the levy from levies imposed on the production of electricity by non-nuclear installations, the Court stressed that the objective of the measure was ultimately to raise ‘revenue intended, inter alia, to contribute, in the context of fiscal consolidation and in accordance with the polluter-pays principle’ to a reduction in the burden borne by the German State to fund the rehabilitation of the specific site at issue where radioactive waste from the use of nuclear fuel is stored.²⁰⁶

Given that energy sources other than nuclear fuel used for the production of electricity were not taxed, the claimant—the operator of a power station—argued that the condition of selectivity was fulfilled. In accordance with the PPP, the German tax aimed to contribute to covering the rehabilitation of a mining site, where radioactive waste from the use of nuclear fuel was stored. The CJEU held that the duty at issue did not constitute a State aid contrary to EU law under Article 107 of the TFEU on the grounds that the methods of producing electricity, other than that based on nuclear fuel, are not in a factual and legal situation that is comparable to that of the production method based on nuclear fuel.²⁰⁷

5. Concluding observations

Given a name that is almost a slogan and the seeming clarity of its underlying logic, the polluter-pays principle (PPP) easily wins approval. It has an important role to play in furthering environment law at the international, EU, and national levels.

²⁰³ Opinion of AG Jacobs in Case C-126/01 *GEMO* [2003] C:2002:273, paras 68–70.

²⁰⁴ See the examples in de Sadeleer, *EU Environmental Law* (n 61) 435–67.

²⁰⁵ Case C-5/14 *Kernkraftwerke Lippe-Ems* C:2015:354.

²⁰⁶ *Ibid.*, para 78.

²⁰⁷ *Ibid.*

The principle answers to an economic logic, and its success in the field of environmental taxation is thus assured.

Nonetheless, a basic ambiguity remains inherent in the PPP. On one hand, it appears essential for the implementation of a preventive environmental protection policy, by making it possible to obtain the funds needed to carry out that policy and, where necessary, modifying the behaviour of those being administered. It can even require polluters to compensate public authorities fully for damage they may have caused. The discretion of the law-maker is restricted by the PPP to the extent that this principle precludes an operator who has not been causing the pollution to be held liable. On the other hand, the principle contains neo-liberal overtones that appear to countenance the idea that the right to pollute can be purchased for the monetary equivalent of the environmental cost sustained.

In addition, the principle's outlines remain singularly difficult to trace at the legal level, despite the simplicity of its message. The more one attempts to refine its definition, the more elusive the principle becomes. The polluter cannot be pinpointed, because any act of pollution is the result of the act of production—the creator of added value—as well as of final consumption. The principle slips yet further from our grasp as pollution becomes increasingly diffuse and historic in nature, rather than clearly identifiable and contemporaneous with the damage produced.

Nevertheless, the principle's vagueness, which is considerable in relation to environmental taxation and even more so in relation to civil liability, should not lead us to condemn it. Rather, it is up to legal doctrine progressively to add the finishing touches that will clarify the definition and scope of the principle, as well as to re-evaluate traditional positive solutions in its light.

2

The Principle of Prevention

1. Introductory remarks

The curative approach has been deeply engrained in environment law since its beginnings. The subsequent appearance of the principle of prevention modified the field radically, signalling a fundamental change of approach. Curative measures may remediate environmental damage, but they come too late to avert it. Preventive measures, on the other hand, do not depend on the appearance of ecological problems; they anticipate damage or, where it has already occurred, try to ensure it does not spread. In any case, common sense dictates timely prevention of environmental damage to the greatest extent possible, particularly when it is likely to be irreversible or too insidious or diffuse to be effectively dealt with through civil liability or when reparation would be extremely expensive.¹ By requiring the adoption of measures intended to prevent such damage from arising, prevention forms a prudent complement to the polluter-pays principle (PPP), which does not necessarily compel polluters to reduce their pollution by requiring them to internalize their costs.

However, the outlines of the preventive principle are difficult to discern; it gives rise to so many questions that any attempt at interpretation calls for constant clarification. We may, for example, ask whether a preventive measure presupposes complete knowledge of the risk to be reduced, if all forms of injury must be foreseen, if intervention should take place at the level of the sources of damage or of their effects, and whether it is preferable to monitor the progress of damage or to prohibit damage the moment it becomes evident.

The following Sections briefly review the evolution of the principle of prevention in international law, European Union (EU) law, and several national legal systems (Section 2). We go on to consider the various aspects of the principle in some depth (Section 3). Finally, we examine the sometimes ambivalent nature of the instruments typical of the preventive principle, using three case studies (Section 4).

¹ In *Gabčíkovo-Nagymaros* (Hungary v Slovakia) [1997] Judgment ICJ Rep 7, the International Court of Justice (ICJ) was mindful of 'the often irreversible character of damage to the environment and the limitations inherent to the very mechanism of reparation of this type of damage'; see para 140.

2. Origin of the principle

2.1 International law

2.1.1 From the no harm principle to the principle of prevention

2.1.1.1 *The no harm principle*

In order to understand the scope of the principle of prevention, one has to delve into the origin of the no harm principle that has been formulated in the *Trail Smelter* case. Several authors consider this award as the first manifestation of the principle of prevention.² In that case, the Dominion of Canada was judged liable for damage caused by pollutants discharged into the atmosphere by a foundry, on the ground that the Government should have ensured that the plant was being operated in conformity with the obligations incumbent upon all States under international law—that is, the duty at all times to protect other States against injurious acts caused by individuals from within its jurisdiction: ‘Under the principle of international law . . . no state has the right to use or permit the use of territory in such a manner as to cause injury by fumes in or to the territory of another of the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.’³

The no harm principle that codifies customary international law⁴ has its origin in the principle of good-neighbourliness and tends ‘to be regarded as a corollary of the principle of permanent sovereignty over natural resources.’⁵ The principle strikes the following balance in an attempt to reconcile two contradictory ideas. According to the UN Charter and the principles of international law, States have the sovereign right to exploit their own resources in line with their own domestic policies; that sovereignty is nevertheless restricted where it entails environmental damage impinging upon the sovereign rights of other States. This obligation results from the requirement of peaceful co-existence between States’ interests in order to avoid significant harm. Neither the principle of sovereignty nor the obligation to prevent transboundary damage is absolute. A State cannot abuse its sovereignty by causing transboundary pollution, although harm caused outside a State’s

² G Handl, ‘Environmental Security and Global Change: The Challenge to International Law’ 1 (1990) YbIEL 1; JG Lammers, ‘International and European Community Law: Aspects of Pollution of International Watercourses’ in W Lang, H Neuhold, and K Zemanek (eds), *Environmental Protection and International Law* (Graham & Trotman/Martinus Nijhoff, 1991) 117.

³ RIAA, vol. III 1907, at 1965. In adjudicating a dispute opposing a Dutch Foundation to a French company discharging waste salt into the Rhine, the Rotterdam District Court decided to resort to the general principles of law recognized by civilized nations. On the basis of the *Trail Smelter* case, the Court reached the conclusion that the discharge amounted to a breach of the principle *sic utere tuo ut alicuius non laedas*; [1979] NJ 113, 313–20. *Handelskwekerij G-J Bier B.V. Stichting Reinwater v Mines de Potasse d’Alsace S.A.* See JG Lammers, *Pollution of international Watercourses* (Martinus Nijhoff, 1984) 196–8.

⁴ *Legality of the Threat or Use of Nuclear Weapons* [1996] ICJ Rep 2, AO.

⁵ P-M Dupuy and J Viñuales, *International Environmental Law*, 2nd ed (CUP, 2018) 65.

jurisdiction or control is not in all instances unlawful.⁶ In the landmark *Urgenda* case, the *Hoge Raad* relied on the no harm principle in order to substantiate the duty of care applicable to the Dutch authorities regarding the minimum reduction in greenhouse gas (GHG) emissions in order to avoid a global temperature increase of more than 2°C.⁷

Since it places emphasis on transboundary harm rather than protection of the environment per se, the no harm principle stops short of embracing a genuine preventive dimension. Moreover, today's environmental problems are global in nature rather than transboundary. As is illustrated by fires caused by the conversion of tropical forests into palm oil plantations, domestic environmental degradation can have a significant global impact.

2.1.1.2 *The principle of prevention*

The no harm principle was reproduced *mutatis mutandis* in Principle 21 of the 1972 Stockholm Declaration on the Human Environment. The 1992 Rio Declaration on Environment and Development set the terms of this obligation in a more restrictive mould in the form of Principle 2. According to this Principle, States henceforth have: 'the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction'. Stockholm's Principle 21 is fully incorporated into the 1979 Convention on Long-Range Transboundary Air Pollution (CLRTAP), the United Nations Convention on the Law of the Sea (UNCLOS),⁸ the 1985 Vienna Convention for the Protection of the Ozone Layer, and the 1992 Convention on Biodiversity (CBD),⁹ whilst 1992 Rio's Principle 2 is incorporated into the Preambles of the UN Framework Convention on Climate Change (UNFCCC).¹⁰

Stockholm's Principle 21 and Rio's Principle 2 display a Janus-face: on the one hand, they reaffirm the no harm principle whilst on the other attempt to detach State responsibility from the principle of sovereignty. Indeed, the reference to 'areas beyond the limits of national jurisdiction' laid the groundwork for a more comprehensive notion of prevention that was no longer restricted solely to bilateral relations.¹¹ That being said, the case law of the international courts is somewhat unclear. In *Pulp Mills*, the ICJ limited the spatial scope of the principle of

⁶ R Lefeber, 'Responsibility not to cause transboundary environmental harm', in L Krämer and E Orlando (eds), *Principles of Environmental Law* (E Elgar, 2018) 94.

⁷ *Urgenda*, 19/00135 [2019] HR: 2019: 2006, para 5.7.5.

⁸ In accordance with Art 192-193, though States have the right to exploit their natural resources in accordance with their environmental policies, they are obligated to protect and preserve the marine environment.

⁹ Art 3 lays down the text of Stockholm's Principle 21, unaltered.

¹⁰ J Vessey, 'The Principle of Prevention in International Law' 3 (1998) ARIEL 181-207.

¹¹ P Birnie, A Boyle, and C Redgwell, *International Law and the Environment*, 3rd ed (OUP, 2009) 145; Dupuy and Viñuales, *International Environmental Law* (n 5) 65; L-A Duvic-Paoli, *The Prevention Principle in International Environmental Law* (CUP, 2018) 9. However, recent MEAs such as the CBD applies to a limited extent to areas beyond national jurisdiction. See Art 4.

prevention set forth in Principle 2 of the Rio Declaration to a transboundary context. In contrast, in its advisory opinion, *Activities in the Area*, the ITLOS Seabed Chamber took the view that Environmental Impact Assessments (EIAs) must be carried out with respect to activities in the global commons.¹²

Although they are intertwined, the scope of the no harm principle and the prevention principle differ: although States will not breach the former principle where any damage caused is not considered to be significant, they might still breach their duty of diligence in not preventing its occurrence.¹³ In addition, prevention seeks to minimize environmental harm as an objective in itself, and not as a result of the principle of sovereignty.¹⁴ Accordingly, Stockholm's Principle 21 and Rio's Principle 2 entail a paradigm shift in placing greater emphasis on preventing damage in general rather than on the damage caused to the sovereign rights of other States.

During the 1980s and 1990s, a number of soft-law instruments and multilateral environmental agreements (MEAs) offered propitious breeding grounds, allowing the preventive principle inferred from Principles 2/21 to develop into a customary principle. Prevention is now widely recognized as reflecting a rule of customary international law, placing preventive duties on the right of States to carry out activities within their territory or under their jurisdiction.¹⁵ In particular, *Gabčíkovo-Nagymaros* reflects the importance afforded by the ICJ to prevention: 'in the field of environmental protection, vigilance and prevention are required on account of the often irreversible character of damage to the environment and of the limitations inherent in the very mechanism of reparation of this type of damage.'¹⁶

The fact that the no harm principle entails a duty of prevention has been acknowledged by the tribunals set up under the auspices of the Permanent Court of Arbitration (PCA). In *Iron Rhine Railway* the arbitration tribunal held that:

environmental law and the law on development stand not as alternatives but as mutually reinforcing, integral concepts, which require that where development may cause significant harm to the environment there is a duty to prevent, or at least mitigate, such harm. This duty ... has now become a principle of general international law. This principle applies not only in autonomous activities but also in activities undertaken in implementation of specific treaties between the Parties.¹⁷

By the same token, in addition to the obligation to take into account the obligations flowing from the 1960 Indus Waters Treaty between India and Pakistan,

¹² *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* [2011] ITLOS Rep 17, AO, paras 145, 148.

¹³ Dupuy and Viñuales, *International Environmental Law* (n 5) 65.

¹⁴ J Verschuuren, *Principles of Environmental Law* (Nomos, 2003) 75.

¹⁵ ILC Prevention Art, General Commentary, para 3.

¹⁶ *Ibid*, para 140.

¹⁷ *Iron Rhine Railway (Belgium v Netherlands)* PCA [2005], paras 58 and 220.

which limited India's right to divert the waters of the Kishenganga/Neelum, the tribunal found that the principle of prevention also constrained India's right to divert these waters. Indeed, States have 'a duty to prevent, or at least mitigate' significant harm to the environment when pursuing large-scale construction activities'.¹⁸

2.1.1.3 Formulations of preventive duties in the MEAs

Prevention cannot be ensured merely by setting general rules whose credibility depends on the effective implementation of State liability. The basis for the preventive principle in international law must be sought in multilateral and bilateral conventions intended to ensure environmental protection rather than in international State liability. The proliferation of preventive mechanisms found in such conventions (EIAs, notification procedures, exchange of data on the impact of harmful activities, etc.) plays a crucial role in implementing the duty of diligence to prevent transboundary harm and therefore giving substance to the principle of prevention. The preventive principle is explicitly set out or can be deduced from an extensive body of international treaties and related instruments, the subjects of which include:

- the marine environment;¹⁹
- the management of high seas fisheries;²⁰
- the protection of shared water resources;²¹
- the climate;²²
- the ozone layer;²³
- waste management;²⁴
- wildlife protection;²⁵
- biodiversity;²⁶
- industrial accidents;²⁷

¹⁸ *The Indus Waters Kishenganga Arbitration (Pakistan v India)* PCA [2013], para 452.

¹⁹ UNCLOS, Arts 194(1)(2), 195, 192, 196, 204, 207, 208, 209, 210, 211, and 212. In its advisory opinion, *Activities in the Area*, the ITLOS Seabed Chamber held that the obligation of due diligence arising under Art 139(1) was equivalent to the duty of prevention enshrined in UNCLOS, Art 194(2). See *Responsibilities in the Area* (n 12) para 113.

²⁰ 1995 UN Fish Stocks Agreement, Art 5.

²¹ 1997 New York Convention on the Law Relating to the Uses of International Watercourses for Purposes other than Navigation (1997 UN Watercourse Convention), Art 21; 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (hereinafter UNECE Water Convention), Art 2(a); ILC Draft Art on the Law of Transboundary Aquifers, Art 12.

²² UNFCCC, Art 3(3).

²³ 1985 Vienna Convention for the Protection of the Ozone Layer, Art 2(2)(b).

²⁴ 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Art 4(2)(c); 1972 London Convention on the prevention of marine pollution by dumping of waste, Art 1.

²⁵ 1979 Convention on the Conservation of Migratory Species of Wild Animals (CMS), Art 3(4).

²⁶ 1992 CBD, Arts 8 and 14.

²⁷ UNECE Convention on Industrial Accidents, Art 6.

- vulnerable ecosystems such as the Antarctic and the Alps;²⁸ and
- transboundary environmental risk assessment.²⁹

It must be pointed out that these provisions do not establish an obligation of result, but rather an obligation to make efforts according to the due diligence rule to prevent the occurrence of significant damage.³⁰ In other words, States are not obliged in absolute terms to prevent activities that jeopardize the environment of other States. Moreover, the stringency of these preventive obligations will depend largely on the nature of the instrument (soft law or hard law) as well as the wording of the relevant provision.³¹

2.1.2 Prevention and due diligence

Obligated by Principles 2/21 'to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdictions', States find themselves bound by a due diligence requirement to prevent the occurrence of significant damage. That obligation is 'now part of the corpus of international law relating to the environment'.³² According to the ICJ, the principle of prevention, as a customary rule,³³ has its origins in the due diligence incumbent upon each State within its own territory. Other authorities, on the other hand, claim that the overarching principle of prevention entails due diligence.³⁴ This is indeed a chicken-and-egg situation.

That being said, States are bound by a duty to prevent harm.³⁵

²⁸ 1991 Madrid Protocol on Environmental Protection to the Antarctic Treaty, Art 3(2); 1991 Salzburg Convention on the Protection of the Alps, Art 2.

²⁹ 1991 Espoo CELATC, Art 2(1); 1992 Helsinki Convention on the Transboundary Effects of Industrial Accidents, Art 3(1).

³⁰ R Pisillo-Mazzeschi, 'Forms of International Responsibility for Environmental Harm', in F Francioni (ed), *Responsibility for Environmental Harm* (Graham & Trotman, 2001) 19. That rule of due diligence can be deduced from a number of MEAs. See, e.g., UNCLOS, Art 194(1); Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Arts I, II, and VII(2); Vienna Convention for the Protection of the Ozone Layer, Art 2; 1988 Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA), Art 7(5); Espoo CELATC, Art 2(1); UNECE Water Convention, Art 2(1); and World Charter for Nature, Principle 21.

³¹ For example, reference to the preventive principle in a preamble fulfils an interpretative function, while its enunciation in an operative provision is binding.

³² *Pulp Mills on the River Uruguay* (Argentina v Uruguay) [2010] Judgment ICJ Rep.

³³ On the customary nature of the principle, see Duvic-Paoli, *Prevention Principle* (n 11) 91–136.

³⁴ In its opinion in *Pulp Mills*, Judge Dugard took the view that due diligence was a standard of conduct flowing from the overarching principle of prevention whilst Judges Owada and Donoghue took the opposite view according to which due diligence was the primary obligation. According to ILC Prevention Art, Art 4, prevention entails the obligation to exercise due diligence. The ILA is also taking the view that due diligence is 'a key component of the obligation to prevent harm'. See Committee on Legal Principles Relating to Climate Change, 'Declaration of Principles', Resolution 2/2014, 25.

³⁵ *Iron Rhine Railway* (n 17), para 59; *Indus Waters Kishenganga* (n 18), para 112.

2.1.2.1 *Normative contours of the duty of diligence in preventing environmental harm in the context of activities not prohibited by international law*

Due diligence does not entail absolute obligations, or obligations of result. Under an obligation of result, States are responsible for any damage caused to others, irrespective of whether all due diligence preventive measures were implemented. In contrast, under a due diligence approach, States only incur responsibility where they do not take all appropriate steps to prevent the transboundary impacts resulting from activities carried out on their territory.³⁶ Thus, since it entails merely an obligation of conduct, the standard of due diligence does not guarantee that harm will never occur.³⁷ This is confirmed by conventional practice. For instance, the UNCLOS provisions governing fishing in the Exclusive Economic Zone (EEZ) of another State or on the high seas require due diligence rather than a specific result.³⁸ Likewise, the 1997 UN Watercourse Convention sets out an obligation to exercise due diligence in the utilization of an international watercourse in order not to cause significant transboundary harm.

In 2001, the International Law Commission (ILC) fleshed out the principle of prevention into more concrete provisions (hereinafter ILC Prevention Articles).³⁹ Given that these draft articles are drawing on international case law, multilateral environment agreements (MEAs), the principles 21/2 enshrined in the Stockholm/Rio declarations,⁴⁰ 1982 UNCLOS, and the 1991 Espoo Convention on EIA in a Transboundary Context (Espoo CEIATC), they do prescribe, to a great extent, existing international obligations.⁴¹ These articles therefore offer an authoritative presentation of international preventive obligations in relation to the environment.⁴² In particular, the ILC codification must be approved for the following reason. Although a balance has consistently been struck between the socio-economic benefits generated by the activity carried out within the territory of the State of origin and its environmental costs, the ILC pursued a new approach by holding that it would be inappropriate to render the obligation to prevent the harm conditional on an equitable balancing of interests.

³⁶ A Tanzi et al, 'Normative features of the UNECE Water Convention' in A Tanzi et al (eds), *The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes* (Brill-Nijhoff, 2015) 123.

³⁷ ILC Prevention Art. Commentary to Art 3(7).

³⁸ *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission* [2015] ITLOS Rep 21, AO, paras 125, 129.

³⁹ ILC, Draft Art on Prevention of Transboundary Harm from Hazardous Activities (with commentaries) *Yearbook of the International Law Commission* (vol. II, part 2) 148. So far, these provisions have not been codified in a treaty. In its resolution 62/68 of 8 January 2008, the UNGA nonetheless commended these draft Articles to the attention of governments (UN DOC. A/RES/62/68).

⁴⁰ Notably Arts 2, 10, 11, 17, 18, and 19.

⁴¹ Dupuy and Viñuales, *International Environmental Law* (n 5) 141.

⁴² For instance, the Seabed Authority made an explicit reference to these articles in its advisory opinion, *Responsibilities in the Area* (n 12), at para 116.

The scope of the ILC draft Prevention Articles is clarified by four different criteria, which apply in parallel to ‘activities’ that:

- are ‘not prohibited by international law’;
- are ‘planned or are carried out in the territory or otherwise under the jurisdiction or control of a State’;
- entail a risk of ‘causing significant transboundary harm’; and
- the ‘physical consequences’ of which cause significant transboundary harm.⁴³

2.1.2.2 *Scope of application of due diligence to take preventive measures*

The key obligation under the ILC Prevention Articles is that laid down in Article 3, which provides as follows: ‘the State of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof’. When determining the scope of the obligation to prevent the occurrence of significant transboundary harm, it is necessary to take account of the combined effect of the likelihood of the occurrence of an accident and the magnitude of its injurious impact. It is, therefore, the combined effect of ‘risk’ and ‘harm’ that sets the threshold.⁴⁴ As a result, we shall start our analysis with an examination of knowledge of the occurrence of such damage, and then move on to address the nature of the harm.

2.1.2.2.1 Knowledge of the risk The ILC is of the view that a threshold has to be set out in order to ‘strike a balance between the interests of States’.⁴⁵

On the one hand, the preventive measures have to be triggered whenever there is a ‘high probability’ that transboundary harm is likely to occur. In other words, the State victim of the transboundary damage bears the burden of demonstrating that there is a ‘high probability’ that the activity taking place on the territory of the State of origin shall cause harm. Unforeseeable risks are thus excluded.⁴⁶

On the other hand, ‘a low probability of causing disastrous transboundary harm’ is sufficient to trigger the preventive obligations.⁴⁷

Once these thresholds have been crossed, the State of origin is called on to adopt preventive measures with a view to averting significant transboundary harm.

In addition, a distinction is drawn between:

- the significant transboundary harm that must be prevented; and
- the risk of significant transboundary harm that must be minimized.

⁴³ Art 1.

⁴⁴ Commentary to Art 2(2).

⁴⁵ Ibid.

⁴⁶ Commentary to Art 3(5).

⁴⁷ Art 2(a).

Hence, the mere 'risk' of significant harm, and even disastrous harm, does not necessarily trigger an obligation to prevent its occurrence but merely to 'minimize' the likelihood of that occurrence.⁴⁸ The assumption underlying this approach is that the existence of a mere risk is not likely to cause significant harm.⁴⁹

It comes thus as no surprise that these distinctions are fraught with controversy. According to Handl, the ILC Articles focus more on the probability than the consequences of any future impacts of the event.⁵⁰ In addition, this approach does not apply the precautionary principle (PP).

2.1.2.2.2 Nature of the harm Due diligence revolves around the concept of harm and not that of environmental interference.⁵¹ The term 'harm' covers any damage that is caused not only to persons and property but also to the environment. However, Article 1 of the ILC Prevention Articles does not define what is meant by the 'environment'. *Ratione materiae*, though most MEAs setting out preventive obligations deal with pollution, the principle of prevention encompasses a variety of categories of harm. For instance, with respect to the law of the seas, prevention is 'not limited to measures aimed strictly at controlling marine pollution' which although 'certainly an important aspect of environmental protection ... is by no means the only one'.⁵² To cite another example, activities that endanger vulnerable ecosystems such as coral reefs are also subject to preventive obligations, such as that laid down by Article 194 of the UNCLOS.⁵³ In the same vein, EIAs identify a wide range of environmental impacts.⁵⁴ Likewise, under Article 8 of the European Convention on Human Rights (ECHR), which enshrines the right to respect for private and family life, the parties are required to adopt preventive measures with the aim of preventing noise pollution,⁵⁵ atmospheric emissions,⁵⁶ smells,⁵⁷ or radiation⁵⁸ whenever these nuisances interfere with the home or private lives of

⁴⁸ G Handl, 'Transboundary Impacts' in D Bodansky et al (eds), *The Oxford Handbook of International Environmental Law* (OUP, 2007) 540.

⁴⁹ Lefeber, 'Responsibility' (n 6) 96; Duvic-Paoli, *The Prevention Principle* (n 11) 182–3.

⁵⁰ G Handl, 'Transboundary Impacts' (n 48) 540.

⁵¹ Transboundary pollution may encompass the 'adverse effect' caused to another State. See CLRTAP, Art 1(b).

⁵² *Chagos Marine Protected Area Arbitration (Mauritius v UK)* PCA [2015], paras 320, 538.

⁵³ *South China Sea Arbitration (Republic of the Philippines v People's Republic of China)* PCA [2013], para 945.

⁵⁴ EIA Directive 2011/92/EU, Art 3.

⁵⁵ *Mileva v Bulgaria*, 43449/02 and 21475/04, 25 November 2010; *Moreno Gómez v Spain*, 4143/02, 16 November 2004.

⁵⁶ *Fadeyeva v Russia*, 55723/00, 9 June 2005.

⁵⁷ *Lopez Ostra v Spain*, 16798/90, 9 December 1994, para 58.

⁵⁸ *Ruano Morcuende v Spain*, 75287/01, 6 September 2005.

applicants. Accordingly, a holistic approach to the concept of environment should be endorsed.

2.1.2.2.3 Significance of the harm Since it is impossible to stipulate a precise technical threshold above which harm is deemed to be unlawful, according to a *de minimis* rule, the ILC employs the more flexible standard of ‘significance.’⁵⁹ By the same token, in *Pulp Mills* the ICJ held that the obligation to carry out an EIA had to be triggered by the ‘risk of significant transboundary harm.’⁶⁰ Likewise, the threshold of ‘significance’ has been encapsulated in a number of MEAs.⁶¹ Last but not least, the European Court of Human Rights (ECtHR) has also reasoned along the same lines: Article 8 of the ECHR applies where the level of pollution affecting the applicant’s private life reaches a certain level of severity.⁶² As a result, any damage that does not exceed that threshold of significance should fall outside the principle of no harm, though States are still bound by a duty of due diligence to prevent its occurrence. Nevertheless, there is no such threshold of significance under many MEAs, EU law, and domestic law.

Although the requirement that harm must be significant has been established, little has been said with regard to its extent. In its comments on the codification of the law on transboundary harm, the ILC stresses: “The term “significant” is not without ambiguity and a determination has to be made in each specific case. It must be concluded that “significant” means something more than “detectable”—small or insignificant impacts are excluded—but need not reach the level of “serious” or “substantial.”⁶³ In other words, the harm must entail a real detrimental effect in areas such as, for example, human health, industry, property, environment, or agriculture in other States. Such detrimental effects must be capable of being measured according to factual and objective standards.⁶⁴ In that regard, the task of establishing the significance of harm can be facilitated by the adoption of Environmental Quality Standards (EQS), which can provide a baseline against which due diligence can be assessed.⁶⁵

That said, the understanding as to what constitutes a reasonable standard of care or due diligence may vary from one region to another, and from one generation to

⁵⁹ The same threshold of significance has been applied in the ILC’s Principles on Allocation of Loss.

⁶⁰ *Pulp Mills* (n 32), para 104.

⁶¹ UN Watercourse Convention, Annex I, Art 7; UNECE Water Convention, Art 1(2); CRAMRA, Art 4(2); Convention on Transboundary Effects of Industrial Accidents, Art 7; 1994 Scheldt-Meuse Agreements. Similarly, at domestic level, law-makers tend to limit the scope of the concept. By way of illustration, under Art 1247 Cciv Fr., the ecological damage is defined as ‘the non-negligible harm to ecosystems...’

⁶² *Maile and Hardy v United Kingdom*, 31965/07, 14 February 2012, paras 187–8; *Borysiewicz v Poland*, 71146/01, 1 July 2008.

⁶³ S McCaffrey, *The Law of International Watercourses* (OUP, 2001) 370.

⁶⁴ Commentary to Art 2(4).

⁶⁵ 1992 UNECE Watercourse Convention, Arts 3 and 9.

another.⁶⁶ Moreover, what may be significant in one case may not be in another. Therefore, this assessment, which involves both factual and objective criteria as well as value judgements, must take place on a case-by-case basis.

2.1.2.2.4 Nature and location of the activity Preventive obligations apply in relation to any activity⁶⁷ that is not prohibited by international law and that is liable to cause significant environmental harm, irrespective of its nature and location.

- The activities falling within the scope of the principle can be located anywhere within the territory of the State of origin, regardless of its proximity to the border with the impacted State.⁶⁸
- The duty to prevent applies not only to activities within the territory of the State of origin but also to any activities that fall under its jurisdiction.⁶⁹ States are called on to prevent significant environmental damage wherever it occurs, be it in their EEZ or in the high seas. In *South China Sea*, the tribunal noted that the obligations in Part XII UNCLOS 'apply to all States with respect to the marine environment in all maritime areas, both inside the national jurisdiction of the States and beyond it'.⁷⁰

2.1.2.3 *The substantive content of the due diligence requirement to take preventive measures*

In the event that a significant risk manifests itself, the duty to take preventive measures to protect the environment in relation to activities that are not prohibited under international law applies. The State must have failed to exercise due diligence if it is to be held liable.⁷¹ However, customary law does not specify what diligent conduct entails or what concrete measures States are required to take in order to fulfil their preventive duties. Moreover, the paucity of case law and diverging views among States complicate the task. Furthermore, the obligation to prevent transboundary harm is subject to a variety of interpretations as to what types of preventive action may be required of a State, as well as the level of damage that is

⁶⁶ ILC Prevention Art, Commentary to Art 3(11); ILC's Principles on Allocation of Loss, Commentary to Principle 2, para 3.

⁶⁷ The ECtHR has endorsed similar reasoning: Art 8 ECHR can be invoked irrespective of whether the pollution is caused directly by the State or whether responsibility for it results from a lack of adequate regulation for private industry. See in particular *Ruano Morcuende v Spain* (n 58), 6 September 2005; *Fadeyeva v Russia* (n 56), 9 June 2005, para 89; *Moreno Gómez v Spain* (n 55), 16 November 2004, para 57; *Tatar v Romania*, 67021/01, 27 January 2009, para 87; *Deés v Hungary*, 2345/06, 9 November 2010, para 23.

⁶⁸ See, for instance, Guide to Implementing the 1992 UNECE Watercourses Convention, para 84.

⁶⁹ ILC Prevention Art, Commentary to Art 1(9).

⁷⁰ *South China Sea* (n 53), para 940.

⁷¹ G Handl, 'State Liability for Accidental Transnational Environmental Damage by Private Persons' (1980) AJIL 540.

to be prevented.⁷² We may thus quite legitimately ask how specific the obligation is that States must prevent any pollution that would cause transboundary harm.

Although the standard of due diligence is vague and elusive, this does not mean that it is devoid of any content.⁷³ Such specificity is essential if the principle of prevention is to fulfil a genuine preventive function. The next step is thus to determine the substantive content of this duty. Although the substantive and procedural duties provided for under the different MEAs to some extent specify its content, it is also possible to infer several key substantive and procedural obligations associated to that standard from the case law of international courts and tribunals as well as codified instruments.

2.1.2.3.1 Substantive content *An appropriate and proportionate approach to the risk of transboundary harm.* If a State of origin fails to prevent the occurrence of transboundary harm, such occurrence triggers an obligation to ‘take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof’. It is only where this is not fully possible that the State of origin is obliged to exert its best efforts to minimize the risk.⁷⁴ This begs the question as to what level of effort is required.

First, the State of origin is required to exert its best possible efforts to avert or to minimize the risk. It follows that ‘due diligence is manifested in reasonable efforts by a State to inform itself of factual and legal components that relate foreseeably to a contemplated procedure and to take appropriate measures, in timely fashion, to address them.’⁷⁵ Reasoning along the same lines, in *Pulp Mills* the ICJ held that the State was subject to an obligation to use all means at its disposal in order to avoid activities that cause significant damage to the environment of another State.⁷⁶

Second, ‘the standard of due diligence is that which is generally considered to be appropriate and proportional to the degree of risk of transboundary harm in the particular instance.’⁷⁷ Hence, given that the extent of the required diligence increases in proportion with the severity of the risk,⁷⁸ a higher standard of care applies to activities which may be considered more hazardous than average.

⁷² A Nollkaemper, *The Legal Regime of Transboundary Water Pollution: Between Discretion and Constraint* (Martinus Nijhoff/Graham & Trotman, 1993) 31.

⁷³ ILA, Due diligence Report, 7.

⁷⁴ ILC Prevention Art, Commentary to Art 3. In this vein, UNCLOS Art 194(1) requires the ‘use of the best practicable means at their disposal and in accordance with their capabilities’. In *Pulp Mills*, the ICJ held that the State is obligated to use ‘all means at its disposal’. See para 101.

⁷⁵ ILC Prevention Art, Commentary to Art 3(10).

⁷⁶ *Legality of Nuclear Weapons* (n 4), para 29. The ICJ reiterated this statement in subsequent cases: *Construction of a Road in Costa Rica along the San Juan River* (Nicaragua v Costa Rica) [2015] Judgment ICJ Rep, para 104; *Certain Activities carried out by Nicaragua in the Border Area* (Costa Rica v Nicaragua) [2015] ICJ Rep, paras 104, 118. See also *Iron Rhine Railway* (n 17), para 222; *South China Sea* (n 53), para 941. A number of MEAs require the adoption of appropriate preventive measures: 1992 UNECE Watercourse Convention, Art 2(1).

⁷⁷ ILC Prevention Art, Commentary to Art 3(11).

⁷⁸ See, for instance, Guide to Implementing the UNECE Water Convention, para 65.

As far as the right to privacy is concerned, it is settled case law that, pursuant to Article 8 of the ECHR, the State has a positive duty to enact adequate measures to secure the applicants' rights.⁷⁹ Thus, the State authorities are required to put in place a preventive regulatory framework under which standards are adapted 'to the specific features of the activity concerned, and in particular to the level of risk which may result.'⁸⁰ Similar requirements stem from EU environmental directives.⁸¹

From an administrative point of view, activities entailing a risk of significant transboundary harm must be subject to an environmental licence. Prior authorization by the State of origin is required in order to carry out such activities.⁸²

Exercise of effective administrative control. In addition to the adoption of appropriate and proportional rules and standards, the due diligence standard against which the conduct of the State of origin should be examined must also cover the adequate enforcement of rules.⁸³ A certain level of vigilance along with the exercise of administrative control over public and private operators are thus required in order to safeguard the rights of the other party.⁸⁴ In other words, the regulations must be implemented with the diligence required under the circumstances.⁸⁵ It follows that States are first obliged to formulate policies that are designed to prevent significant transboundary harm or to minimize the risk thereof,⁸⁶ and secondly, to implement those policies in an effective manner.⁸⁷

That said, the failure to comply with this duty of due diligence engages States' liability, irrespective of whether the damaging activity itself is prohibited.⁸⁸ However,

⁷⁹ Regarding the risk of earthquakes, the ECtHR held that 'prevention essentially involves the adoption of measures to enhance the State's capacity to respond to violent and unexpected natural phenomena'. See *Özel v Turkey*, 14350/05, 17 November 2015.

⁸⁰ *Fadeyeva v Russia* (n 56), 20 March 2008; *Tatar v Romania* (n 67), 27 January 2009, para 88.

⁸¹ Regarding EU nature protection law, under Directive 92/43, Art 6(2), which provides for the avoidance, in the special areas of conservation, of the deterioration of natural habitats, the Member States are called on to establish an appropriate system of protection of the habitats and to enforce the prohibition on construction and unplanned building works. See Case C-504/14 *Commission v Greece* [2016] C:2016:847, para 43.

⁸² ILC Prevention Art, Art 6.

⁸³ Dupuy and Viñuales, *International Environmental Law* (n 5) 209.

⁸⁴ *Pulp Mills* (n 32), para 197.

⁸⁵ R Pisillo-Mazzeschi, 'The Due Diligence Rule and the Nature of the International Responsibility of State', in R Provost (ed), *State Responsibility in International Law* (Taylor, 1992) 26.

⁸⁶ ILC Prevention Art, Commentary to Art 3(17).

⁸⁷ Rio Declaration, Art 11. According to ECtHR case law, the implementation of environmental standards must be effective. It is settled case law that any interference with the right to respect for private life and the home will not be permitted where public authorities do not apply the law (*Hatton v UK*, 2 October 2001, n° 36022/97,

para 120; *Fadeyeva v Russia* (n 56) paras 83–4). In effect, no State can expect to persuade the ECtHR that it is striking a fair balance between the needs of economic development and applicants' rights in relation to their private lives and homes if it does not enforce domestic regulations.

⁸⁸ ILC's Principles on Allocation of Loss, 62.

any breach of that obligation must result from fault, and there is no provision for strict liability.⁸⁹

A proactive approach. The requirement is not static; due diligence entails a positive obligation that requires States to take active steps with a view to preserving the environment.⁹⁰ For instance, Article 2 of the 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention) requires a proactive and anticipatory approach: riparian states are called on 'to constantly adopt and implement the necessary preventive measures before any danger to the transboundary waters becomes acute or even apparent.'⁹¹ Likewise, according to the ILC, the obligation requires a continuous review of the preventive obligations in light of scientific advancement.⁹² In its advisory opinion on illegal, unreported, and unregulated (IUU) fishing activities, the ITLOS Seabed Chamber clarified the scope of the principle of prevention as applied to this issue. Coastal states have a *primary responsibility* to carry out any action necessary in order to prevent, deter, and eliminate IUU fishing within their EEZ.⁹³ This *responsibility* entails an obligation of 'due diligence'. It is therefore only the failure by a flag state to comply with its obligations of 'due diligence' that will constitute a breach of that state's international obligations under UNCLOS. In explaining the meaning of 'due diligence', the Chamber stressed that a flag state must do 'the utmost' to prevent IUU fishing.⁹⁴

Given that techniques and technologies to avert pollution and environmental risks have to be constantly adapted, recourse to best available technologies (BAT) should be the yardstick against which the behaviour of States should be reviewed.⁹⁵

No one-size-fits all approach. The standard of diligence is likely to vary depending upon the level of development of the State of origin. However, this cannot release developing States from their due diligence obligations.⁹⁶

2.1.2.3.2 Procedural content In addition to the obligation to adopt and enforce relevant environmental preventive regulations, various procedural obligations enshrined in Principles 17–19 of the Rio Declaration on Environment and

⁸⁹ R Pisillo-Mazzeschi, 'Forms of International Responsibility for Environmental Harm', in F Francioni and T Scovazzi (eds), *International Responsibility for Environmental Harm* (Graham & Trotman, 1991) 15.

⁹⁰ *South China Sea* (n 53), para 941; Duvic-Paoli, *Prevention Principle* (n 11).

⁹¹ A Tanzi, A Kolliopoulos, and N Nikiforova, 'Normative Features of the UNECE Water Convention', in A Tanzi et al (eds), *The UNECE Convention* (n 36) 117.

⁹² ILC Prevention Art, para 5.

⁹³ *Sub-Regional Fisheries* (n 38), para 106.

⁹⁴ *Ibid*, para 129.

⁹⁵ 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), Art 2(3)(b)(i); 1992 Helsinki Convention on the Baltic Sea, Art 3(3); UNECE Water Convention, Art 3. In *Pulp Mills*, the parties agreed that the mills had to be operated according to the highest international standards.

⁹⁶ ILC Prevention Art, Commentary to Art 3(13).

Development provide further guidance as regards the procedural dimension to prevention. First of all, it is settled case law that, for the purposes of protecting the environment with respect to activities that may be liable to cause transboundary harm, States are required to carry out an EIA.⁹⁷ Subsequently, the EIA triggers a duty to co-operate with States that are likely to be affected by the activity; that duty entails notification, the exchange of information, consultation and negotiation in good faith.

Duty to address the risk. In *Pulp Mills*, the ICJ sets out one of the core requirements of due diligence:

to fulfill its obligation to exercise due diligence in preventing significant transboundary environmental harm, a State must, before embarking on an activity having the potential adversely to affect the environment of another State, ascertain if there is a risk of significant transboundary harm, which would trigger the requirement to carry out an environmental impact assessment.⁹⁸

Such an obligation ‘may now be considered a requirement under general international law.’⁹⁹ By way of illustration, in *South China Seas*, the arbitral tribunal held that, given the scale and impact of the activities likely to cause transboundary harm, China was required to prepare and communicate an EIA ‘as far as practicable’.¹⁰⁰ Along the same lines, with a view to ensuring a fair balance between economic development and the right to private and family life,¹⁰¹ the ECtHR has imposed a requirement to carry out an EIA,¹⁰² ‘of an appropriate nature to prevent and evaluate in advance’ the effects on the environment.¹⁰³

Hence, the EIA should enable the State to determine the extent and nature of the risk associated with an activity and consequently the type of preventive measures that it should take.¹⁰⁴ That said, neither the literature nor the case law suggests which body should carry out the EIA, how much independence the assessors should have,¹⁰⁵ what the contents of the impact assessment should be, which impacts and environmental resources should be analysed, whether alternatives should be assessed, etc. These requirements have to be laid within MEAs, such as the Espoo CEIATC, which makes detailed provision concerning the content of

⁹⁷ *Iron Rhine Railway* (n 17); *Pulp Mills* (n 32), para 204; *Certain Activities* (n 76), para 104; *Construction of a Road* (n 76), para 153; *South China Seas* (n 53), paras 947–8; *Responsibilities in the Area* (n 12), para 145; ILA’s Berlin Rules on Water Resources, Art 29; ILC Prevention Art, Art 7.

⁹⁸ Para 101. See E Ruozzi, ‘The Obligation to Undertake an EIA in the jurisprudence of the ICJ’ 8:1 (2017) EJRR 158–69.

⁹⁹ *Pulp Mills* (n 32), para 204.

¹⁰⁰ *South China Sea* (n 53), para 988.

¹⁰¹ ECHR, Art 8.

¹⁰² *Tatar v Romania* (n 67), 27 January 2009, para 116.

¹⁰³ *Lemke v Turkey*, 5 June 2007, para 44.

¹⁰⁴ ILC Prevention Art, Commentary to Art 7.

¹⁰⁵ Regarding the independence of the assessors, see *Pulp Mills* (n 32), para 168.

such assessments.¹⁰⁶ In addition, as discussed above, an obligation to carry out an EIA is triggered by the assessment of the significance of 'a risk of significant transboundary harm'.¹⁰⁷ Given that the knowledge of the likely significance of the impacts of the projected activity is generally limited, this can give rise to a catch 22 situation. As a result, a prior assessment (scoping) is needed in order to determine whether an EIA is required.

Duty to cooperate. The EIA would be nugatory were the State of origin not under an obligation to co-operate with the State that is likely to be affected by the transboundary harm.¹⁰⁸ Accordingly, if the EIA confirms that there is a risk of significant transboundary harm, the State planning to undertake the activity is required, in accordance with its due diligence obligation, to notify and consult in good faith with the potentially affected State¹⁰⁹ in order to enable the parties to determine appropriate measures to prevent or mitigate the risk of harm.¹¹⁰ Conversely, when the State is not under an international obligation to carry out an EIA given the lack of any risk of significant transboundary harm, it is not required to co-operate. The duty to co-operate thus depends on what could be expected from a State acting in good faith.

Duty to notify. In the first place, treaty law as well as the case law of the international courts and tribunals require the State of origin to notify the States that are likely to be affected by the planned activity that may cause transboundary harm.¹¹¹

Duty to exchange information. Secondly, if the EIA suggests that there is a risk of transboundary harm, the State engaging in hazardous activities is required to exchange the relevant information with the affected State(s).¹¹² In the *MOX Plant*

¹⁰⁶ According to the ICJ, the content of the EIA must be set by the domestic laws of the State. See *Pulp Mills* (n 32), para 205.

¹⁰⁷ *Responsibilities in the Area* (n 12), para 105.

¹⁰⁸ In its provisional measures order in *MOX Plant*, ITLOS held that 'the duty to cooperate is a fundamental principle in the prevention of pollution of the marine environment under UNCLOS Part XII of the Convention and general international law': *Mox Plant (Ireland v UK)* [2001] ITLOS Rep 10, Provisional Measures, para 82; see also *Pulp Mills* (n 32), para 77. Regarding the implementation of UNCLOS, Art 61(1) according to which the coastal State shall determine the allowable catch of the living resources in its EEZ, ITLOS held that States have the obligation to co-operate through regional or sub-regional fisheries organizations. See *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission* [2015] ITLOS Rep 21, AO, para 118. See also *Chagos Marine Protected Area* (n 52); UNCLOS Annex VII arbitral tribunal, 18 March 2015, para 2015.

¹⁰⁹ *Pulp Mills* (n 32), para 77; *Certain Activities* (n 76), para 105.

¹¹⁰ *Pulp Mills* (n 32), para 104.

¹¹¹ *Corfu Channel* (UK v Albania) [1949] Judgment ICJ Rep; *Pulp Mills* (n 32), para 79; *Certain Activities* (n 76), para 105; *Mox Plant* (n 108), paras 82–4. See also, among others, Rio Declaration, Principle 19; UNCLOS, Art 165(2)(c), 169(1) and 198; ILC Prevention Art, Art 8; ILA's Berlin Rules on Water Resources, Arts 56–7. The Vienna Convention on early notification of nuclear accidents, adopted shortly after the 1986 Chernobyl nuclear accident, greatly contributed to the crystallization of that obligation into a customary rule.

¹¹² *Mox Plant* (n 108), para 89; *Case concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v Singapore)* [2003] ITLOS Rep 12, Provisional Measures, para 99; *Pulp Mills* (n 32), para 79; Rio Declaration, Principles 18–19; Convention for the Prevention of Marine Pollution from Land-based Sources, Art 10; UNCLOS, Arts 198–206; 1974 Nordic Environmental Protection Convention, Art 5; 1985 Vienna Convention for the Protection of the Ozone Layer, Art 4; 1986 International Atomic Energy Agency (IAEA) Vienna Convention on Early Notification of a Nuclear

case, the ITLOS established a link between precaution and the duty to exchange information.¹¹³

A question arises as to whether due diligence also entails an obligation to provide the public with information.¹¹⁴ It would appear that the procedural obligations discussed above go beyond traditional interaction between the source State and the risk-exposed State(s). The procedural rights—access to information, participation, and access to justice—guaranteed under the Aarhus Convention and the Escazu Agreement on access to information, public participation, and justice in environmental matters must go hand in hand with the above mentioned obligations. These MEAs contribute to enhancing states' ability to avoid prohibited transboundary impacts.¹¹⁵ In particular, according to the ECtHR case law, Article 8 of the ECHR encompasses the rights to information and to challenge domestic decisions pursuant to Article 9(2) of the Aarhus Convention. In addition, Article 8 requires that 'an effective and accessible procedure be established which enables such persons to seek all relevant and appropriate information.'¹¹⁶

Moreover, the ECtHR has underscored the importance for the public of being able to gain access to these studies in order, first, to evaluate the danger to which they are exposed and, secondly, to enable opponents to initiate court proceedings in the event that their observations have not been sufficiently taken into consideration. The failure to ensure the full effectiveness of these procedural guarantees will amount to a violation of Article 8, although this provision does not lay down any express procedural stipulations.¹¹⁷

Duty to consult and to negotiate in good faith. Thirdly, States are under an obligation to consult¹¹⁸ and to negotiate in good faith.¹¹⁹ The obligation to consult in accordance with Article 9 of the ILC Prevention Articles entails an obligation to seek solutions based on 'an equitable balance of interests.' Article 10 lists the factors that must be taken into account by States when defining and implementing their preventive measures (degree of risk of harm, importance of the activity at issue,

Accident; 1986 Vienna Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; 1991 Espoo CEIATC, Art 3; 1992 Helsinki Convention on the Transboundary Effects of Industrial Accidents, Arts 10–17; CLRTAP, Art 5; ILC Prevention Art, Art 12.

¹¹³ *Mox Plant* (n 108), para 84.

¹¹⁴ ILC Commentary to Art 13; Rio Declaration, Art 10. See 1991 Espoo CEIATC, Art 6(2); EIA Directive 2011/92/EU, Art 8; Habitats Directive 92/43/EEC, Art 6(3).

¹¹⁵ Handl, 'Transboundary Impacts' (n 48) 543.

¹¹⁶ *McGinley and Egan v UK*, 9 June 1998, para 101; *Tătar v Romania* (n 67), para 116, 27 January 2009.

¹¹⁷ *Hatton v UK* (n 87), para 128; *Taskin and Others v Turkey*, 10 November 2004, n° 46117/99; and *Giacomelli v Italy*, 2 November 2006, n°59909/00, para 82.

¹¹⁸ *Fisheries Jurisdiction* (UK v Iceland) [1974] Judgment, ICJ Rep, 33, para 78; 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses, Art 6(2); 1991 Espoo CEIATC, Art 5; Industrial Accidents Convention, Art 4; ILC Prevention Art, Art 9; ILA's Berlin Rules on Water Resources, Art 58.

¹¹⁹ *Lake Lanoux Arbitration* (*France v Spain*) [1957] 12 R.I.A.A. 281; *Gabcikovo-Nagymaros* (n 1), paras 112 and 139–41; *Responsibilities in the Area* (n 12), para 104; *Pulp Mills* (n 32), para 79.

economic viability of the activity, etc.). Similarly, the right to protection of health set out in Article 11 of the European Social Charter will be breached where the authorities do not ‘enter into fair and genuine consultations with those exposed to environmental risks’ about the risks of pollution to which they are exposed due to the exploitation of lignite.¹²⁰ The obligation to consult is closely linked to the prior informed consent (PIC) regime applicable under regulations governing international movements of waste and pesticides.¹²¹

Duty to anticipate risks. In its advisory opinion, *Responsibilities in the Area*, ITLOS Seabed Chamber took a further step in holding that due diligence entailed the obligation to apply a precautionary approach.¹²²

2.1.3 Concluding remarks

As a customary rule, the principle of prevention originates from the no harm principle, which imposes a requirement of due diligence on a State within its territory.¹²³ There is a difference between the natures of the two principles, given that prevention is no longer conceived of from a State-sovereignty perspective.¹²⁴ Nevertheless, both principles could be seen as two faces of the same coin.

In fact, these principles are unique in that they apply to all States without distinction, whether developed or developing.¹²⁵ Moreover, the interaction between prevention and due diligence entails a cascade of far-reaching procedural obligations: the preliminary assessment as to whether the activity entails a risk of significant harm which, if it does, triggers a requirement to carry out an EIA, which in turn obliges the State to comply with the duties to notify, consult, and negotiate. In conclusion, these three transboundary impact-related procedural obligations are part of present-day customary international law. In particular, States have not challenged these obligations.¹²⁶ On the contrary, litigation before the international courts revolves around the following questions: whether the magnitude of the harm is sufficiently significant in order to entail due diligence, whether an appropriate EIA must be carried out, and whether domestic environmental regulations have been consistently applied. That view is reinforced by the extensive treaty practice establishing the obligations for States to assess, notify, and consult before engaging in or allowing activities that are likely to give rise to a significant risk of

¹²⁰ European Commission of Social Rights, *Fondation Maranyopoulos v Greece*, 6 December 2006, n° 30/2005, para 217.

¹²¹ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

¹²² *Responsibilities in the Area* (n 12), paras 31 and 135.

¹²³ *Pulp Mills* (n 32), para 101; ILC Prevention Art, Commentary to Art 3(7).

¹²⁴ A Cassese, *International Law* (OUP, 2001) 380.

¹²⁵ The economic level of a State cannot be used to exempt it from its due diligence obligation, given the risk of companies acquiring the nationality of developed States ‘in the hope of being subjected to less burdensome regulations and controls’. See *Responsibilities in the Area* (n 12), para 159.

¹²⁶ Birnie, Boyle, and Redgwell, *International Law and the Environment* (n 11) 140.

transboundary harm.¹²⁷ The State of origin must comply with these obligations irrespective of whether any damage occurs. Where each of these substantive and procedural duties is complied with, this is indicative of diligent behaviour by State authorities. That said, the reasonableness that is characteristic of due diligence falls short of preventing a significant number of environmental risks.

Nonetheless, prevention has become much broader in scope than the no harm rule thanks to the preference expressed within an array of MEAs for preventing environmental harm rather than compensating for harm that has already occurred.¹²⁸ In particular, it is necessary to establish a more precise framework in order to determine the level of due diligence when adopting specific obligations under treaty law.

Moreover, due diligence is deemed to be insufficient when it comes to allocating damage in cases involving transboundary harm arising as a result of hazardous activity. For that reason, by adopting its Principles on the Allocation of Loss the ILC has proposed a strict liability regime, which runs counter to the long-standing principles of State responsibility for transboundary damage.

Finally, the principles discussed above that have arisen as issued within international environmental law are characterized more as obligations towards other States than towards all the members of the international community.¹²⁹

2.2 EU law

Originally oriented primarily towards industrial pollution, EU environmental policy has progressively evolved towards a global and preventive approach. As the Cinderella principle of the EU environmental policy, prevention has been proclaimed in Article 191(2) of the Treaty on the Functioning of the European Union (TFEU), together with the principle that environmental damage should as a priority be rectified at source and the PPP. It also strengthens one of the objectives assigned to EU environment policy by Article 191(1): namely, 'to ensure a prudent and rational utilization of natural resources'.

In addition, as will be seen subsequently, secondary law has contributed substantially to the development of legal instruments of a preventive nature. The proliferation of preventive mechanisms found in EU environmental law—EIAs, BAT, notification procedures, adequate control of risks, exchange of data on the impact of harmful activities, etc.—play a crucial role in preventing environmental harm and therefore give substance to the principle.

¹²⁷ Handl, 'Transboundary Impacts' (n 48) 541–3

¹²⁸ Report of the Secretary-General, UNGA, *Gaps in international environmental law and environmental-related instruments*, A/73/419, 7.

¹²⁹ Cassese, *International Law* (n 124), 380.

With respect to waste management, prevention has been transformed into a key policy objective; it prevails over other operations such as reuse, recycling, and disposal.¹³⁰ The presence of the preventive principle in Treaty law allows the courts to interpret the provisions of the 2008/98 Waste Framework Directive (Waste FD) to favour protection of the environment. Thus, the Court of Justice of the EU (CJEU) has ruled that:

the principles of precaution and preventive action oblige the [EU] and the Member States to anticipate, reduce and, as far as possible, to cut off at their origin sources of pollution or nuisances through the adoption of measures intended to eliminate known risks ... To the extent that wastes, even those in temporary storage, may give rise to serious damage to the environment, there is reason to consider that the provisions of [the Waste FD] which aims to implement the precautionary principle, are equally applicable to operations involving temporary storage.¹³¹

Along the same lines, Directive 94/62/EEC on packaging and packaging waste makes it quite clear that the best means of preventing the creation of packaging waste is to reduce the overall volume of packaging. A contribution payable by economic operators who place packaged products on the national market, but who are not packaging the goods, is consistent with Directive 94/62 that seeks, first, to 'prevent or reduce' the impact of packaging waste 'on the environment, thus ensuring a high level of environmental protection' and, secondly, 'to reduce the overall volume of packaging'.¹³²

Closely related to the preventive principle, the principle of rectification of environmental damage at source as a priority plays an important role in the control of transboundary movements of waste intended for disposal, according to the case law of the CJEU. The Court held that the principle means that any region, municipality, or other local authority is entitled to adopt measures to limit the transport of waste and to ensure that their disposal takes place as close as possible to their place of production.¹³³

Likewise, there is no shortage of illustrations of the salience of preventive regulatory schemes in the case law of the CJEU.

- A procedure for prior authorization to be obtained prior to the setting up of large retail establishments is appropriate for achieving the objectives relating to town and country planning and environmental protection pursued by the

¹³⁰ Art 4.

¹³¹ Cases C-175/98 and C-177/98 *Paolo Lirussi et Francesca Bizzaro* [1999] ECR I-6881, paras 51–3.

¹³² Case C-104/17 *SC Cali Esprou SRL* [2018] C:2018:188, para 22.

¹³³ Case C-2/90 *Commission v Belgium* [1992] ECR I-1, para 34.

regional authorities. In truth, the damage which would be caused if the authorization scheme were not to be applied could not be repaired after the establishment had been opened. Against this background, the CJEU stressed the soundness of the preventive approach: ‘adoption of measures a posteriori, if the setting up of a retail establishment already built should prove to have a negative impact on environmental protection, appears a less effective and more costly alternative to the system of prior authorisation.’¹³⁴

- The CJEU held regarding the Cartagena Biosafety Protocol’s content, that ‘there is a clear reflection of the Protocol’s environmental aim in the fundamental obligation imposed on the parties ... to prevent or reduce the risks to biological diversity in the development, handling, transport, use, transfer and release of any LMO.’¹³⁵
- The Water Framework Directive (Water FD) 2000/60 entails obligations that are more binding than any Member States really expected. The Member States are obliged to subdivide the ecological quality ratios for each surface water category into five different classes (high, good, moderate, poor, and bad). Any deterioration of the status of all bodies of surface water must be prevented.¹³⁶ The CJEU has interpreted the concept of ‘deterioration of the status’ of a body of surface water as not necessarily entailing a classification of that body of water within a lower class.¹³⁷ Accordingly, the duty to prevent deterioration of the status of bodies of surface water applies whenever the body has deteriorated, irrespective of any change of class. This prohibition amounts to a stand-still obligation and is much more stringent than had been previously expected.
- The requirement to hand over waste by an undertaking which carries out waste disposal and recovery operations ‘implements’ the principle of prevention.¹³⁸
- The requirement that an EIA should precede consent is justified ‘by the fact that it is necessary, in the decision-making process, for the competent authority to take effects on the environment into account at the earliest possible stage in all the technical planning and decision-making processes, the objective being to prevent the creation of pollution or nuisances at source rather than to counteract their effects subsequently.’¹³⁹

In the field of permits, the 2010/75 Industrial Emission Directive (IED) serves as an important instrument for implementing the principle. Its Article 1 lays down the

¹³⁴ Case C-400/08 *Commission v Spain* [2011] C:2011:172, para 92.

¹³⁵ Opinion 2/00, para 31.

¹³⁶ Art 4(1)(a)(i).

¹³⁷ Case C-461/13 *Bund für Umwelt und Naturschutz Deutschland eV* [2015] C:2015:43, paras 50 and f.

¹³⁸ Case C-494/01 *Commission v Ireland* [2005] C:2005:250, para 179.

¹³⁹ Case C-526/16 *Commission v Poland* [2018] C:2018:356, para 75; Case C-411/17 *Inter-Environnement Wallonie* [2019] C:2019:622, para 83.

measures designed to prevent or, where that is not practicable, to reduce emissions to air, water, and land from installations. As regards prevention, Article 3 stipulates that the operator of an installation is to take all appropriate preventive measures against pollution and ‘the necessary measures to prevent accidents.’ However, there is no general requirement that the operator prevent pollution; rather, their obligations are determined by permit conditions. Another good example of the implementation of the principle of prevention in EU secondary legislation is found in Directive 96/82/EC on the control of major accident hazards involving dangerous substances, which aims to prevent such accidents. Article 5(1) of the Directive requires that ‘Member States shall ensure that the operator is obliged to take all measures necessary to prevent major accidents and to limit their consequences for man and the environment.’¹⁴⁰

National authorities must take account of the principle of prevention when administering any licensing regime provided for under EU legislation. If it could be shown that a national authority had not applied the principle at all, had applied it improperly, or had failed to consider relevant evidence, the national permit would be in breach of EU law and would therefore be defective.

Along the same lines as several MEAs, a number of EU environmental laws have stipulated a significance threshold above which preventive regulatory action may be taken in order to ward off risks:

- ‘significant adverse effects’ affecting the conservation status of species in accordance with Directive 2004/35/EC on environmental liability (ELD) give rise to fault-based liability;¹⁴¹
- ‘significant adverse effects’ trigger EIAs or strategic environmental studies (SEAs);¹⁴²
- ‘disturbance likely significantly to affect the conservation objectives’¹⁴³ of the Habitats Directive and ‘significant disturbance’ of wild birds are prohibited;¹⁴⁴
- ‘serious veterinary reasons justify precautionary measures’;¹⁴⁵
- ‘significant risk that an invasive alien species of Union concern will spread to another Member State’;¹⁴⁶

¹⁴⁰ The obligation to maintain an appropriate distance between plants falling under the Seveso Directive on the one hand and buildings of public use on the other hand applies to all authorities involved in the implementation of plans and policies that are linked to the objective of preventing serious accidents. See Case C-53/10 *Franck Mücksch* [2011] C:2011:585, para 27.

¹⁴¹ Arts 2(1)(a) and 3(4).

¹⁴² EIA Directive 2011/92/EU, Art 3(1); SEA Directive 2001/42/EC, Art 2(1); and Habitats Directive 92/43/EEC, Art 6(3).

¹⁴³ C-399/14 *Grüne Liga Sachsen* [2016] C:2016:10, para 41; Cases C-387/15 and C-388/15 *Orleans* [2016] C:2016:583, para 40.

¹⁴⁴ Birds Directive 2009/147/EC, Art 5(d).

¹⁴⁵ Case T-333/10 *ATC v Commission* [2014] T:2014:84.

¹⁴⁶ Regulation 1143/2014 on the prevention and management of the introduction and spread of invasive alien species, Art 19(5).

- in order to be listed, a plant protection product must not have ‘any unacceptable effects on plants or plant products’;¹⁴⁷
- ‘serious risk to human or animal health or to the environment’ of seeds treated with plant protection products;¹⁴⁸
- ‘a serious risk to human health, animal health or the environment’ must be demonstrated in order to ‘suspend or modify urgently an authorisation’ on the placing on the market of genetically modified food and feed.¹⁴⁹

It comes as no surprise that these vague mandatory standards increase the scope of the discretion left to the European Commission or the Member States. By way of illustration, if the obligation under chemical law to avert ‘unreasonable risks’ is further scrutinized, it is found to entail an implicit standard endorsed by experts that no more than one person in a million should be adversely affected. That said, the constraint of abating a significant risk is not laid down in many laws. Preventive measures must be taken irrespective of the magnitude of the harm. Accordingly, polluting activities (listed installations, landfills, water treatment plants, incinerators, etc.) are subject to a administrative authorization requirement irrespective of their potential impact.¹⁵⁰

Finally, EU secondary law features a high degree of compartmentalization since it regulates environmental risks on a case-by-case basis (or substance-by-substance, product-by-product or installation-by-installation) with reference to the best available information; however, this approach involves limited consideration of any cumulative and synergetic effects. By way of illustration, EU climate change policy closely mirrors this approach as it is premised on a broad swath of interdependent instruments: the carbon market, GHG emission standards, energy efficiency, etc. The effectiveness of each of these instruments is determined by the efficacy, or absence thereof, of the others.¹⁵¹

2.3 National laws

Recognized in the field of international law, the principle of prevention has exercised a decisive influence on the evolution of national environment legislation in Europe and in the United States. The principle of prevention is well known within administrative law, being historically based on a desire to prevent the occurrence

¹⁴⁷ Regulation 1107/2009 of 21 October 2009 concerning the placing of plant protection products on the market, Art 4(3).

¹⁴⁸ Regulation (EC) 1107/2009 on pesticides, Art 49(2).

¹⁴⁹ Regulation (EC) 1829/2003 on genetically modified food and feed, Art 39.

¹⁵⁰ The State of origin cannot be discharged by its own duties of prevention under international law by a regime of strict liability that is channelled on the operator (ILC Draft Principles, Commentary 9).

¹⁵¹ V Heyvaert, ‘Governing Climate Change: Towards a New Paradigm for Risk Regulation’ (2011) 74:6 MLR 835–6.

of public unrest by taking appropriate action. Accordingly, national regimes are fundamentally preventive in nature, since they prompt the public authorities to take measures to protect the environment even when environmental damage has not yet occurred. The preventive principle may be recognized in either of two ways: first, it may be drawn from a number of important preambular provisions of sectoral statutes governing air, water, soil, nature, wastes, and dangerous substances. Secondly, as will be seen from the following examples, it is expressly set out in various framework laws on environmental protection. We shall provide here just a few illustrations of the manner in which the principle of prevention unfolds in different domestic legal orders.

In Germany, both the literature and the case law draw a distinction between *Gefahrenabwehr* (warding off dangers) on the one hand and *Vorsorge* (precaution) on the other, which has far reaching consequences. It has been settled case law since 1882 that the authorities are required to take preventive measures if the legally protected interests of private persons or public order and security have been or are about to be impaired; that is, if they are 'in danger'.¹⁵² The impairment must be imminent and its occurrence must be subject to a degree of probability. This nineteenth-century concept of *Gefahrenabwehr* has pervaded German environmental law since its inception in the early 1970s. However, this concept does not apply to risks that are not identifiable due, for instance, to the fact that the empirical sciences have not been able to establish a cause and effect relationship. This gap is filled with the *Vorsorge* principle.

Section 5(1) nos 1 and 2 of the *Bundes-Immissionsschutzgesetz* (BImSchG), the Federal Immission Control Act, illustrate this distinction. An installation that is subject to an environmental licence can be built and operated provided that:

- it does entail any detrimental environmental effects or other hazards (*Gefahr*) for the general public and the surrounding areas (head 1, preventive principle);
- the precautionary approach extends beyond the scope of mere hazards with the adoption of emission control measures corresponding to the state of the art (head 2, precautionary principle).

This entails drawing the following distinction: EQS are implementing §5(1) N°1, whilst emission standards are deemed to emanate from §5(1) N°2. The fact that EQS mirror prevention and emission standards reflect a precautionary approach has far-reaching practical consequences as regards the standing of third parties.¹⁵³

¹⁵² Amtliche Entscheidungssammlung des Preußischen Oberverwaltungsgericht, Band 77, Seite 333.

¹⁵³ G Roller, 'Environmental Law Principles in the Jurisprudence of the German Administrative Courts', in M Sheridan, M and L Lavrysen (eds), *Environmental Law Principles in Practice* (Bruylant, 2002) 163–5.

Traditionally, the German administrative law provides that an action challenging an administrative measure will only be admissible if the measure at issue affects the claimant's rights.¹⁵⁴ It follows that the plaintiff must demonstrate that the rule protecting his individual right has been breached. The EQS that implement the preventive principle confer such individual rights and, consequently, standing. In sharp contrast, according to the *BVerwGE*, a breach of emission standards cannot give rise to any individual rights.¹⁵⁵ Since precautionary standards enhance the general interest, they have not been perceived as being in the specific interest of third parties.¹⁵⁶ However, an exception has been made for infringements of emission standards involving carcinogenic or highly toxic substances as these standards emanate from the principle of prevention.¹⁵⁷

In French law, the principle of preventive action is proclaimed in the Environmental Code, as well as in the French Constitutional Charter.¹⁵⁸ The constitutional principle is not directly applicable as law-makers are required to determine the manner in which it is to be implemented.¹⁵⁹ Moreover, the French Constitutional Council held that it cannot act in place of the law-maker, which is required to give effect to the right to a clean environment. The constitutional right to a healthy environment and the duty to preserve the environment imply that everyone must comply with 'a duty of vigilance to prevent environmental harms that could result from his activity'.¹⁶⁰

According to the Italian Constitutional Court, freedom of economic enterprise can be restricted with a view to avoiding 'disproportionate damage to the environment and human health'. These restrictions can be rooted in the preventive principle and the PP.¹⁶¹

It would also appear that the use of the preventive principle can be inferred from constitutional law on environmental protection. In several decisions, the Greek High Administrative Court has ruled that Article 24 of the Constitution contains a basic principle of preventing damage to the natural environment; the resulting limitations require public authorities to pursue a policy of sustainable

¹⁵⁴ In *Trianel*, the CJEU went on to say that the German *Schutznorm* theory was too restrictive regarding the wide access of justice for environmental non-governmental organizations (NGOs) and therefore was at odds with EIA Directive, Art 10a (Case C-115/09 *Trianel* [2011] C:2011:289, para 51). See A Schwerdtfeger, 'Schutznorm theorie and Aarhus Convention' (2007) JEEPL 270–7; EJ Lohse, 'Surprise? Surprise!—Case C-115/09 (Kohlekraftwerk Lünen)' 18:2 (2012) EPL 249–68; B Wegener, 'European Rights of Action for Environmental NGOs' (2011) JEEPL 315–28; and case note 49 (2012) CMLRev 787–93.

¹⁵⁵ *BVerwGE* 69, 37—Heidelberger Heizkraftwerk.

¹⁵⁶ *BVerwGE* 72, 300.

¹⁵⁷ VGH—Manheim 1995, 639. See G Roller, 'Drittsschutz im Atom- und Immissionschutzrecht' (2010) NVwZ 990–6.

¹⁵⁸ Environmental Code, Art L 100–I; Constitutional Charter, Art 3.

¹⁵⁹ CC, 8 April 2011, no. 2011–116, *Michel Z*.

¹⁶⁰ CC, 8 April 2011, no. 2011–116; CC, 10 November 2017, no. 2017–672.

¹⁶¹ Corte cost, 17 March 2006, no. 116 (G.U. 22 mars 2006, no. 12).

development. Moreover, the preventive principle plays a pivotal role in the Greek Council of State case law.¹⁶²

Finally, in US law, the 1990 Pollution Prevention Act (PPA) declares that: ‘It is the policy of the United States that pollution should be prevented at source.’¹⁶³ The PPA requires EPA to consider source reduction in all of its decision-making processes and to co-ordinate source reduction activities throughout the federal government. Nevertheless, the Act focuses on voluntary pollution prevention activities by industry, rather than mandatory compliance.

2.4 Link between climate change and positive obligations of a preventive nature

For around twenty years, environmental concerns have progressively been incorporated into the interpretation of first-generation human rights, including, in particular, the right to life (Article 2) and the right to respect for private and family life (Article 8) guaranteed under the ECHR.¹⁶⁴ Thanks to a constructive and dynamic interpretation of the Convention, the ECtHR has been able, by extension, to guarantee a minimum level of environmental protection. Until the Hague Court of Appeal held in 2018 that Articles 2 and 8 of the ECHR had been violated due to an overly cautious domestic policy to combat global warming, the application of fundamental rights to this problem was still a disputed matter.¹⁶⁵ Lately the link between climate change and positive obligations of a preventive nature that are incumbent upon States under human rights law has been increasingly debated. Since the 2018 Hague Court of Appeal’s judgment, the debate has been in full swing as climate risks may be distinguished from industrial and technological risks both due to their temporal unpredictability as well as the collective nature of the harm they are liable to cause. Specifically, the potential victims are by definition less easy to identify than residents living in the vicinity of a classified installation.

In its landmark 2019 judgment, the *Hoge Raad* dismissed the appeal of the Dutch authorities. It held that, given the severity of the impact of climate change, the Dutch State is subject to a duty of care in accordance with Articles 2 (right to life) and 8 (right to privacy and family life) of the ECHR, which have direct effect, and is required to adopt mitigating measures.

¹⁶² Decisions 2259/1994 paras 14–15, 2260/1994, paras 11–15, and 613/2002; Decision 26/2014-Plenary, paras 27, 28. The prevention principle has been applied along with the PP without any clarification about the relationship between the two principles (Decision 1493/2012).

¹⁶³ 42 USC, paras 13102 (1999). See JS Applegate, J Laitos, and C Campbell, *The Regulation of Toxic Substances and Hazardous Wastes* (Foundation Press, 2000) 1165–76.

¹⁶⁴ N de Sadeleer, *EU Environmental law and the Internal Market* (OUP, 2014) 112–22.

¹⁶⁵ Judgment of 9 October 2018.

In determining the scope of Articles 2 and 8, consideration must be given to the nature of the damage involved. With respect to untargeted risks, the concept of ‘victim’ and the ‘demonstrable’ nature of the damage or risk of damage must be interpreted more broadly than is required for industrial or technological risks. It follows that both ECHR provisions offer general protection to society against the risks associated with climate change.¹⁶⁶

Where the risk is ‘real and immediate’, which is the case for the Netherlands, the State is under a positive duty to take preventive action. The preventive nature of the positive obligations does not require any acute or immediate danger. Even though there is scientific uncertainty concerning the exact nature of the risks that any sea-level rise may have on the human population in the Netherlands over an extended period of time,¹⁶⁷ the Dutch authorities are not relieved of their positive obligations to prevent such a risk from being realized. The HR went on to add that the State “policy” must not only be “coherent” and “timely”, but must also take all action required in relation to the matter according to a “due diligence” approach.¹⁶⁸ The decision as to whether these measures are “reasonable and adequate” must be subject to judicial review.¹⁶⁹ It follows that the State must bear the burden of proving that it has complied with these requirements.¹⁷⁰ Finally, the obligation at issue pertains to the means and not to the result.¹⁷¹

The preventive measures the Netherlands are called on to adopt must involve a 25 per cent reduction of GHG emissions by the end of 2020, instead of the Government’s projected reduction of 20 per cent. Such a target is deemed to be necessary in order to limit the concentration of GHG in the atmosphere to 450 ppm in order to prevent the dangerous climate change that would be associated with any temperature rise in excess of 2°C.

Because the 25 per cent reduction of GHG emissions in 2020 ordered by the Dutch courts is deemed to be the minimum target in order to avoid significant damage from rising sea levels, the Dutch State has no margin of appreciation to postpone compliance with that target. Indeed, were the reduction to be put off any longer, additional efforts would be insufficient to exclude the risk of exceeding the 2°C temperature increase threshold.¹⁷² Moreover, the scope for discretion left to the authorities as to the nature of the measures to be taken in order to achieve a

¹⁶⁶ Opinion of the Procurator General FF Langemeijer and the Advocate General MH Wissink in *Urgenda* (n 7), para 3.11.

¹⁶⁷ The State could not require that the Hague Court of Appeal should identify with precision the communities the fundamental rights of which were liable to be violated, as this would be tantamount to requiring the Court to furnish a *probatio diabolica* (para 5.6.2). Large swathes of the population of the Netherlands may be exposed risks related to rising sea levels (para 5.6.2).

¹⁶⁸ *Urgenda* (n 7), para 5.3.3

¹⁶⁹ Effective judicial relief must be guaranteed. See paras 5.5.1, 5.5.2, and 5.5.3.

¹⁷⁰ Opinion of the Procurator General and the Advocate General (n 166), para 4.181

¹⁷¹ *Urgenda* (n 7), para 5.3.4; Opinion of the Procurator General and the Advocate General (n 166), para 2.53.

¹⁷² *Ibid*, para 3.24.

reduction of 25 per cent target does not prevent Articles 2 and 8 from having direct effect, and does not preclude judicial review of the exercise of that margin of appreciation.¹⁷³ It follows that the ill-tailored nature of the Dutch measures to combat climate change could be objected to with reference to Articles 2 and 8 of the ECHR on the grounds that the State ‘had failed to exercise due diligence by pursuing a policy that was suitable and coherent’.¹⁷⁴

As a result, where the authorities are aware of a real and imminent threat of sea-level rise, they must be required to take preventive action in accordance with their obligations under international environmental and human rights law and EU law.¹⁷⁵ In particular, human rights law requires the State to mitigate (prevention) rather than to promote adaptation (harm reduction).¹⁷⁶

2.5 Concluding remarks

Under international law, the obligation to implement preventive measures within the framework of activities that are not prohibited under international law is a primary norm establishing an obligation of conduct.¹⁷⁷ In contrast with precaution, the nature of prevention is not controversial, although uncertainty remains as to how it interacts with due diligence. Given their close proximity, their relationship tends to be blurred.¹⁷⁸ In addition, one of the main weaknesses of due diligence and preventive duties is their restricted spatial scope, since they are mostly limited to tackling transboundary harm.¹⁷⁹ Nonetheless, the above analysis of recent treaty and case law developments suggests that a move is underway from the traditional negative aspects of prevention—that is, to ensure that activities falling within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction—towards a more affirmative duty to take all appropriate measures with a view to preventing significant harm to the environment.¹⁸⁰ The analysis also highlights the pivotal role of different substantive and procedural duties in framing the substantive content of due diligence. Finally, since transboundary pollution appears to be much more the rule than the exception within international relations, one might wonder how effective the principles and rules discussed above actually are.

¹⁷³ Ibid, para 2.69

¹⁷⁴ Ibid, para 6.5.

¹⁷⁵ The Hague Court of Appeal, 9 October 2018, *Netherlands v Urgenda*, §43.

¹⁷⁶ *Urgenda* (n 7) para 7.5.2; Procurator General’s Opinion (n 166), § 3.14.

¹⁷⁷ G Hafner and I Buffard, ‘The work of the ILC: From Liability to Damage Prevention’, in M Maljean Dubois et al, *The Transformation of International Environmental Law* (Pedone & Hart, 2010) 240.

¹⁷⁸ Duvic-Paoli, *Prevention Principle* (n 11) 23.

¹⁷⁹ Ibid, 111.

¹⁸⁰ Tanzi, Kolliopoulos, and Nikiforova, ‘Normative Features of the UNECE Water Convention’ (n 91) 145.

Under municipal law and EU law, the principle of prevention is fairly complex, owing to the number and diversity of the legal instruments in which it recurs. It may be expressly recognized in framework laws or inferred from normative texts that are both constitutional and legislative in origin.

As the boundaries between municipal and international law are tending to become increasingly porous, it may be hoped that the international courts will be more inclined to embrace a genuine preventive approach.

Last, our analysis throws up more questions than it solves. It has indicated that the preventive principle is too broad to provide clear guidelines for State authorities as to precisely how they should prevent transboundary harm. By the same token, much ink has been spilled over the quantity and the quality of the scientific information that justifies preventive measures, the dividing line between acceptable and unacceptable risks, as well as regulatory techniques.

3. Systematic analysis

Preventive measures aim to avoid environmental harm and reduce or eliminate the risk of harm. Given the abundance of essentially preventive rules (Subsection 3.1) it is possible to describe the outlines of the principle of prevention and to specify its content. Having determined the scope of the preventive principle in relation to other principles of environmental law (Subsection 3.2) and systematized its various aspects (Subsection 3.3) we go on to consider the role of proportionality in determining the degree of prevention sought (Subsection 3.4).

3.1 The multiple aspects of the principle

For many years, administrative law has been the main source of environmental law. Accordingly, this branch of law has been hitherto practised mostly by administrative lawyers and not by lawyers specializing in economic law or in civil or common law.¹⁸¹ It goes without saying that administrative law encapsulates a genuine preventive dimension. The law-makers allow the public authorities to impose prohibitions, grant authorizations for activities which would normally be prohibited, encourage or require the taking of particular action, and verify compliance with the obligations created.

However, we should note that prevention is extending its reign to instruments which *a priori* have no direct relationship to administrative law. This is particularly the case as regards civil liability, environmental taxation, and criminal law; under

¹⁸¹ After having favoured an approach based on civil liability, the EU institutions supported an administrative liability scheme, which led to the adoption of the ELD.

the influence of the preventive principle, provisions are increasingly being formulated in all these areas in a manner that accentuates their preventive effect.

Despite its essentially restorative function, civil liability also incorporates a preventive function, as it always involves loss or impoverishment for the party found to be liable. The extent of the redress required thus serves the purpose of prevention in that potentially liable parties will adapt their behaviour based on the likelihood of incurring liability. Whilst tort law can help to prevent harmful conduct, operating in support of criminal law and administrative law, liability under tort only arises where there is a proven risk of damage; it therefore does not enable risks that are purely suspected to be pre-empted.¹⁸² That being said, the ELD breaks new ground by endorsing a preventive approach towards impending environmental damage. Specifically, the competent authority is obliged to recover from the operator any costs relating to an ‘imminent threat of damage’.¹⁸³ This means ‘a sufficient likelihood that environmental damage will occur in the near future’.¹⁸⁴ Of course, the liability regime provided for under this Directive is more in keeping with administrative law than with private law.

The elimination of fault in determining responsibility for damage which is inherent in strict liability regimes has also helped to reinforce the preventive dimension of civil liability. In such regimes the preventive function has overtaken the curative function that civil liability is intended to fulfil. The party responsible for environmental damage, no longer able to plead the absence of fault, henceforth has an interest in exercising extreme care. It will verify the qualifications of the operators with whom it deals, carry out audits of the lands it buys, and equip its installations with the BAT.

Prevention may also be carried out via a fiscal approach through the use of ‘economic instruments’, which are being held up as alternatives to binding administrative measures: in other words, ‘command and control’ instruments. If the object of taxes on pollution is to provide the public authorities with sufficient financial means to repair the damage caused by authorized pollution, a sizeable increase in levels of taxation should encourage polluters to curb their discharges. Eco-taxes symbolize this shift from redistributive taxation to a strongly dissuasive approach.

The administrative obligations are generally associated with criminal and administrative sanctions.¹⁸⁵ In the area of criminal law, we must recognize that dissuasive sanctions and penalties specifically adapted to environmental crime help prevent environmental violations from being committed. Reparatory sanctions occupy a central position in criminal policy concerning the environment, for they

¹⁸² X Thunis, ‘Compenser le préjudice écologique: ressources et limites de la responsabilité civile’ 3 (2012) *Amén.-Env.* 85.

¹⁸³ Art 8.2.

¹⁸⁴ Art 2.9.

¹⁸⁵ Industrial Emissions Directive 2010/75/EU, Art 79; Directive 2008/99/EC on the protection of the environment through criminal law [2008] OJ L 328/28.

form the junction between a retribitional concept of punishment largely oriented towards the past and a more future-oriented preventive approach. In addition, the right of a court to order that polluted areas be returned to their pristine state not only prevents perpetuation of a violation but also serves to dissuade behaviour that seeks to continue and profit from unlawful activities. However, attempts to reinforce the dissuasive effect of sanctions will primarily result in a widening of the range of sanctions, since an overly narrow definition of these—as a function of the seriousness of the violation—could compromise the effectiveness of dissuasion.

3.2 Interactions between the preventive principle and other principles of environmental law

Other principles under international law, which are also recognized in EU law (the PPP, the PP, and the principle of rectifying pollution at source), can reinforce the principle of prevention by providing suggestions as to what actions should be taken by public authorities.¹⁸⁶ This section will consider how prevention differs from both the PPP, which focuses on the restoration of existing damage, and the PP, which serves to counter risks that are still uncertain. Prevention may, but will not necessarily, combine with the principle of rectifying pollution at source when it is applied before any damage has occurred.

3.2.1 Relationship with the PPP

A distinction should be drawn between the obligation to reduce and control existing pollution and the obligation to prevent new cases of pollution. When damage has already occurred prevention is no longer relevant: the damage must be either halted or repaired. In the latter case, reparation presupposes causation of damage, or at least an injury which will become evident in the future. The PPP should free sufficient financial resources to avoid the cost of repair falling to the community and, in certain cases, to prevent future repetition of the damage.

Preventive measures, on the other hand, seek to avoid the problem of reparation arising in the first place. That is, prevention only applies when damage has not yet occurred or when its spread and/or recurrence can be averted. For example, an injunction to cease an unlawful act is a preventive measure: while not affecting the damage that has already occurred, it prevents its recurrence in the future.

3.2.2 Relationship with the PP

The distinction between the preventive principle and the PP rests on a difference of degree in the understanding of risk. Prevention is based on certainties: it rests on

¹⁸⁶ L Soljan, 'The General Obligation to Prevent Transboundary Harm and its Relation to Four Key Environmental Principles' 3 (1998) ARIEL 209–32.

cumulative experience concerning the degree of risk posed by an activity (Russian roulette, for example, involves a predictable one-in-six chance of death). Therefore, prevention presupposes an objective assessment of risks in order to reduce the probability of their occurrence. Preventive measures are thus intended to avert risks for which the cause-and-effect relationship is already known (e.g. chronic pollution, repetitive risks). In such situations, the goal is to prevent the recurrence of a risk that has already taken place—a risk to which a probability can be attached, so that it may be characterized as ‘certain.’¹⁸⁷

Precaution, in contrast, comes into play when the probability of a suspected risk cannot be irrefutably demonstrated. The distinction between the two principles is thus the degree of (un)certainty surrounding the occurrence of risk. The lower the margin of uncertainty, the greater the justification for intervention as a means of prevention, rather than in the name of precaution. By contrast, precaution is to be used when scientific research has not yet reached a stage that allows the veil of uncertainty to be lifted.

Of course, it is difficult to draw a dividing line between prevention and precaution. There is in some sense a continuum ranging from the certainty underlying preventive action through to precautionary action justified by uncertainty. Whilst the two categories are clearly separate within the law, the dividing line between prevention and precaution is not always so clear-cut in real life. Preventive measures are liable to turn into precautionary measures where they become embroiled in scientific uncertainty; on the other hand, the nature of initially precautionary measures can become more preventive if scientists are able to dispel any lingering uncertainty. Accordingly, prevention can give rise to a requirement of precaution and *vice versa*. As a result, the pendulum swings back and forth between scientific certainty and uncertainty.¹⁸⁸ The interplay between the two principles is thus circular in nature and not linear.

In French constitutional law, the distinction between the two principles is of importance on the grounds that Article 3 of the Environmental Charter (prevention) empowers the law-maker to adopt permanent restrictions whilst Article 5 (precaution) merely allows temporary measures. Accordingly, given that the risks entailed by shoal gas extraction are ‘certain’ and not hypothetical, the French Constitutional Council ruled that the law prohibiting such operations must be reviewed in light of the principle of prevention and not the PP. It follows that this perennial prohibition does not breach Article 5, which allows exclusively temporary restrictive precautionary measures.¹⁸⁹ Similarly, the distinction drawn in German law between danger prevention and precautionary measures entails

¹⁸⁷ See the discussion in Chapter 3, Subsection 4.2.1.2.1.2.

¹⁸⁸ M Mbengue, *Essai sur une théorie du risque en droit international public* (Pedone, 2009) 167–8.

¹⁸⁹ Decision 2013-346 QPC, 11 October 2013.

different proportionality tests and has consequences on the standing of third parties.¹⁹⁰

3.2.3 Relationship with the principle of rectification at source

The principle of prevention also tends to merge with the principle of rectification at source, which has been recognized in the 1992 UNECE Watercourses Convention,¹⁹¹ the 1994 Scheldt-Meuse Agreements,¹⁹² the 1992 Porto Agreement on the EEA,¹⁹³ and Article 191(2) of the TFEU. In French environmental law, the two principles are intertwined.¹⁹⁴ This principle marks a significant departure from an ‘end-of-pipe’ policy, given that it implies a preference for emission standards rather than EQS.

The scope of the preventive principle is wider than that of the principle that environmental damage should, as a priority, be rectified at source. Prevention posits the anticipation of potential damage without necessarily tackling the source of the pollution. Thus, respect for EQS could well suffice to prevent pollution. On the other hand, the principle of rectification at source of environmental damage as a priority aims to correct the nature of the activity producing environmental damage. At this level EQS no longer suffice; rather, it is appropriate to tackle the source of pollution by requiring polluters to make use of BAT. The principle of rectification thereby refines the scope of the preventive principle by demanding stronger intervention on the part of the public authorities in the fight against environmental degradation.

3.3 The dimensions of the preventive principle

The preventive principle translates into a number of disparate instruments. Their scope may be widespread or limited, global or local; their duration may be brief or lasting; their intensity may vary from one extreme to another. In the following subsections, we seek to establish a hierarchy among the different types of preventive measures with regard to their temporal, spatial, material, and sectoral dimensions.

3.3.1 The temporal and spatial dimension of preventive measures

The complexity of pollution arises from the fact that it evolves in time and in space. While preventive measures may be taken at any stage in the progression

¹⁹⁰ BImSchG, Section 5(1) nos 1 and 2. See D Hanschel, ‘Progress and the Precautionary Principle in German Administrative Law’, in M Pâques (ed), *Precautionary Principle and Administrative Law* (Bruylant, 2017) 104–5. See the discussion in Chapter 3, Subsection 2.3.2.

¹⁹¹ Art 3(1)(d).

¹⁹² Art 3(2)(d).

¹⁹³ Art 73(2).

¹⁹⁴ Environmental Code, Art L. 200-1.

of the pollution, it is nevertheless possible to arrange such measures in a hierarchy based on the time and distance that separate the ecological damage from its source. Prevention may be linked to both pollution sources and points of impact. As regards sources, public authorities may adopt product standards, regulate manufacturing processes in order to make them less damaging, or assess the environmental impacts of projects before authorizing them. As regards impacts, they may establish EQS for receiving environments.

Lead, a metal whose polluting effects at almost all stages of pollution have been regulated by EU secondary legislation, provides a clear illustration of the range of preventive measures that may be used by public authorities.¹⁹⁵ Lead constitutes a particularly diffuse threat to human health as it is able to contaminate a variety of environmental mediums. Found in soils in its natural state, it may enter surface water and then find its way into water used for food processing. Lead pipes also pose a threat to human health by contaminating the drinking water that passes through them. Lead pollutes the aquatic environment when it is discharged into water by various industries. As a constituent of paint or petrol, lead enters the atmosphere by mixing with other gaseous emissions. In brief, lead may pollute air, water, and soil, and in contaminating each of these mediums, may poison humans. The widespread presence of this toxic metal in the environment poses a significant health risk.¹⁹⁶ Yet at each stage of lead's journey, its harmful effects may be forestalled by the implementation of an appropriate legal instrument. As will be seen below, the prevention of pollution caused by lead becomes increasingly efficient the closer one gets to its source.

EQS are set for lead in surface water¹⁹⁷ as well as in the ambient air.¹⁹⁸ These standards provide guarantees of the quality of environmental receptors (water, air), striking a balance between the conservation of natural resources and the presence of pollutants. Nonetheless, these standards focus more closely on symptoms of contamination than on eradicating their cause. Preventive action may however shift upstream if public authorities decide to act against pollution directly rather than protecting potential victims or environmental resources. This is the approach taken by emission standards or disposal standards, which aim to limit releases of lead from anthropogenic sources. They limit the direct or indirect release of lead emitted by fixed polluting facilities (plants, facilities, industries). These standards are 'expressed in terms of certain specific parameters, concentration and/or level of an emission, which may not be exceeded during one or more periods of time'.¹⁹⁹

¹⁹⁵ H Needleman and D Gee, 'Lead in petrol makes the mind give away' in *Late Lessons from Early Warnings: Science, Precaution, Innovation, EEA Report 1/2013* (EEA, 2013) 46–76 (hereinafter EEA Report 1/2013).

¹⁹⁶ *Lead Industry Ass'n v EPA*, 647 F.2d 1130, 1148–9 (DC Cir. 1979).

¹⁹⁷ Directive 2008/105/EC on EQS in the field of water policy. Lead is listed among the priority substances for which EQS need to be set for bodies of surface water.

¹⁹⁸ Ambient Air Quality Directive 2008/50/EC.

¹⁹⁹ IED 2010/75/EU, Art 3(4) and (5).

Thus, for instance, the Water Framework Directive 2000/60 (Water FD) requires Member States to set concentration thresholds through relevant emission limit values for discharges of lead-containing wastewater.²⁰⁰

At this stage, prevention equates to an 'end-of-pipe' policy, since emission limit values do not alter the source of pollution but merely limit it. It is possible, however, for public authorities to intervene at an earlier stage by directly regulating the production processes that give rise to pollution by requiring that the emission controls are based on BAT.²⁰¹ The IED requires that the permit conditions including emission limit values must be based on BAT. In order to abate emissions of lead, operators are called on to adapt their production processes with a view to taking into account the development of technologies. The advantages of this option are clear: while discharge standards may rapidly become obsolete in the wake of technical and scientific progress, the obligation to use BAT requires a continuous effort by industrial operators to reduce their environmental impact.

The potential victim of lead pollution may be directly protected by the adoption of exposure standards. For example, Directive 98/83/EEC on the quality of water intended for human consumption sets maximum concentrations for lead in abstraction water in order to protect consumer health,²⁰² and the Bathing Water Directive 2006/7/EC fixes maximum concentrations of lead allowed in bathing water in order to protect the health of bathers. Similarly, the protection of health is also ensured by legal acts that aim to guarantee food quality by setting exposure standards. Commission Regulation 1881/2006, for example, limits the quantities of lead in foodstuffs. Likewise, lead is prohibited in cosmetics.²⁰³

Even further upstream, the authorities may regulate the lead content within products. Directive 98/70/EC relating to the quality of petrol and diesel fuels, for instance, obliged Member States to prohibit the marketing of leaded petrol within their territory by 1 January 2000.

When disposed of as waste, the lead contained in products can be released in the environment. Accordingly, product standards including thresholds for lead in packaging under Directive 94/62 on packaging and packaging waste are likely to prevent this form of pollution.²⁰⁴ However, product standards are far from perfect. For instance, the manner in which cars are designed does not take into account the cumulative impact of pollutants emitted by all cars driven in cities, which results in air EQS being breached in many agglomerations.²⁰⁵ If compliance with air

²⁰⁰ Ibid, Art 10(2)(b).

²⁰¹ Ibid, Art 10(2)(a).

²⁰² Case C-42/89 *Commission v Belgium* [1990] ECR I-2821.

²⁰³ Regulation 1223/2009 on cosmetic products, Annex II.

²⁰⁴ Art 11.

²⁰⁵ N de Sadeleer, 'Car Emissions in the Wake of the Dieselgate', in M Peeters and M Eliantonio (eds), *EU Environmental Law Research Handbook* (E Elgar, 2020) 379–95.

Table 2.1 Typology of environmental standards

	EQS	Emission standards	Process standards	Product standards
Objective	Set of requirements which must be fulfilled at a given time by a given environment (air, water, soils)	Standards expressed in terms of certain specific parameters, concentration and/or level of an emission, limiting the pollutants emitted by fixed polluting facilities with a view to protecting ecosystems and human health	Standards to ensure that plant operations are conducted in a safe, effective, and professional manner, in accordance with safety requirements	Standards setting limits on pollution or nuisance levels
Addressees	Authorities	Plant operator	Plant operator	Producer and importer of the substance or the product
Level of stringency	Low	Inasmuch an operator does not exceed the EQS, they are free to choose the technology	The operator is called on to apply BATs	Standards not to be exceeded both as regards the product's composition as well as its emissions
Sanctions	Administrative measures	Administrative and criminal sanctions	Administrative and criminal sanctions	Administrative and criminal sanctions

pollution thresholds is to be guaranteed in major cities, only particularly clean vehicles should be allowed.

Table 2.1 compares the different regulatory preventive techniques discussed above.

3.3.2 The material dimension of preventive measures

In international environmental law, environmental issues are tackled in a piecemeal fashion, and not in an integrated manner. By way of illustration, by distinguishing between the rules on the prevention of marine pollution and the rules on the conservation and management of living resources, UNCLOS fails to endorse a

genuine preventive approach.²⁰⁶ Because of their narrow scope, preventive measures do not enable pollution sources to be cut back effectively.

On another note, the preventive principle varies as a function of the degree of constraint set by implementing standards. Prevention may be absolute in character if damage is prevented from occurring by the adoption of prohibitory measures (embargo, prohibition, on commercialization of a product or operation).

Contrasting with this first approach is that of information. In EU law information requirements relating to the ecological quality of products²⁰⁷ and services²⁰⁸ serve to inform both undertakings and the public about how these should be produced and used. A number of MEAs set out information and notification requirements for neighbouring States for certain types of activities.²⁰⁹ This is also the case for the obligation to set thresholds for alerting populations to the dangers they face.²¹⁰ By taking an informative rather than interventionist approach, public authorities may adopt appropriate measures in a timely fashion. It is no longer a question of following the evolution of a situation that could become problematic, than of immediately acting to prohibit it.

Finally, the constraints imposed by preventive measures may range from bans to notification obligations. All authorization mechanisms that allow a certain degree of disturbance, nuisance, pollution, and hazard do not in fact question the existence of the regulated activity. These intermediate forms of prevention are at present found at the heart of most environmental law regimes. This approach, based on the principle that 'the solution to pollution is dilution', paints a deliberately reassuring picture of the phenomena that underlie pollution.²¹¹ It assumes that, as long as emissions do not exceed a certain critical threshold, receiving environments may absorb and disperse them. Ecological deterioration only occurs when the self-cleansing capacity of environments is saturated as a result of excessive concentrations or the overly rapid accumulation of polluting substances. It may therefore not be absolutely necessary to reduce discharges of polluting substances to zero as long as legal instruments can provide an appropriate response to any type of pollution by setting the precise level of a pollutant that a given ecosystem can absorb.²¹²

²⁰⁶ P Sands and J Peel, *Principles of International Environmental Law*, 4th ed (CUP, 2018) 456–7.

²⁰⁷ Regulation 1980/2000 on a revised Community eco-label award scheme.

²⁰⁸ The objective of Regulation 761/2001 allowing voluntary participation by organizations in a Community eco-management and audit scheme (EMAS) is to promote continual improvements in the environmental performance of organizations by 'the provision of information on environmental performance and an open dialogue with the public and other interested parties' (Art 1(2)(c)).

²⁰⁹ See above section 2.1.2.3.2.

²¹⁰ See Ambient Air Quality Directive 2008/50/EC, Art 2(10).

²¹¹ MW Holdgate, *A Perspective of Environmental Pollution* (CUP, 1979).

²¹² As discussed above, regulators are reluctant to aim for a zero threshold of risk. For instance, a *de minimis* risk approach transpires from many regulations which provide that the activity or the product may only be authorized if it has no *unacceptable* effects on the environment or human health; this implicitly confirms the acceptance of a residual risk.

This form of prevention is favoured by public authorities since it promotes a reconciliation between the factors of production that generate economic wealth and social well-being on the one side and the need to guarantee a high quality environment on the other. The private sector also prefers this approach to a more aggressive mode of prevention because it avoids prohibitions, rather emphasizing the scientific and technical management of environmental impacts: polluting activities remain authorized, even if their discharges are regulated.

This intermediate approach is thus less radical—and probably less effective—than the absolutist approach, which is criticized by industry and public authorities as being too extreme. Yet it replaces prevention with notification, which is however considered to be too timid. Based on forestalling and notifying the occurrence of ecological damage, this middle path requires energetic intervention by the public authorities in order to control, regulate, intervene in, and limit pollution to an acceptable level. On the other hand, it also demonstrates an almost blind confidence in science and technology, coupled with a risk that new types of ecological damage will not be anticipated and understood.

3.3.3 The sectoral dimension of preventive measures

Environment law has developed piecemeal, as a function of successive perceived needs. Prevention perceptibly wavers between localized or sectoral intervention and a global approach based on ecosystems. In fact, preventive measures can both halt the highly specific impacts of an activity (for instance, a sectoral authorization concerning waste, air, or water) and apprehend all the impacts of an activity on the environment (e.g. assessment of all direct and indirect impacts of a project, or an integrated permit).²¹³ However, the fragmented nature of sectoral policies can mask transfers of pollution from a regulated sector to other sectors. For example, a prohibition on the production of waste may easily translate into an increase in energy production, contributing to atmospheric pollution. It is thus highly ineffective to deal with nuisances in a fragmented manner, since only a comprehensive perspective is capable of grasping the full complexity of ecological reality.

At European level new legal arrangements, following the example of the IED, are tending towards greater integration, in particular by establishing single licensing schemes that aim to cover all the nuisances generated by a single industrial installation. Likewise, life cycle analysis can foster a holistic approach. Restrictions placed on a product that are based on such an analysis seek to minimize the cumulative environmental effects throughout all stages of a product's life from cradle to grave. For instance, such a holistic understanding is reflected in the 'cradle-to-grave' approach set out in Regulation 1980/2000 on the eco-label award scheme. However, the widening of the preventive dimension of such instruments should not disguise

²¹³ The ILC Prevention Articles support a broad definition of the material scope of the damage. See Commentary to Art 1.

the fact that they are proving to be less effective than more precise instruments. Thus, the provisions of the IED allow Member States very wide discretion, while Regulation 1980/2000 is a voluntary instrument. This leads to the risk that State authorities will be unable to achieve a high level of environmental protection.

3.4 Application threshold for the principle of prevention

Everyone agrees that it is better to prevent ecological damage than to repair it. It is thus undoubtedly preferable to favour instruments that most efficiently prevent damage, particularly when these are intended to bring into play a constitutional right relating to the environment. Should the law aim to prevent damage at any cost? This seems unlikely, since the content of any preventive measure remains largely determined by a more general principle of proportionality according to which the probability of damage must be balanced against its extent, and restrictions set on other interests must be justified by the need to adopt the measure in question.

In the following subsections, we consider the concrete consequences of the preventive principle on the scope of preventive measures. Before adopting such a measure, public authorities first verify the probability of damage and then weigh ecological benefits in the absence of such measures against the potential socio-economic consequences if preventive measures are taken.

3.4.1 The relationship between the probability and the extent of damage

The preventive principle, as noted earlier, is premised on a certain degree of mastery of environmental risks. In some cases, the negative impact of pollution is immediate; in other cases however, it is suspected that pollution might affect ecosystems at a later point in time.²¹⁴

When pollution is likely to have a transboundary impact, the degree of risk posed by a polluting activity is an essential element of the obligation to prevent environmental harm. Where the probability of a risk occurring is seen to be extremely low, the authorities generally find themselves caught between intervention and non-intervention.

A due diligence obligation implies that States must prevent activities, which involve a 'significant risk', of causing environmental harm.²¹⁵ Significance depends on the probability that a risk will materialize, but also on the magnitude of harm that might be caused. When damage is not expected to be serious, due diligence will only be required if such damage is highly likely to occur; the higher the risk,

²¹⁴ For instance, Art 2(2)(a) of the 1992 UNECE Water Convention obliges parties 'to take all appropriate measures to prevent pollution of waters causing or likely to cause transboundary impact'.

²¹⁵ See Section 2.1.2.

the greater the diligence required from the polluter. A risk with a low degree of probability may still be regarded as significant if it is likely to cause significant harm.²¹⁶ Despite the likelihood of a nuclear accident being one in a million, for example, such an accident is as likely to occur tomorrow as in 100 years, with catastrophic results. Thus, the occurrence of that risk must be averted even if it is minimal. In other words, where there is a high degree of uncertainty concerning the occurrence of extreme adverse effects, risk reduction is unconditional; even a ban or moratorium can be appropriate.

Similarly, German doctrine recognizes limits to the application of the principle of protection against danger (*Schutzprinzip*)—the equivalent of the preventive principle—by recourse to probability theory (*die Je-Desto Formel*).²¹⁷ A major accident of low probability must be avoided owing to its disastrous implications. By contrast, a very high risk of relatively negligible damage need not be countered in the name of prevention.

3.4.2 Cost-benefit analysis (CBA)

There is little doubt that most of the obligations of prevention, in both international and national law, aim to leave a margin for socio-economic analysis.²¹⁸

That trend can be observed in several national environmental framework laws. The Swiss Federal Law of 7 October 1983 on protection of the environment envisages preventive emission limits ‘in keeping with the current state of technology and conditions of use and to the extent that this is economically acceptable’. In France, the implementation of the principles of preventive action and rectification at source as a priority are subject to the prerequisite of ‘economically acceptable cost’.²¹⁹ According to the 1998 Swedish Environmental Code, ‘particular importance shall be attached in this connection to the benefits of protective measures . . . in relation to their cost. The cost-benefit relationship shall also be taken into account in assessments relating to total defence activities or where a total defence measure is necessary’.²²⁰

According to those national provisions, before adopting a preventive measure public authorities should evaluate whether the cost of their action will or will not exceed the cost of the damages that might be avoided. Thus, hypothetically,

²¹⁶ ILC Prevention Articles, Art 2(a).

²¹⁷ For a critical analysis of this theory, see G Roller, *Genehmigungsaufhebung und Entschädigung im Atomrecht* (Nomos, 1994) 62.

²¹⁸ UNCLOS, Art 194; 1994 Charleville-Mézières Agreements on the protection of the Scheldt and the Meuse, Art 3(2)(c). As far EU secondary law is concerned, the Registration, Evaluation, Authorisation and Restriction on Chemicals (REACH) authorization procedure aims to ensure that substances of very high concern (SVHCs) are progressively replaced by less dangerous substances where technically and economically feasible alternatives are available (Art 63). As far as EU secondary law is concerned, the economic costs of an air pollution directive must be properly assessed. See Case C-128/17 *Poland v Commission* [2019] C:2019:194, para 35.

²¹⁹ Environmental Code, Art L. 200-1.

²²⁰ 1998 Swedish Environmental Code, Chapter 2, Section 7.

a cost–benefit analysis should be carried out if an industrial discharge is harming the environment and could only be prevented by closing down the polluting plant at a high socio-economic cost. If calculations were to indicate that the costs of terminating the activity would be disproportionate, the operation should not be shut down. Likewise, in the case of transboundary pollution, activities should not be considered as unlawful *a priori*. Rather, States must negotiate on the modalities of reducing pollution.²²¹

There is a serious risk that this balancing exercise will rely entirely on classical economic analysis, which does not afford equal value to vulnerable environmental components and discounts future costs and benefits. Yet public authorities find it more difficult to justify the adoption of preventive measures in cases where the cost allocated to environmental elements is modest—or even nil—than where it is high. In this equation, the cost of the redistribution of resources to the detriment of other needs—an inevitable result of adopting a preventive measure (e.g. the economic and social costs implicit in closing down a polluting activity)—can easily surpass the benefits obtained through use of the preventive measure (e.g. the advantages gained by halting a polluting activity). The difficulty lies in the fact that the cost of socio-economic harm is quantifiable, which is not necessarily the case for the cost of environmental damages—particularly those caused to *res communes*.

For environmental protection to be raised to the level of a fundamental value in most of the legal systems we are examining would require that ecological damage take its rightful place in the CBA procedure. Such integration would serve to temper the rigour of classical economic analysis by permitting consideration of non-quantifiable data.

4. Applications of the principle

Owing to its wide-ranging definition, prevention covers a plethora of legal instruments, ranging from monitoring mechanisms to bans. Three instruments representative of the principle of prevention are evaluated below. These are the technique of thresholds (Subsection 4.1), best available technology (Subsection 4.2), and impact assessment (Subsection 4.3).

4.1 Setting thresholds

It is clearly impossible for the public authorities to anticipate all forms of environmental degradation. It is also not possible to prohibit all noise, pollution,

²²¹ Nollkaemper, *The Legal Regime of Transboundary Water Pollution* (n 72), 46.

nuisances, and damage to the natural environment; indeed, this is not in fact necessary because the environment has, to some extent, the capacity to regenerate and assimilate. However, human activities must not exceed the planet's capacity. We must therefore authorize activities that are injurious to the environment but within binding thresholds, beyond which environmental deterioration is judged to be unacceptable. This technique requires public authorities to determine the level at which the natural absorption capacities of receiving environments are able to function.

Thus, discharge standards for pollutants to air, water, and soil; EQS for each of these environmental mediums; and product norms must respect thresholds. Expressed in an extremely diverse manner—by percentages of materials, concentrations of substances, decibels, etc.—thresholds have permeated all areas of environment policy. Respect for these thresholds is best guaranteed when their breach is automatically considered an infringement leading to criminal or administrative sanctions (e.g. withdrawal of a permit).

From the perspective of achieving the internal market, harmonization of standards at EU level implies adoption of regulations setting uniform thresholds based on Article 114 of the TFEU.²²² The choice of this legal basis avoids distortions of competition arising from national decisions taken on a case-by-case basis; these EU standards enhance a common playing field for economic operators to the extent that Member States may in principle no longer derogate from the rule of EU harmonization.²²³

Despite its obvious merits, the threshold technique may be criticized on two counts. First, it reinforces the power of experts, thereby camouflaging the resurgence of technocratic decision-making. Secondly, by conciliating the needs of economic development with requirements for environmental protection, it runs counter to a fundamentally protective orientation based on the principle of non-degradation, which calls for general and absolute prohibitions on activities that damage the environment. By legalizing a certain level of nuisance, thresholds stand in the way of integrated protection of the environment.

The usual response to such criticism is that tolerance of pollution under the threshold technique is scientifically justified. According to an 'assimilative' approach, it should be possible to determine the precise quantity of pollutants that ecosystems can absorb without damage.²²⁴ This thesis, however, may be disputed on four levels.

²²² See de Sadeleer, *EU Environmental law* (n 164) 157–61, 195–7.

²²³ *Ibid.*, 358–80.

²²⁴ The assimilative capacity is 'a property of the environment, defined as its ability to accommodate a particular activity, or rate of activity, without unacceptable impact'. See, e.g. V Praydic, 'Environmental Capacity: Is a New Scientific Concept Acceptable as a Strategy to Combat Marine Pollution?' 16 (1985) MPB 295.

First, there is no definition of what constitutes an undesirable effect or unacceptable impact on an ecosystem or of how it will be measured.²²⁵ Secondly, in order to be effective, emission levels must coincide with EQS. Only the latter unequivocally correspond to an optimal policy of prevention, since they are calculated with a view to guaranteeing the quality of receiving environments. In practice, however, emission limit values seem to be established on the basis of the economic or technical capacities of the polluter rather than with regard to the absorption capacities of the receiving environment. Supported by studies carefully selected in favour of the regulator's vision, these standards are apparently clothed in the mantle of science.²²⁶ They are more often linked to EQS by coincidence than on the basis of a planned policy, given the extent to which policy and economic considerations having nothing to do with environmental science play a role in their determination. In addition, the scientific certainty upon which emission limits are based has increasingly become a subject for caution since the standard-setting process consistently ignores the cumulative effects of pollution. Attempts to establish safe levels for the marine ecosystem, for example, are severely flawed.²²⁷ Indeed, such difficulties were at the origin of the emergence of the PP in international law. Lastly, the fact that damage is now shown to be occurring at increasingly lower levels of exposure to chemicals, like EDCs, no safe threshold of exposure can be identified.²²⁸

Although constituting the vanguard for the preventive principle, the technique of thresholds thus remains open to criticism on several fronts, notably for its tolerance of a certain degree of harm. In particular, when the thresholds are too low, the EQS cannot ward off the rise of pollution. Therefore, the principle of prevention has to go hand in hand with the stand-still principle.²²⁹

4.2 Use of best available technologies

In practice, the main use of the principle is in issuing authorizations that set out the conditions for administrative controls. These authorizations use technical specifications to determine means of operation, quantities and concentrations of

²²⁵ Is an EQS threshold value breached when one single sampling point reaches it, or where the average air pollution measured across all sampling points in a city reaches the limit? In order to answer that question, the CJEU considered the general scheme and the purpose of the air quality Directive. The principle of rectification of pollution requires that the most protective measurement prevails. The fact that a limit value has been exceeded at a single sampling point is sufficient to trigger the enactment of the principle of rectification on the ground that 'it is necessary ... to ensure that appropriate measures are taken to combat the sources of such pollution': Case C-723/17 *Craeynest* [2019] C:2019:533, para 67, case note de Sadeleer, 1 REDC (2020) 491.

²²⁶ W Wagner, 'The Science Charade in Toxic Risk Regulation' 95 (1995) Columbia LR 1640–45.

²²⁷ M MacGarvin, 'Precaution, Science and the Sin of Hubris' in T O'Riordan and J Cameron (eds), *Interpreting the Precautionary Principle* (Cameron May, 1994) 88.

²²⁸ EEA Report 1/2013, 670, 672, 674.

²²⁹ Vershuuren, *Principles* (n 14) 97.

pollutants that may be discharged, and what type of security measures must be put in place by the permit holder during the duration of the permit. These thresholds are deemed to avoid the discharges exceeding the EQS. However, EQS deal with the symptom of the pollution rather than the cause, which is often related to outdated technology. Increasingly, permits are based on concepts such as BAT, 'best environmental practice', 'clean production methods', or 'best available technology not entailing excessive cost' (BATNEC). Some authors consider that the use of BAT naturally follows from the PP²³⁰—an analysis that appears overly categorical. We believe their use is linked to the principle of prevention, since recourse to BAT is required of operators when the impacts of their pollution are known. By contrast, when recourse to BAT is required in a context of uncertainty, that obligation is rather in response to the PP. In either case the requirement to turn to BAT, which is found in both international and EU law, is generally related to the preventive principle.

In many international treaty regimes the obligation to prevent harmful releases into the environment is directly related to the obligation to apply BAT.²³¹ Similarly, the obligation to use BAT is found in EU law, and more particularly in the IED. According to this Directive, installations shall operate under a regime of BAT.

From the perspective of prevention, such obligations should in any case be welcomed. They shift the focus from 'end-of-pipe' solutions to the regulation of industrial processes with a view to preventing harmful discharges in the first place. Is the best means for averting the risk of pollution not precisely that of requiring operators to make use of the most effective technologies available?

That said, use of BAT is not an absolute. As soon as the cost of new technologies is considered too onerous, operators renege on approvals of new investment, arguing that what is being asked of them is disproportionate in relation to the environmental improvements anticipated. In order to avoid companies weakening their competitive position, legislation balances the requirement to use BAT against an economic factor: the purchase of such technologies should not entail excessive costs for the operator. Their use should not only be technically feasible, it must also be economically acceptable.²³²

In each case costs must be balanced against the nature and volume of the discharges in question.²³³ The preventive principle thereby risks becoming considerably weakened by recourse to CBA. First, the inevitable consequence of this

²³⁰ J Cameron et al, 'Precautionary Principle and Future Generations', in E Agius and S Busuttill (eds), *Future Generations and International Law* (Earthscan, 1998) 109.

²³¹ 1992 UNECE Water Convention, Art 3(c) and Annex I (1); 1992 OSPAR Convention, Art 2(3) (b) and Annex I; 1992 Baltic Convention, Art 3(1) and Annex II; 1998 Aarhus Protocol on Persistent Organic Pollutants.

²³² 1979 CLRTAP, Art 7(a); 1992 UNECE Watercourses Convention, Annex I (1)(c); Scheldt-Meuse Agreements, Art 2(11). Under IED, Art 3(10)(b), the BAT are developed under 'economically and technically viable conditions, taking into consideration the costs and advantages'.

²³³ Nollkaemper, *The Legal Regime of Transboundary Water Pollution* (n 72), 132.

balancing will be to redefine appropriate technologies as a function of the financial capacity of individual operators. Highly polluting operations could easily evade this obligation by claiming insufficient financial resources, while less polluting, but more affluent, firms would comply with their obligations. The differential treatment that would result, particularly in setting operating conditions, could cause discrimination among firms.

In addition, administrations might be tempted to verify whether the use of BAT is actually necessary to respect the EQS they have set by employing the proportionality principle. If an administration considers the requirement to acquire new technologies disproportionate—that is, the environmental improvement is relatively small in relation to the socio-economic sacrifices required—it may well decide to abandon the requirement. Yet such an analysis must take into account all the risks inherent in the activity in question. It is of course at this point that proportionality becomes problematic, because it generally disregards such considerations. Seen in this perspective, the requirement to use BAT is not necessarily strongly preventive in character.

Finally, environmental harm will continue to occur whenever the BAT are not sufficiently optimal. Accordingly, BAT do not always prevent pollution.

4.3 Environmental Impact Assessment

The preferred terrain for the preventive principle is undoubtedly the EIA.²³⁴ Given that large number of international conventions require EIAs in a transboundary context, the ICJ and the ECtHR had no difficulty recognizing the fundamental role of this procedure.²³⁵ At first glance, such a procedural requirement seems likely to require States to show due diligence.²³⁶ Although this procedural requirement is interdependent on substantive preventive obligations, the ICJ has held that any breach of this procedure would be immaterial as long as compliance with substantive obligations has been assured. This interpretation has been criticized on the grounds that the compliance with procedural requirement is an indicator of whether or not substantive preventive obligations have been breached.²³⁷

²³⁴ N Craik, 'Environmental Impact Assessment', in J Viñuales (ed), *The Rio Declaration on Environment and Development* (OUP, 2015) 451–70.

²³⁵ See above, Section 1. In *Hatton*, the ECtHR considered that States are required 'to minimise, as far as possible, the interference with (fundamental) rights, by trying to find alternative solutions and by generally seeking to achieve their aims in the least onerous way as regards human rights. In order to do that, a proper and complete investigation and study with the aim of finding the best possible solution which will, in reality, strike the right balance should precede the relevant project.' *Hatton v UK* (n 67), 2 October 2001, para 97.

²³⁶ Rio Declaration, Principle 17 does not restrict the performance of EIAs to transboundary impacts. Impacts on the global commons and others that remain under domestic jurisdiction are therefore also encompassed within the obligation of due diligence.

²³⁷ *Pulp Mills* (n 32), Joint Dissenting Opinions of Judges Al-Khasawaned and Simma, para 26.

With the exception of the 1991 Espoo CEIATC, however, none of the environmental agreements define the minimum content for a proper EIA. Thus, uncertainty persists as to the essential components of this procedural obligation (independence of the author of the EIA, quantity and quality of the information, public participation, etc.).²³⁸ Moreover, closer examination of the relevant international and EU obligations indicates that the EIA procedures are still falling short at preventing environmental harm.

In EU law, EIA Directive 2011/92 is often held up as one of the most striking examples of the principle of prevention. Indeed, this procedure forces truly incremental changes upon traditional administrative processes. The underlying philosophy of the Directive is that when authorities are fully aware of all the environmental consequences of a given project, they will be in a better position to consider whether the project should be approved at all, and if so what could be done to minimize its negative consequences. The Directive thus leaves no doubt as to the clear preference given to considering environmental impacts as far upstream as possible.

All the ‘environmental impacts’ of a given project—that is, all its direct as well as indirect effects, both short term and long term, temporary and permanent, accidental or intended—on the various elements of the environment must be evaluated from a trans-sectoral perspective, in a holistic and systematic manner. This procedure gives rise to a dynamic which informs administrators, project initiators, and third parties and provides them with an opportunity to require fuller integration of environmental concerns into the decision-making process.

Unfortunately, despite its innovative aspects, Directive 2011/92 contains several gaps that weaken its preventive effect. One weak point is the inappropriateness of the time requirement for impact assessment. The Directive lays down an obligation to assess a project prior to granting it authorization, but practice clearly demonstrates that project conception is at this stage so advanced that it is difficult to modify it in any substantial way. The current EIA regime is carried out much too late to allow the course of the project to be appreciably altered. Nonetheless, Directive 2001/42/EC on environmental assessment of certain plans and programmes fills this gap by requiring Member States to ensure that environmental impacts of certain plans and programmes are assessed before their adoption.

A further difficulty, and not the least of them, has to do with the relatively narrow field of application *ratione materiae* of Directive 2011/92, in that only those projects that have a significant impact on the environment must be subjected to the EIA procedure. The Directive adopts a twin-track approach based on the nature of a given project. Annex I projects must be subjected to an EIA since they are assumed to have a significant impact. Member States enjoy no discretion for such

²³⁸ P Okowa, ‘Procedural Obligations in International Environment Agreements’ Lxvii (1996) BYbIL 275–336.

projects. These are few in number, however: only projects with a very significant impact (nuclear installations, motorways, etc.) must undergo an EIA. By contrast, Annex II projects *may* be subjected to an EIA procedure. The Directive recognizes that these projects do not always have significant effects but acknowledges that in particular cases this may nonetheless be the case. Although Annex II projects are significantly greater in number than those set out in Annex I, Member States are accorded some discretion as to how to treat them. An EIA is required only when a project is likely to have important impacts on the environment, notably as a result of its nature, size, or location. This should imply that a case-by-case examination is undertaken to determine at what point the impact is important. Yet the Directive authorizes Member States to use nationally determined thresholds or criteria as a guideline, thereby enabling them to avoid case-by-case consideration.²³⁹ This significantly increases Member States' power of discretion: by setting low thresholds, they may permit a sizable number of projects to avoid the requirements of the impact assessment procedure. Nonetheless, the CJEU has been limiting the discretion granted to Member States in light of the obligation to subject projects likely to have significant effects on the environment, particularly by virtue of their nature, size or location, to an assessment with regard to their effects.²⁴⁰

Furthermore, EIA generally addresses the risks posed by one single project, without taking into account overall aggregate risks, which may be tolerable at the outset but may become significant in conjunction with other projects. For instance, the placing of additional pressure on an ecosystem that is already subject to a high level of pollution may have a greater effect than equivalent pressure on an uncontaminated ecosystem.

Last but not least, we should recall that if the EIA procedure is a *sine qua non* for granting an administrative authorization,²⁴¹ it is nonetheless a procedural requirement. In the current state of EU law, submission of a project to an EIA is a purely formal guarantee, which does not in itself entail any strengthening of ecological controls. Thus, while the EIA procedure has the merit of informing various interested parties about the damaging effects certain types of activities have on the environment and requiring authorities to provide a statement of reasons for their authorization decisions, it at no time imposes an obligation to reject or modify a project on the ground of damaging environmental impacts.²⁴²

The adoption of preventive measures based on assessment results thus continues to depend on the goodwill of public authorities. The Directive's critics therefore

²³⁹ Art 4. See N de Sadeleer, *Droit des déchets de l'UE* (Bruylant, 2016) 588–92.

²⁴⁰ Case C-72/95, *Kraaijeveld* [1996] ECR I-5403, para 52; Case C-392/96 *Commission v Ireland* [1999] ECR I-5901, para 65; Case C-531/13 *Marktgemeinde Straßwalchen* [2015] C:2015:79, paras 40–2.

²⁴¹ Espoo CEIATC, Art 3(7).

²⁴² The EIA Directive 'does not lay down the substantive rules in relation to the balancing of the environmental effects with other factors or prohibit the completion of projects which are liable to have negative effects on the environment'. See Case C-420/11 *Jutta Leth* [2013] C:2013:166, para 45.

consider it an alibi, a *trompe-l'œil*, a smokescreen which, owing to its purely informative nature, in the end provides no more than illusory guarantees of protection.

5. Concluding observations

At times prevention is elevated to the level of a fundamental principle;²⁴³ at other times it is formulated in very general declaratory rules; sometimes it may be deduced from the objectives of normative instruments of a more technical nature. Thanks to the diversity of its customary and conventional sources, the breadth of its material scope, and its extended temporal scope, it acts as a beacon for environmental law at both the international level and in national legal orders: a sort of golden rule.

But anyone trying to abstract the quintessential nature of such a principle is likely to rapidly become lost in the maze of legal mechanisms to which prevention gives rise. The level of generality of the principle is such that its efficiency may be questioned; the obligations that follow from it appear as vague as their legal content is ephemeral.

A legal principle can only be effective if everyone agrees upon its effects, even in an imprecise manner. In this regard the systematic examination carried out above makes it possible to identify various forms of prevention and to specify which are the most effective in achieving the protection sought. Critical analysis of the various legal instruments stemming from the preventive principle also makes it possible to determine their strong points, which include the procedures for fixing nuisance thresholds, BAT, and EIA procedures. We may nevertheless ask whether these instruments, in their current state of development, constitute a sufficiently strong rampart against increasing environmental threats.

Examined more closely, most of these instruments may be seen to be highly ambiguous. Quality standards intended to limit pollution on the basis of the self-cleansing capacity of ecosystems in reality mask an approach that seeks to conciliate economic needs and protection of the environment and in no way questions an unshakeable faith in economic growth. While EIA procedures have the merit of providing information to the various actors concerned, they present no obstacle to the adoption of decisions that will lead to serious environmental damage.²⁴⁴ Examples of this are not lacking. In fact, do all these procedures in one way or another not legitimize a certain level of environmental degradation? But these ambiguities

²⁴³ International Union for the Conservation of Nature (IUCN) Commission on Environmental Law, Draft International Covenant on Environment and Development, Art 6.

²⁴⁴ Advocate General MB Elmer's Opinion in Case C-431/92 *Commission v Germany* [1995] ECR I-2189.

arise less from the principle upon which these instruments are based than from the interaction between a litany of limitations and an ideal of proportionality.

In order for the preventive principle to be able truly to serve environmental protection law, it appears indispensable to define its scope more precisely. Several principles that have appeared in its wake could contribute to that result. Among these, the PP (examined in greater detail below) should make it possible to consolidate the preventive approach by forcing the public authorities to act even when they do not have conclusive proof to provide grounds for their action. As for the principle of rectification of environmental effects at source as a priority, it should be combined with the preventive principle in order to require public authorities to act as far upstream as possible in tackling the causes of environmental damage. The PPP should also be called upon to evolve within the framework of prevention. In addition, recourse to the principle of integration would enlarge the scope of prevention by requiring those responsible for other public policies to attenuate their impacts on the environment. Were such adjustments to be made, the preventive function of environmental law would be able to flower fully.

The Precautionary Principle

1. Introductory remarks

Policy measures intended to counter environmental damage have undergone a succession of radical modifications over time. A first phase took the form of remedial action, which translates into late intervention by the public authorities. At this stage damage has already occurred; the only possible course of action is remedy.

This approach evolved to include a preventive dimension, by which public authorities intervene prior to the occurrence of damage that is likely to take place if nothing is done to prevent it. This second stage is marked by an understanding that threats to the environment are tangible and that situations may rapidly become critical; for that reason, timely prevention of damaging consequences should be undertaken.

Finally, the third variation is marked by anticipation. It differs from the other two in that the authorities are prepared for potential, uncertain, or hypothetical threats: indeed, for all cases where no definitive proof exists that a threat will materialize. The most recent phase in the evolutionary process, precaution is the end point of a range of public measures meant to counter ecological damage. Not only has damage not yet occurred, but there is no irrefutable proof that it will occur.

This progression is evidence of a genuine paradigm shift. While prevention is based on the concept of certain risk, the new paradigm is distinguished by the intrusion of uncertainty. Precaution does not posit a perfect understanding of any given risk: it is sufficient that a risk is suspected, conjectured, or feared. The rational view, ‘ascertain the facts, then act’, must be reversed, to become ‘act first, then ascertain the facts’.

Envisaging anticipatory preventive action in response to uncertainty, precaution represents an important milestone in risk reduction. The question is no longer merely how to prevent assessable, calculable, and certain risks, but rather how to anticipate risks suggested by possibility, contingency, and plausibility. Decision-making processes must henceforth take all risks into account, whatever their degree of certainty. By leaving behind the realm of rational certainty, precaution necessarily gives rise to controversy and its practical application to conflict.

The PP is invoked increasingly often: in relation to the spread of genetically modified organisms (GMOs), urban smog, health claims linked to endocrine disruptors, among other issues. Reflecting the adage ‘better safe than sorry’, the

principle calls for risk to be anticipated. It has also assumed a legal role; legislators cite it, some courts draw inspiration from it, and important scholarly analyses have been devoted to it. Its value amply justifies in-depth consideration.

Yet despite the success of the PP in the fields of national, EU, and international law, its outlines are far from clear. Accorded diverse definitions in these legal orders and case law applications, the principle can in fact be understood in a variety of ways.

A retrospective of positive law is necessary at this point. Section 2 below reviews the definitions given to the principle in various legal systems, as well as representative court decisions, in order to set out the problematic elements inherent in this principle. Variations in terminology have emerged, reflecting the considerable controversy surrounding the principle. International law is rather confusing in this respect. To avoid the more extreme versions of the PP, which press for optimal environmental protection, some—including US policy-makers—prefer to use the term precautionary *approach* (PA) rather than precautionary *principle*; the latter term is preferred by the EU institutions. For our part, as we consider this an irrelevant debate, a semantic squabble between decision-makers, we will use the terms PP and PA interchangeably.¹

On the basis of empirical analyses of a swath of areas permeated by uncertainty (Section 3), we consider the various thresholds for application of the PP: the concepts of risk, damage, and proportionality (Section 4). This fourth section sets out the difficulties that characterize the principle and recommends ways in which these weaknesses might be remedied.

More forward-looking in character, Sections 5 and 6—based on the empirical materials of Sections 2 and 3—assess how the PP might provide fresh impetus to the evolution of environmental law. For the sake of greater clarity, we have distinguished between the role scientists should play in the decision-making process (Section 5) and the effects of the principle on positive law (Section 6), despite numerous points of overlap. Section 5, based on a multidisciplinary approach, demonstrates that opposing science to precaution is unproductive and proposes practical solutions in the field of risk assessment and risk management. Section 6, which takes a more classical legal approach, demonstrates how the principle could influence the elaboration of standards and civil liability.

Economic factors do not play the same central role in discussions about the PP as they do in debates about the PPP. While the latter is derived from economic

¹ Other authors use both terms interchangeably, e.g. E Hey, 'The Precautionary Concept in Environmental Policy and Law: Institutionalizing Caution' (1992) 4 G Int'l Env L Rev 303; D Freestone, 'The Road from Rio: International Environmental Law after the Earth's Summit' 6 (1994) JEL 210–13. Such authors suggest that the 'precautionary approach' can only be defined by reference to the principle. See also P Birnie, A Boyle, and C Redgwell, *International Law and the Environment*, 3rd ed (OUP, 2002) 448.

theory, the PP is a decision-making principle related to the principle of prevention, in which economic elements are not of prime importance.²

2. Origin of the principle

Arising in the mid-1980s from the German *Vorsorgeprinzip*, the PP was widely invoked throughout the 1990s within international legal circles and legitimated in a number of multilateral environment agreements (MEAs). It has come to occupy an uncontested position in international (Subsection 2.1) and EU law (Subsection 2.2) as well as in certain national legal regimes (Subsection 2.3) to the point where it overshadows a number of other environmental principles. The literature on the PP has grown exponentially alongside these developments.

In this section, we try to demonstrate how the PP is capable of slowly but inexorably permeating the numerous crevices of positive law, whether through the declaration of public policy objectives (soft law, preambles to MEAs), regulatory acceptance (hard law), or new methods of judicial interpretation (case law). Moreover, we examine to what extent the boundaries between international law and national legal regimes are porous; in any event, developments in international environment law cannot be understood without being related to national laws and *vice versa*. This cross-fertilization between international law and domestic law confirms the extent to which hierarchies quintessential to legal systems can be intertwined.

2.1 International law

The decisions adopted in the course of the 1990s by States within the North Sea Ministerial Conferences mark the first use of the PP in international law. In the aftermath of these decisions, the principle has steadily expanded its dominion in the field of marine pollution, transboundary watercourses, and fisheries.³ The uncertainty surrounding the causes and effects of atmospheric pollution has also served to favour the use of the PP. Paradoxically, the 1985 Vienna Convention for the Protection of the Ozone Layer was adopted just as the scientific controversy over the effects of global ozone layer depletion was reaching its height.⁴

² We thus approach the economic implications of the PP in a more diffuse manner, both in various parts of this chapter (Subsections 3.2.3.2 and 5.3.3.4) and in Chapter 5.

³ See Subsections 3.2 and 3.3 below.

⁴ See the 1985 Vienna Convention, Recital 6. The Convention did not fix a reduction quota for emissions of chlorine into the atmosphere, but it did set in motion a regulatory process that rapidly resulted in the 1987 adoption of the Montreal Protocol on Substances that Deplete the Ozone Layer, subsequently amended several times in order to achieve the phase-out of all CFCs by 1995. The Parties to

Since then the principle has been endorsed by other instruments concerning air pollution.⁵

The PP rapidly moved beyond the fields of marine and atmospheric pollution to other areas of international environmental law. It was successively established as a general principle of environmental policy in various soft law documents adopted in the early 1990s by the United Nations Economic Commission for Europe (UNECE), the United Nations Environment Programme (UNEP), the Organization of African Unity (OAU), the UN Economic and Social Commission for Asia and the Pacific (ESCAP), and the Organization for Economic Co-operation and Development (OECD).⁶

It was eventually accorded universal recognition at the UN Conference on Environment and Development⁷ in Rio de Janeiro, which resulted in a Declaration and two framework Conventions. Principle 15 of the non-binding 1992 Declaration on Environment and Development declares: 'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.' Similarly, the PP was enshrined in the 1992 Framework Convention on Climate Change (UNFCCC) as well as in the Preamble of the 1992 Convention on Biological Diversity (CBD).

Since the 1992 Rio Conference, the PP has been taken up in the majority of bilateral and multilateral environmental agreements (MEAs). Today, it can be found in some sixty multilateral treaties, covering a wide array of environmental issues ranging from air pollution to waste management.⁸

As a matter of policy, disputes have arisen as to whether the PP should be labelled as a 'principle' or merely as 'an approach'.⁹ This debate reflects the different perceptions of the suitable regulatory responses required to avoid environmental and health damages amid uncertainty. Proponents of an 'approach' take the view that precaution is not legally binding, whereas a legal principle is clearly stated as

the 1987 Protocol declared themselves 'Determined to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it' (Recitals 2 and 6).

⁵ The 1998 Convention on Long-range Transboundary Air Pollution (CLRTAP) Protocols on POPs and on Heavy Metals.

⁶ Bergen Ministerial Declaration on Sustainable Development in the Economic Commission for Europe (ECE) Region, para 7; United Nations Environment Programme (UNEP) Governing Council Decision 15/27 (1989) on the Precautionary Approach to Marine Pollution; 1990 Bangkok Declaration on Environmentally Sound and Sustainable Development in Asia and the Pacific.

⁷ The principle is also recognized in the non-binding 'Agenda 21' (1992) UN Doc A/Conf 151/26, Vol. III (1992).

⁸ S Marr, *The Precautionary Principle in the Law of the Sea: Modern Decision Making in International Law* (Kluwer Law Int'l, 2003); A Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (Kluwer Law Int'l, 2002).

⁹ J Peel, *The Precautionary Principle in Practice* (Federation Press, 2005) 483–501; Trouwborst, *The PP in International Law* (n 8) 36–44.

such. To avoid the more extreme versions of precaution, which press for greater environmental protection, some prefer to use the term precautionary approach rather than precautionary principle; the latter is preferred by the European Union (EU) institutions and some of its Member States.

The various provisions of MEAs enshrining precaution mirror this variation.¹⁰

In Chapter 6, we address the legal status of precaution in international environmental law (IEL). In brief, after being proclaimed and applied for more than four decades there is no doubt that the PP is, on the one hand, a general principle of international law, and, on the other, a general principle of environmental (or even administrative) law at national level.¹¹

The PP has also been subject to international trade disputes where states have relied on it in derogating from their trade obligations. In particular, in the 1990s it became a major point of controversy in the strained relationship between trade and environment, with the EU pleading for its expansion while the United States called for trade measures to be based on 'sound science'. It should be noted that the principle is not mentioned explicitly in any of the constitutive agreements of the World Trade Organization (WTO), although recourse to it has been somewhat unsatisfactorily addressed on a case-by-case basis in cases concerning the Sanitary and Phytosanitary Measures (SPS) Agreement¹² by the WTO Dispute Settlement Bodies (DSBs).¹³ That said, the EU was able to obtain the inclusion of a watered-down version of the principle in the Comprehensive Economic and Trade Agreement (CETA) concluded with Canada.¹⁴

International courts have until recently remained reluctant to accept the PP and even a PA, despite their wide recognition in international treaties. Several decisions indicate the absence of a common approach to risk assessment under uncertain conditions and to the possibility of invoking this environmental principle. While the International Court of Justice (ICJ) and the European Court of Human Rights (ECtHR)¹⁵ are not favourable either to addressing the principle directly or

¹⁰ For instance, in the 1992 Rio Declaration on Environment and Development, the 1996 Protocol to the London Dumping Convention, and the 2001 Stockholm POPs the principle is called an 'approach', while the 'approach' became a principle in the 1992 OSPAR Convention, the 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area, and the Barcelona Convention to Protect the Mediterranean. In the field of waste management, the 1991 Bamako Convention, not yet in force, uses both the terms 'precautionary approach' and 'precautionary principle' in the same provision (Art 4.3(f)). Lastly, the Cartagena Protocol on Biosafety (CPB) refers to the 'precautionary approach' in its preamble, but uses terminology which clearly reflects the same basic rationale for the application of the PP in Arts 10 and 11.

¹¹ See the discussion in Chapter 6.

¹² Chapter 7 below.

¹³ Although not mentioning the principle, the SPS Agreement does support the application of some aspects of the principle. See the discussion in Chapter 7 below.

¹⁴ Regarding trade and labour: Art 23.3(3); with respect to trade and environment: Art 24.8(2).

¹⁵ In *Tătar*, when confronted with contradictory scientific assessments concerning the impact on health of sodium cyanide, the ECtHR referred to the precautionary principle when condemning the superficial nature of the investigation into the risks incurred by the local population that had been carried out prior to the issue of the authorization for a gold mine. See *Tătar v Romania*, 67021/01, 27 January 2009, esp. paras 109–20. However, this doctrine was not expanded later on. For instance, in a

to adopting a precautionary approach, some elements of the principle can already be found in the case law of the WTO DSBs and the International Tribunal for the Law of the Sea (ITLOS).¹⁶

2.2 EU law

Since the 1990s, a flurry of regulatory failures (bovine spongiform encephalopathy (BSE), contaminated blood in France, dioxin crisis in Belgium, etc.) has been placing the health and environmental agenda in the limelight. As a result, a new risk adverse political culture emerged and gave rise to the PP. Enshrined in Article 192(2) of the TFEU—a provision declaring the principles underpinning EU action in the field of environmental protection—it has however not been defined by the treaty framers, even though there are various definitions in the MEAs concluded by both the EU and its Member States. The Court of Justice of the EU (CJEU) filled this gap in 1998 by asserting that: ‘where there is uncertainty as to the existence or extent of risks to human health, protective measures may be taken without having to wait until the reality and seriousness of those risks become fully apparent.’¹⁷ The PP quickly developed into one of the foundations for the high level of environmental protection in the EU.¹⁸ Since then, the EU has been playing a leading role in promoting the PP. As an ‘obligation placed on the EU legislature’,¹⁹ the principle has slowly but inexorably been permeating the numerous crevices of EU law, either through the declaration of public policy objectives (soft law), directives and regulations (hard law), or judicial interpretation (case law). Moreover, in accordance with Article 11 of the TFEU, the PP has been expanded beyond the environmental realm to include agriculture,²⁰ consumers, food safety, and public health

case where applicants were unable to ascertain in a comprehensive manner the risks stemming from liquefied gas terminals because of the complexity of the regulatory scheme the ECtHR did not consider interpreting Art 8 in the light of the PP. See *Maile and Hardy v UK*, 31965/07, 14 February 2012, paras 228, 231.

¹⁶ Subsection 3.3.4 below.

¹⁷ The EU courts adopted a PA in determining that the Commission had not committed a manifest error of appraisal by instituting a ban on the export of beef, since no delay was permissible when the most probable explanation of Creutzfeldt-Jakob's disease was exposure to BSE. See Case C-157/96 *NFU* [1998] ECR I-2211, para 63; Case C-180/96 *UK v Commission* [1998] ECR I-2265, para 99. This interpretation of the PP has become settled case law: Case C-236/01 *Monsanto Agricoltura Italia* [2003] ECR I-8105, para 111; Case C-77/09 *Gowan* [2010] C:2010:803, para 73; Case C-333/08 *Commission v France* [2010] ECR I-757, para 91; Case C-343/09 *Afton* [2010] C:2010:419, para 62. See also Case T-13/99 *Pfizer* [2002] ECR II-3305, para 139.

¹⁸ Case C-127/02 *Waddenzee* [2004] ECR I-7405, para 44; Case T-125/17 *BASF Grenzach GmbH* [2019] T:2019:638, para 272. See N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014) 45–56.

¹⁹ Case C-616/17 *Blaise* [2019] C:2019:800, para 42, case note A Bailleux (2020) 57 CMLR 861–76.

²⁰ The principle applies to the hazardous substances regulated under the CAP (Case C-333/08 *Commission v France* (n 17) para 72).

policies involving scientific uncertainty.²¹ It has steadily expanded its dominion in the field of secondary law to the extent that a broad range of measures ranging from notification procedures,²² prior authorization schemes,²³ restrictions to the use or the sale of a product,²⁴ and safeguard clauses²⁵ to bans²⁶ have been adding flesh to its bones. In particular, the uncertainty surrounding the causes and effects of GMOs and chemical substances that are subject to a high level of harmonization has served to favour its recognition. When compared with the embryonic formulation of the principle in the *ESB* case, the version provided by the Food Safety Regulation 178/2002 (hereinafter GFL) is much more complete.²⁷ Accordingly, it is deemed to be 'an integral part of the decision-making process leading to the adoption of any measure for the protection of human health.'²⁸ It will therefore come as no surprise that, from an academic perspective, much ink has been spilled over its status at EU level.²⁹

The BSE crisis, coupled with public unease regarding authorized GMOs, prompted an overhaul of EU science-based decision-making. It was necessary for scientific rationality to become the cornerstone of a new rational technical approach. In order to obviate irrational fears, the EU institutions announced that decisions would have to be based on scientific assessments, which would need to be separate from the risk management phase. In addition, it was necessary to promote the independence of risk assessors by creating independent agencies in order to ensure that decision-making processes take place in a context free from vested interests.³⁰ Although initially an environmental principle, the PP has thus been a driver of a deeper reform of risk-based decision-making at EU level.

Against this backdrop, the European Commission adopted, in 2000, a Communication on the PP, according to which the principle had to be applied within this rational framework.³¹

²¹ Joined Cases T-74, 76, & 83/00 to T-85, 132, & 137/00 and T-141/00 *Artegodan* [2002] ECR II-4945, para 184.

²² Case C-6/99 *Greenpeace France* [2000] ECR I-1676, para 44.

²³ Communication from the Commission on the Precautionary Principle (COM(2000) 1) (hereinafter Communication on the PP).

²⁴ Case C-6/99 *Greenpeace France* (n 22), para 44.

²⁵ Case C-6/99, *Greenpeace France* (n 22), para 55; Case C-236/01 *Monsanto Agricoltura Italia* (n 17), para 110; and Case C-36/11 *Pioneer Hi Bred Italia* [2012] C:2012:534, paras 51–5.

²⁶ The proportionality principle does not preclude the adoption of bans of hazardous substances in the light of the precautionary principle. See Case T-13/99 *Pfizer* (n 17), para 457.

²⁷ Regulation (EC) 178/2002 laying down the general principles and requirements of food law (hereinafter GFL).

²⁸ Case C-77/09 *Gowan* (n 17), para 74.

²⁹ See the bibliography in P Craig, *EU Administrative Law*, 3rd ed (OUP, 2018) 694–5.

³⁰ M Everson and E Vos, 'The Scientification of Politics and the Politicisation of Science', in M Everson and E Vos (eds), *Uncertain Risks Regulated* (Routledge-Cavendish, 2009) 1–9.

³¹ Communication on the PP, para 2. While the communication is typically a soft-law instrument, it is not devoid of any legal consequences. Indeed, applying the principle of equal treatment, the EU judiciary can ascertain whether an EU measure is consistent with the guidelines that the institutions have laid down for themselves by adopting such a communication. See Case T-13/99 *Pfizer* (n 17), para 123.

The Commission considers precaution as a risk management tool which is part of this risk analysis framework.³² According to this argument, precautionary action should only be taken after experts prepare an ‘objective’ quantitative risk assessment (RA).³³ Accordingly, the decision-maker is not relieved from the duty to perform a RA on the basis of the best available evidence. Furthermore, precaution is seen as a temporary measure pending further scientific information.³⁴ The importance of assessing alternatives to potentially harmful activities is completely missing from the Communication. On a more positive note, however, the Communication emphasizes the need to incorporate qualitative as well as quantitative scientific evidence, acknowledges that protection of health and the environment should be put before economic concerns,³⁵ and encourages a decision-making procedure that is transparent and involves all interested parties as early as possible and to the extent reasonably possible. According to the Communication, determination of what constitutes an ‘acceptable’ level of risk for society is an eminently *political* responsibility.³⁶ The Commission consequently claims that the EU has the right to fix levels of protection—particularly of the environment, and of human, animal, and plant health—although it acknowledges that the PP must be submitted to the principles of proportionality and non-discrimination, and to cost-benefit analysis (CBA). Thus, the thresholds determined in the Communication do not constrain the EU institutions from acting in a strictly determined manner.³⁷

In emphasizing the need to carry out an RA prior to the adoption of precautionary measures, the Communication tends to ensure consistency with international trade obligations. However, this rather monolithic vision of regulatory science is inherently in tension with the demand for a greater reflexive and pluralistic decision-making process, based on public participation. As discussed below in Section 5, a greater emphasis placed on scientific assessment does not negate a repoliticization of the decision-making process given that the competing interests have, at the end of the day, to be deliberated.³⁸ Whether the reform of the EU risk decision-making process has been bridging the gap between scientific rationality and stakeholders carving for more participation remains to be seen. Lastly, the Communication is deemed to be far too general to be correctly applied in complex areas such as the regulation of GMOs.

The extent to which national authorities are bound by the PP has been addressed in a number of requests for preliminary rulings under Article 267 of the TFEU

³² For instance, in food law in accordance with the GFL, the PP intervenes exclusively as a risk management tool.

³³ See para 4 and 6. I.

³⁴ GFL, Art 7.

³⁵ See Case T-584/13 *BASF Agro* [2010] T:2018:279, paras 55 and 168.

³⁶ See Case T-13/99 *Pfizer* (n 17), para 201.

³⁷ See Joined Cases T-429/13 and T-451/13 *Bayer CropScience* [2018] T:2018:280, para 459.

³⁸ Everson and Vos, *Uncertain Risks* (n 30) 11–12.

as well as within infringement actions pursuant to Article 258 of the TFEU. Since the PP is binding on EU institutions, it has been regularly invoked by applicants within annulment actions before the General Court (GCt) and also on appeal before the CJEU when disputing the validity of secondary legislation. The applicant may therefore argue before the EU courts that the institutions have incorrectly implemented or failed to apply the Communication on the PP. The fact that such a treaty principle has been infringed constitutes a ground for annulment. Thus far, the PP has been mostly invoked in actions dealing with health and safety issues and hazardous substances. Whilst the CJEU has been more careful in speculating about the nature of that principle,³⁹ the GCt has classified precaution as a general principle of EU law.⁴⁰

On consideration of the case law of the EU courts, two observations can be made.

First, a distinction must be drawn between health and food safety cases on the one hand⁴¹ and genuine environmental cases on the other (waste management, water and nature conservation). In matters relating to health, where scientific knowledge is far more advanced than it is in the environmental domain, various rules of secondary law flesh out the PP further in relation to the Commission's enforcement powers.⁴² In sharp contrast, within genuine environmental cases, the obligation to take account of the most salient scientific findings does not warrant strict rules in relation to evidence.⁴³ In fact, the uncertainties are far more pronounced in this area given the difficulty in predicting how ecosystems will respond to ecological risks. Nonetheless, ecosystems are subject to chaotic fluctuations, which cannot be adequately modelled, nor even understood, in traditional scientific terms.⁴⁴ In addition, the environmental cases adjudicated to date by the CJEU deal mostly with the interpretation of provisions of various environmental

³⁹ AG Kokott took the view that a legislative measure adopted on the basis of Art 114 of the Treaty on the Functioning of the European Union (TFEU) cannot be directly assessed according to whether it observes the precautionary principle. See the Opinion of AG Kokott in Case C-343/09 *Afton* (n 17) para 54. That reasoning was endorsed implicitly by the CJEU. However, the CJEU is becoming stricter. Although the Court confirmed in *Blaise* the validity of the PPPR, it interpreted that regulation in light of the PP. In so doing, it enhanced the precautionary obligations placed on the authorities when approving an active substance such as glyphosate. Case C-616/17 *Blaise* (n 19).

⁴⁰ Due to its highly abstract nature and particularly broad scope of application, the PP could be defined 'as a general principle of [EU] law requiring the competent authorities to take appropriate measures to prevent specific potential risks to public health, safety and the environment, by giving precedence to the requirements related to the protection of those interests over economic interests'. Joined Cases T-74, 76, & 83/00 to T-85, 132, & 137/00 and T-141/00 *Artegodan* [2002] ECR II-4945, para 184.

⁴¹ Indeed, these last years, the PP has been regularly invoked before the EU courts in food safety and drugs cases.

⁴² It should at this point be noted that in contrast to EU food safety and chemicals regulations where the principle is expressly defined (GFL Regulation, Art 7), few environmental directives or regulations specifically mention the PP in their operative provisions (REACH, Art. 1; Regulation (EC) 1107/2009 concerning the placing of plant protection products on the market (hereafter PPPR), Art. 1(4)).

⁴³ Opinion AG Kokott in Case C-343/09 *Afton* (n 17) para 34.

⁴⁴ B Wyne, 'Uncertainty and Environmental Learning' (1992) 2 *Global Environmental Change* 111-27.

directives, rather than with the functioning of the internal market and the fundamental principle of the free movement of goods.⁴⁵

Secondly, until now the judicial review of EU measures has been more procedural than substantive. In addition, the scope of review exercised by EU courts varies extensively. By contrast, it should be noted in this respect that, within its earlier case law, the CJEU displayed a high degree of deference. Accordingly, the PP was invoked with a view to legitimizing the discretion of the EU institutions to tackle risks characterized by uncertainty. However, after the landmark *Pfizer* judgment,⁴⁶ the EU courts have been engaging in a more robust scrutiny of precautionary measures by spelling out a number of procedural and substantive tests.⁴⁷ This shift can be explained by three factors:

- the influence of the US discourse on risk issues;⁴⁸
- the influence of the WTO DSB case law after the *Hormones* decision;
- the 2000 Commission Communication on the PP that has been taken as an ‘authoritative account’ of the principle.⁴⁹

It is settled case law that precautionary measures must be subject to a number of criteria, including the need for the authorities to carry out an RA that is as complete as possible. Moreover, where it is not possible for a full scientific RA to be carried out, this does not prevent the authorities from adopting preventive measures where such measures appear necessary in order to avoid the occurrence of risks deemed to be unacceptable for society. These tests have been applied more strictly in health-related cases than in genuine environmental cases due to the fact that fundamental freedoms (freedom to conduct a business,⁵⁰ free movement of goods⁵¹) were at stake.⁵² Whenever these requirements are met, the EU courts will not call into question the wide margin of discretion left to the regulator, which implies a limited power of review on their part. In particular, the EU courts acknowledge that disagreement between experts can be a good reason for triggering the PP. There is indeed room for dissent. That said, if any fundamental rights are

⁴⁵ de Sadeleer, *EU Environmental Law* (n 18) 80–9.

⁴⁶ Case T-13/99 *Pfizer* (n 17).

⁴⁷ E Scottford, *Environmental Principles and the Evolution of Environmental Law* (Hart, 2016) 87.

⁴⁸ E Fisher, *Risk Regulation and Administrative Constitutionalism* (Hart, 2007) 223.

⁴⁹ *Ibid.*, 220. According to this author, the 2000 Commission on the PP accelerated the shift from a ‘deliberative constitutive’ paradigm to a ‘rational instrumental paradigm’.

⁵⁰ European Convention on Human Rights (ECHR), Art 16.

⁵¹ TFEU, Arts 34–36.

⁵² N de Sadeleer, ‘The Precautionary Principle in EC health and Environmental Law’, in N de Sadeleer (ed), *Implementing the Precautionary Principle: Approaches from Nordic Countries and the EU* (Earthscan, 2007) 10–58.

impaired, the extent of the EU legislature's discretion may prove to be limited.⁵³ In fact, the rights established under EU law cannot be deprived of all useful effect, and in particular must not be undermined.⁵⁴

However, as far as national measures are concerned, the existence of discretionary powers in relation to the relevant scientific methods that are to be applied does not render the decisions taken by those authorities in that respect exempt from judicial review, in particular in order to verify whether they have exceeded the limits set for the exercise of those powers.⁵⁵ The discussion in Sections 3.4 and 3.5 concerning hazardous substances and GMOs illustrates the Janus-face of the principle: on one hand, the interpretation endorsed by the EU courts might restrict the room for manoeuvre of the Member States should they wish to depart from harmonized EU standards; on the other hand, the principle might also promote the adoption of new reforms within various environmental sectors, involving in particular the establishment of new precautionary assessment methodologies⁵⁶ and classification methods for chemicals (cut-off hazards). All in all, the manner in which the PP is applied in the case law differs depending on the legislative framework and the judicial procedure at issue.

The PP cannot be construed as an isolated legal requirement; it is merely one device within a broad package of regulatory requirements intended to uphold the principle of good administration.⁵⁷ In that respect, Koen Lenaerts classifies it as a trust-enhancing principle; it enhances the trust that constituents should place in EU governance.⁵⁸

It remains to be seen whether the PP is being properly implemented or rather ignored or misinterpreted by the EU institutions.⁵⁹ From a political perspective, there has been no shortage of attempts to portray the principle as anti-scientific.⁶⁰ Recently, the concept—mistakenly referred to as a 'principle'—of innovation has been invoked by the European Commission in order to undermine the PP.⁶¹

⁵³ AG Kokott's Opinion in Case C-723/17 *Craeynest* [2019] C:2019:533, para 47.

⁵⁴ AG Kokott's Opinion in Case C-488/15 *Commission v Bulgaria* [2016] C:2016:862, paras 2 and 3.

⁵⁵ Case C-72/95 *Kraaijeveld* [1996] C:1996:404, para 59; Case C-237/07 *Janecek* [1998] C:2008:447, para 46; Case C-723/17 *Craeynest* (n 53), para 45.

⁵⁶ Case C-127/02 *Waddenzee* (n 18), para 44.

⁵⁷ EUCFR, Art. 41.

⁵⁸ K Lenaerts, 'In the Union we Trust. Trust-Enhancing Principles of Community Law' 41 (2004) CMLR 317.

⁵⁹ The CJEU held recently that the manner in which the RA underpinned the authorization granted to glyphosate—an active substance found in the Roundup—had not been undermining the pesticides Regulation. The authorization was therefore not inconsistent with the PP. See Case C-616/17 *Blaise* (n 19).

⁶⁰ The two European Environmental Agency (EEA) reports on the PP stress that the PP is mistakenly portrayed as an obstacle to innovation.

⁶¹ K Garnett, G Van Calster, and L Reins, 'Towards an Innovation Principle: an Industry Trump or Shortening the Odds on Environmental Protection?' 10:1 (2018) *Law, Innovation and Technology* 1–14.

2.3 Domestic law

2.3.1 US law

During the 1960s and 1970s, the US law-maker fully adopted the essence of precaution. A PA pervaded many statutes ranging from the Endangered Species Act to the 1970 Clean Air Act amendments.⁶² The Delaney Clause prohibiting carcinogens in food irrespective of their dose was also testament to a PA. Moreover, Federal Courts applied a precautionary approach in a number of landmark judgments.⁶³ However, since the 1990s the environmental agenda has lacked momentum. Moreover, the fact that federal courts have been requiring regulatory agencies to reckon upon sound science and to stick closely to formal and rigid procedures, has led to a regulatory paralysis. As a result, the United States has become a 'regulatory laggard'.⁶⁴ That said, in spite of an ongoing political willingness to water down environmental legislation, the risk-adverse statutes have not been repealed.

2.3.2 German law

Though several countries had already incorporated elements of precautionary thinking before the PP made headway in international law, precaution was only expressly recognized in the mid-1980s by the German authorities. In Germany the concepts of precaution and prevention tend to be merged into the term *Vorsorge*. Nonetheless, German legal literature distinguishes between prevention (*Prävention*), which refers to foreseeing known dangers (*Gefahr*), and precaution (*Vorsorge*), which does not require certainty of the occurrence of the risk to be averted (*Risiko*).⁶⁵ As we shall see, this distinction has been confirmed by case law.

⁶² One of the best statements regarding the need for regulators to intervene in the absence of full certainty is found in *Ethyl Corp v EPA*, 541 F.2d 1 (DC Cir. 1976), a case involving the regulation of lead additives in gasoline presumed to present 'a significant risk of harm' to the public health. The US District Court of Appeal for the District of Columbia explained that 'Relative certain proof of harm of danger can be readily found. But more commonly the statutes—and common sense—demand regulatory action to prevent harm. Certainty is a scientific ideal to the extent that even science can be certain of its truth. . . . Awaiting certainty will often allow for only reactive, not preventive regulation.'

⁶³ *Reserve Mining Co. v EPA*, 514 F.2d 492 (8th Cir. 1975); *Tennessee Valley Authority v Hill*, 437 US 153 (DC Cir. 1978).

⁶⁴ D Vogel, 'The Hare and the Tortoise Revisited: The New Politics of Consumer and Environmental Regulation in Europe' 33 *British Journal of Political Science* (2003) 578. Other authors claim that this opposition between the EU and the United States is false. See J Wiener, 'The Rhetoric of Precaution', in J Wiener et al (eds), *The Reality of Precaution* (RFF Press, 2011).

⁶⁵ For a fuller discussion of the role of the principle in the evolution of environmental law in Germany, see: M Bothe and H Scharp, 'La juridiction administrative allemande empêche-t-elle le développement de l'utilisation pacifique de l'énergie nucléaire?' 4 (1986) RJE 420; E Rehbinder, 'Vorsorgeprinzip im Umweltrecht und Präventive Umweltpolitik', in UE Simonis (ed), *Präventive Umweltpolitik* (Herausgeber, 1988) 129–41; ; A Reich, *Gefahr-Risiko-Restrisiko* (Werner-Verlag, 1989); G Roller, *Genehmigungsaufhebung und Entschädigung im Atomrecht* (Nomos, 1994); S Boehmer-Christiansen, 'The Precautionary Principle in Germany', in T O'Riordan and J Cameron (eds), *Interpreting the Precautionary Principle* (Cameron May, 1994) 31; K-H Ladeur, 'Zur Prozeduralisierung des Vorsorgebegriffs durch Risikovergleich und Prioritätensetzung', in *Jahrbuch des Umwelts und Technikrechts* (TechnikB, 1994) 297; B Bender et al, 'Hauptprinzipien des Umweltrechts' in *Umweltrecht* 3. Aufl. (R. Müller, 1995) 24; D Murswiek, 'Der Bund und die Länder Schutz der natürlichen

The German case law has been able to fashion a legally binding (*rechtssatzförmiges Prinzip*) principle of precaution for administrative agencies that deal with listed installations, nuclear plants, and biotechnology, construing certain texts in a manner not intended at the time they were adopted.

Regarded as a 'fundamental central idea' (*grundlegender Leitgedanke*), the *Vorsorgeprinzip* aims to minimize environmental risks by anticipating possible danger. By way of illustration, whilst Section 5(1), no. 1 of the Federal Emissions Control Act (*Bundesimmissionsschutzgesetz*, hereinafter BImSchG) covers the regulation of mere hazards by ambient quality standards (*Immissionswerte*) according to the preventive principle, Section 5(1), no. 2 empowers the authorities to adopt precautionary measures (*Emissionswerte* or emission standards) even beyond the scope of mere hazards⁶⁶ by recourse to best available technologies (BAT). The second paragraph thus implies that BAT may be used in order to reduce pollution at source. Ambient emission standards (or EQS) can be set at a level below the threshold of a hazard. These precautionary thresholds thus act as a buffer zone.⁶⁷

The case law has clarified the scope of that paragraph. Whenever an emission standard implements the PP, the administration is required to produce evidence of the causal link between the emission and the damage.⁶⁸ As discussed in Chapter 1, according to the German Federal Administrative Court (*Bundesverwaltungsgericht*, hereinafter *BVerwG*) case law, the breach of emission standards fleshing out the PP cannot give rise to any individual rights.⁶⁹ It follows that plaintiffs have no standing. Finally, precautionary measures are subject to the proportionality principle. This general principle does not however prohibit the adoption of strict regulations to govern the discharge of hazardous substances in the absence of certainty concerning their potential damage, as this is permitted under the PP.⁷⁰

Lebensgrundlagen', in M Sachs (ed), *Grundgesetz: Kommentar* (Beck'sche Verlagsbuchhandlung, 1996) 653; T Lundmark, 'Principles and Instruments of German Environmental Law' 4 (1997) *J Env L & Practice* 43; K von Moltke, 'The *Vorsorgeprinzip* in West German environmental policy', in *Royal Commission on Environmental Pollution*, 12th report: Best practicable environmental option, Cmnd 310, (HMSO, 1988); ; P Sand, *Transnational Environmental Law* (Kluwer Law Int'l, 1999) 136–7; G Roller, 'Environmental Law Principles in the Jurisprudence of German Administrative Courts', in M Sheridan and L Lavrysen (eds), *Environmental Law Principles in Practice* (Bruylant, 2002) 157–71; S Marr and A Schwemer, 'The Precautionary Principle in German Environmental Law' 3 (2004) *YbEEL* 125–48.

⁶⁶ Section 5, no. 2 reads as follows: 'Installations subject to authorization are to be constructed and operated in such a manner that precaution is taken against damaging environmental effects ...'

⁶⁷ Marr and Schwemer, 'The PP in German Law' (n 65) 138.

⁶⁸ *BVerwG*, 10 January 1991, 995.

⁶⁹ *BVerwGE* 69, 37—Heidelberger Heizkraftwerk. However, in situations where emission standards relate to highly hazardous substances, and the administration did not lay down EQS (*Immissionswerte*), the *BVerwGE* has accepted standing for neighbours; see *BVerwG*, NVwZ 2004, 610 (611). In particular, 'regarding cases involving high risk technologies, such as nuclear energy, neighbors have standing if not all necessary measures to comply with the PP have been taken into consideration'. See *BVerwG* of 10 April 2008, NVwZ 2008, 1012. The *Restrisiko* amounts to the remaining risk every citizen has to accept. The difference from the previous case law is that in the field of precaution more measures are considered to give rise to standing. *BVerwG* of 30 August 1996, 4 B 117 (1996), 498.

⁷⁰ *BVerwG* of 30 August 1996, 4 B 117 (1996), 498.

From a precautionary perspective, the *BVerwG* accepts that administrative measures may limit freedom of action even without any clear proof of a causal link between the activity being regulated and environmental damage. This case law is particularly interesting in that it draws a fine distinction between dangers, risks, and residual risks, which will be considered later in this section.

In a judgment of 17 February 1978 concerning the operation of a coal-fired power plant,⁷¹ the *BVerwG* ruled that: ‘according to §5 of the *BImSchG*, installations must be established and operated in such a way that harmful effects on the environment and other dangers, disadvantages and considerable nuisances are avoided and that the necessary precautions are taken against pollution, particularly by limiting emissions on the basis of best available techniques.’ In a later judgment of 14 February 1984,⁷² the same court went on to specify the conditions under which it was possible to invoke the principle: ‘Precaution ... is appropriate when there are sufficient grounds to believe that there is a danger that emissions might lead to environmental damage—even if a causal link has not been proved for the case under consideration.’

The PP is also embedded within German constitutional law (*Bundesverfassungsgericht*). The *BVerfG* held that, pursuant to Article 2 of the *Grundgesetz*, a provision that guarantees the right to life and physical integrity, the law-maker is obliged to provide sufficient protection for the public against the possible detrimental effects of the use of hazardous technologies. It follows that these installations require authorization. If it is technically impossible to avert their foreseeable danger, they cannot be authorized. However, these precautionary obligations do not entail a requirement to stipulate minimum threshold values for emissions of potentially dangerous substances.⁷³

2.3.3 Other EU Member States

Since it was first enunciated in the 1992 Maastricht Treaty, the PP has been championed by environmental and health advocates, but has also met with resistance in certain quarters. Since EU law prevails over a Member State’s law, it will come as no surprise that most of them have gradually incorporated the PP into their own national laws. Moreover, the Member States that have not integrated the PP into their own legislation tend to comply with it when implementing EU law. In several Member States, it is regarded as a sound principle of public decision-making⁷⁴ or ‘*un principe de bonne administration*’.

⁷¹ *BVerwG*, 17 February 1978, Bd. 55 (1978) 250.

⁷² (1985) 69 *BVerwG*, 17 February 1984, 43.

⁷³ B W Wegener, ‘Principles into Practice-Germany’, in R Macrory (ed), *Principles of European Environmental Law* (Europa Law, 2004) 109.

⁷⁴ E Fisher, J Jones, and R Von Schomberg, *Implementing the PP: Perspectives and Prospects* (E Elgar, 2006) 5.

Although almost one hundred constitutions recognize the right to environmental protection, only one of them refers to the PP, specifically the French Constitutional Charter for the Environment.⁷⁵ This is a notable distinguishing feature of French law. By embedding the PP within the Constitutional Charter, the framers sought to enhance its autonomy as a source of French law. In the event of any conflict with EU or international law, the French concept of precaution should have precedence.⁷⁶ However, the PP has been framed narrowly here.

Article 5 of the Charter charges the public authorities with responsibility for implementing the PP and obliges them to carry out an RA of the risks. That said, this provision establishes more a duty for public authorities rather than a right. It is rather limited in scope, since the precautionary measure must not only be provisional and proportionate in order to avert serious and irreversible effects for their environment, but must also be supported by a RA. Whilst the PP under EU law covers health, safety, and environmental protection, under French constitutional law it is restricted to environmental issues and health hazards where they are determined by environmental factors. In other words, health considerations must be ancillary to broader environmental concerns. All in all, these conditions are more restrictive than those stipulated by the CJEU.

While Nordic environmental policies are not necessarily referred to as 'precautionary', they are certainly underscored by a strong and long-lasting anticipatory philosophy with respect to environmental risks. In contrast to Norway and Denmark where precaution is proclaimed in policy documents, Swedish and the Finnish law-makers referred to the PP in their environmental framework laws. Both Finnish and Swedish definitions espouse a rather strong version of precaution, which dictates what should be done by operators as well as the authorities. For instance, in order to trigger the principle the threat need not be severe or irreversible, a requirement which is laid down for instance in the French constitution. In addition, the PP is closely linked to the substitution principle, according to which the mere existence of an alternative substance that appears to be less dangerous than the substance in question constitutes a sufficient basis for a restriction or a prohibition. Likewise, the transfer of the burden of proof concerning the safety of the technology enhances recourse to the PP.⁷⁷ If State practice and doctrinal debate in the Nordic countries is considered carefully, it may be concluded that the

⁷⁵ Article 5 reads as follows: 'Even if scientific knowledge is uncertain where damages occur which could have serious and irreversible effects on their environment, public authorities shall within their own domains of competences, apply the precautionary principle through the implementation of procedures for the evaluation of risks, and the adoption of provisional and proportionate measures in order to prevent the damage occurring.'

⁷⁶ See Kosciusko-Morizet, *Rapport relatif à la Charte de l'environnement* (Assemblée nationale, no. 1595, 19 May 2004) 35–6.

⁷⁷ See the different contributions in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 59–330 and in Macrory, *Principles of European Environmental Law* (n 73) 75–224.

PP should be considered a principle of customary international law, at least from a regional perspective.

Several constitutional and high administrative courts—in Latvia,⁷⁸ Italy,⁷⁹ and Belgium⁸⁰—have embraced the PP. In the Netherlands, the PP has coloured the interpretation of more traditional principles of administrative law, namely the duty of care and principles of justification.⁸¹ Other Member States, such as the United Kingdom,⁸² have been much more cautious in embracing the PP, let alone a PA. Under UK law, the PP does not have any independent legal status, outside the context of EU law.⁸³ All in all, the number of cases in which the PP has been shaping outcomes remains surprisingly low, as if the principle was still in its infancy.⁸⁴

Finally, climate risks are distinguished from industrial and technological risks both by their unpredictability over time and by the collective nature of the damage they are likely to cause. Indeed, their potential victims are less easy to identify than residents living near to a hazardous facility. The historic judgment handed down on 20 December 2019 by the *Hoge Raad* (HR) opens up new perspectives on the scope of Articles 2 and 8 of the ECHR, in particular with reference to the precautionary principle. In its appeal before the HR, the Dutch Government stressed that the impact of sea-level rise is heavily encumbered with uncertainty. The HR inferred the precautionary principle from Article 3(3) of the UN Framework Convention on Climate Change (UNFCCC) and Articles 2 and 8 of the ECHR. Nevertheless, the principle does not constitute an independent basis for assuming a preventive obligation for the Netherlands to avert significant risks; it is only relevant when

⁷⁸ In setting higher admissible threshold values of noise for open-air motor racing tracks that exceed World Health Organization (WHO) threshold noise values, the Latvian Constitutional Court ruled that the executive did not act in compliance with the PP, ensuring and protecting human dignity as the supreme value of a democratic state governed by the rule of law. See Case 2017-02-03, 19 December 2017, § 19.3.

⁷⁹ Cass. it., no. 3567, 20 March 2000; no. 282, 26 June 2002; no. 116, 17 March 2006. The Italian Council of State has endorsed a similar definition of the PP to the one laid down by the CJEU in *NFU*. See Consiglio di Stato, Section IV, no. 826, 8 February 2018.

⁸⁰ CE Bg, no. 82.130, 20 August 1999, *Venter*.

⁸¹ L Van Middlekoop, 'Environmental Principles in Dutch Law' in Macrory, *Principles of Environmental Law* (n 73) 141–4.

⁸² The Court of Appeal held that it was correct to interpret 'risk' under Section 3(1) of the Health and Safety at Work Act 1974 not as simply referring to proven risks but also to possibilities of danger and that such an interpretation was consistent with the public health and safety aims of that legislation (*R v Board of Trustees of the Science Museum* (1993) ICR 876). Likewise, the public perception of an unsubstantiated risk was held to be a relevant consideration for a planning inspector to take into account in refusing planning permission (*Newport BC v Secretary of State for Wales and Browning Environmental Services Ltd* [1998] Env L R 174). For example, E Fisher, 'Is the Precautionary Principle Justiciable?' 13: 3 (2001) JEL 324. Although a strict precautionary approach is required for Art 6(3) Habitats Directive, the Court of Appeal held that it should not be adopted in a case related to an airport infrastructure impacting Natura 2000 sites a more intensive standard the appropriate standard of review than the *Wednesbury irrationality standard of review*. See *Plan B Earth, Friends of the Earth, and Hillingdon LBC v Secretary of State for Transport* [2020] EWCA Civ 214 EWCA Civ 214, paras 75, 77.

⁸³ R Moules, *Environmental Judicial Review* (Hart, 2001) 61.

⁸⁴ R Macrory and I Havcroft, 'Environmental Principles in the UK' in Macrory (ed), *Principles of Environmental Law* (n 73) 141–4.

substantively interpreting the scope of States' obligations.⁸⁵ The HR held that even though there is scientific uncertainty concerning the exact nature of the risks that any sea-level rise may have on the human population in the Netherlands over an extended period of time, the Dutch authorities are not relieved of their positive obligations to prevent such a risk from being realized. According to the PP, 'the existence of a tangible possibility that such a risk may manifest itself' results in a requirement to take appropriate action.⁸⁶ Accordingly, the PP does not apply solely in relation to clearly identifiable risks to specific environmental resources, but also encompasses the risks associated with climate change, the exact nature, time of realization, and scope of which are still uncertain.⁸⁷ Given continuing temperature rises, the more flexible reduction target for the Dutch authorities (20 per cent reduction of greenhouse gas (GHG) emissions by the year 2020 against the 1990 benchmark, instead of a 25 per cent reduction as proposed in the intergovernmental panel on climate change (IPCC) AR 4 report) runs counter to the environmental principle.⁸⁸ It is clear that, since the case involved an application for an order of specific performance rather than a liability action, a more flexible approach was followed as regards the causal link between the inaction on the part of the State and the violation of the rights concerned.

2.3.4 Non-European States

Whilst several Western European States have either defined the principle explicitly or embraced rather broad definitions, other States have been much more cautious in embracing the PP, let alone a PA.

The situation varies from a full endorsement of the PP through to its outright rejection by supreme courts. When the principle is enshrined in environmental framework law, the weaker formulations incorporate concerns regarding technical feasibility and economic efficiency and emphasize the importance of basing precautionary measures on 'sound science'.⁸⁹

For instance, the PP has become 'part of the environmental law' of India.⁹⁰ Besides, Australia embarked on a 'grand experiment with respect to the adoption of several environmental principles, among which the PP, through the widespread adoption of the national strategy for Ecologically Sustainable Development (ESD) and the non-binding Intergovernmental Agreement on the Environment (IAD) in

⁸⁵ Opinion of the Procurator General FF Langemeijer and the Advocate General MH Wissink, para 4.241.

⁸⁶ Case C-19/00135 *Urgenda* [2019] HR:2019:2006, para 5.6.2.

⁸⁷ *Ibid*, para 5.7.5.

⁸⁸ *Ibid*, para 7.2.5.

⁸⁹ A Jordan and T O'Riordan, 'The PP: A Legal and Policy History', in *The Precautionary Principle: Public Health, Protection of Children and Sustainability. Fourth Ministerial Conference on Environment and Health* (Budapest, 2004) 37.

⁹⁰ Indian SCt, *Vellore Citizens Welfare Forum v Union of India* (28 August 1996) 5 SCC 647, 1996 AIR SC 2715.

Commonwealth and State environmental legislation.⁹¹ The PP has generally been defined along similar lines to those laid down in Principle 15. The PP applies to all aspects of natural resources and environmental protection decision-making. In fleshing out the PP enshrined in the ESD, the Australian Commonwealth and State environmental legislation resort to qualifying terms such as ‘promote’, ‘facilitate’, or ‘achieve’,⁹² which provide considerable leeway to the authorities implementing the principle. Precautionary measures have been mostly reviewed on their merits by generalist administrative tribunals and specialist environmental courts, such as the Land and Environment Court of New South Wales (NSWLEC).⁹³ Generally speaking, the Australian courts have considered the PP as a ‘standard of common sense’ irrespective of its status in domestic legislation.⁹⁴ However, with the exception of the landmark *Leatch* case, they have applied the PP rather cautiously.⁹⁵

Although the PP has been incorporated into provincial and federal Canadian acts,⁹⁶ domestic courts have been rather divided on the issue. On the one hand, some courts have ruled that the PP’s ‘potentially paralysing effects’ must be balanced against an ‘adaptive management’ approach in order to authorize useful projects to proceed before their environmental consequences have been ascertained.⁹⁷ On the other hand, other courts have held that the statutory duty to take into consideration the PP has been breached by the authorities by the persistent failure to protect endangered species⁹⁸ or to review a pesticide posing an unacceptable environmental risk.⁹⁹

2.4 Concluding remarks

Known at the start of the 1990s by only a few specialists of environmental law, the PP has within the space of two decades experienced a meteoric rise and, as a result, been able to establish itself as a new general principle of international law. Thanks to its generality, it has been applied in an array of areas ranging from hazardous waste to fisheries. In addition, the PP has not only come to occupy an uncontested

⁹¹ R Fowler, ‘Environmental Principles in Australia’, in L Krämer and E Orlando (eds), *Principles of Environmental Law* (E Elgar, 2018) 476–93.

⁹² *Ibid.*, 482.

⁹³ Fisher, *Risk Regulation* (n 48) 133–60.

⁹⁴ *Greenpeace Australia Ltd v Redbank Power Company Pty Ltd.* (1994) 86 LGERA 154.

⁹⁵ *Leatch v. National Parks and Wildlife Service & Shoalhaven City Council* [1993] 81 LGERA 270. See E Fisher and R Harding, ‘The PP in Australia’ in O’Riordan and Cameron, *Interpreting the Precautionary Principle* (n 65) 215.

⁹⁶ The PP can be found in an array of regulatory settings ranging from provincial legislation to federal acts. Some statutes refer explicitly to the PP (Endangered Species Act, Section 2(1)(h)) whilst other encapsulate the idea of precaution without proclaiming the principle (Canadian Environmental Assessment Act).

⁹⁷ *Canadian Parks and Wilderness Society v Canada*, 2003 FCA 197.

⁹⁸ *Centre québécois du droit de l’environnement v Canada*, 2015 FC 773.

⁹⁹ *Wier v Canada (Health)*, 2011 FC 1322.

position in international law but in EU law as well, to the point that it overshadows the principle of prevention. The fact that the meaning of the PP depends largely on the regulatory context, not to mention the legal culture, within which it is embedded does not negate such a status. However, some authors claim that the PP has been applied inconsistently within one jurisdiction or with respect to different jurisdictions on a similar topic.¹⁰⁰

The analysis of these historical developments is important from the perspective of creating a new principle of customary law. Owing to its near universality and to the development of certain State practices that recognize its validity, the PP should be considered a rule of customary law, although this position does not yet enjoy unanimous support.¹⁰¹ We consider this question in greater depth in Chapter 6.

Celebrated by some, and disparaged by others, the PP is no stranger to controversy. Possibly no other environmental principle has produced as much controversy as this principle. Generally, two criticisms have been levelled against it.

First of all, critics argue that the PP is nugatory due to the sheer variety of definitions within the various legal systems and its resulting vagueness. Although it has been subject to varying interpretations and afforded more than twelve different definitions within international treaties and declarations, each enunciation of the principle contains the elements of an anticipatory regulatory approach in the face of uncertainty. The core components of the principle can be readily identified. In fact, all definitions share common features, such as a body of basic knowledge, the prevention of a threat of serious damage, etc.¹⁰² As a result, the differences between these various definitions do not render the principle unpredictable¹⁰³ and do not undermine its overall coherence.¹⁰⁴

Secondly, other scholars are inclined towards the view that the PP has been applied randomly, or even irrationally.¹⁰⁵ However, these criticisms are not grounded in proper evidence. It might also be argued that these fears are misconceived because false negatives outweigh false positives. In addition, from a positivist viewpoint, as exemplified by the latest reforms in the chemical sector, the PP is applied fairly consistently. Indeed, whether in the United States or in the EU, law-makers tend to prioritize the assessment and control of substances according to their level of threat. By the same token, in relation to other matters (waste management, listed installations) the PP is also consistently applied according to the severity of the risks at hand.

¹⁰⁰ J Zander, *The Application of Precaution in Practice* (CUP, 2010).

¹⁰¹ See the discussion in Chapter 6, Subsection 3.2.4 below.

¹⁰² J Wiener, 'Precautionary Principle', in Krämer and Orlando, *Principles of Environmental Law* (n 91) 179.

¹⁰³ L Butti, *The Precautionary Principle in Environmental Law 19 Quaderni della Rivista Giuridica dell'Ambiente* (Giuffrè, 2007) 127.

¹⁰⁴ Peel, *The Precautionary Principle in Practice* (n 9) 18.

¹⁰⁵ C Sunstein, *The Laws of Fear. Beyond the Precautionary Principle* (CUP, 2005).

3. Implementation of the precautionary principle in different environmental sectors

3.1 Introduction

The aim of this third section is to take a critical look at the implementation of the PP on a sector-by-sector basis:

- water resources (Subsection 3.2);
- fisheries (Subsection 3.3);
- nature protection (Subsection 3.4);
- hazardous substances (Subsection 3.5);
- GMOs (Subsection 3.6);
- nuclear energy (Subsection 3.7);
- electromagnetic fields (Subsection 3.8); and
- climate change (subsection 3.9)

In so doing, we shall attempt to demonstrate for each of these sectors how the PP is capable of slowly but inexorably percolating into the numerous crevices of positive law, whether through regulatory acceptance (hard law), declarations of public policy objectives and non-binding opinions (soft law), or new methods of judicial interpretation (case law). The conditions and circumstances under which the PP can be legitimately applied differ from one sector to another. In some sectors, uncertainty stems from a lack of data, whilst in others it is related to epistemological issues. It follows that the types of risk assessment RAs can differ significantly depending on the types of uncertainty that arise. Furthermore, the context-dependent nature of the PP is indeed reflected by the variety of ways in which it is formulated.¹⁰⁶

In addition, the variability or plasticity of the PP can not only be accounted for by the variety of regulatory approaches (under international law RA principles differ for fisheries and chemicals), but also by the legal systems within which the principle operates. Therefore, the challenges stemming from different legal, regulatory, and administrative cultures must not be understated. For instance, as a member of the common law family, Australian law does not resemble civilian Belgian law in any way. The standards of proof applied in EU administrative law are not similar to those operating under US administrative law.¹⁰⁷ Moreover, whilst some sectoral regulations are still in their infancy (e.g. chemicals in international law) others have been subject to a greater level of regulatory provision (e.g. EU regulations on hazardous substances).

¹⁰⁶ Peel, *The Precautionary Principle in Practice* (n 9) 63.

¹⁰⁷ E Fisher, *Risk Regulation and Administrative Constitutionalism* (Hart, 2010) 89–125, 207–41.

Since this section will focus on an examination of the manner in which the principle is implemented in practice across a large swath of environmental sectors, ranging from pesticides to nature protection, there is unfortunately no space for a detailed discussion of each individual legal culture. In addition, the PP has not taken root in virgin soil. As will be stressed in the following, it must continuously engage with pre-existing decision-making requirements. Whilst the law in several areas (e.g. chemicals, fisheries) provides clear guidance for decision-makers, elsewhere it is silent on the matter (e.g. climate change policy, nature). It thus comes as no surprise that the comparisons drawn here between the manner in which the PP is implemented within different areas of the law as well as within different legal orders are far from perfect.

Since the dividing lines between different environmental sectors are not clear-cut, it is hardly surprising that the PP transcends the various legal sectors we shall consider. Finally, the analysis proposed here is not intended to be exhaustive. Nonetheless, the diverse nature of the applications described below points to the potential of a principle which, having originated within environmental law, is now called upon to regulate broad areas of positive law over the longer term.

3.2 Water resources

3.2.1 Introductory comments

Given their interdependence, freshwater and saline water resources¹⁰⁸ are linked to each other. Rivers flow into the seas and oceans, whilst land-based pollution is the primary source of marine pollution. Accordingly, in this section we shall address the role of the PP within the law of the sea and the law of international watercourses. The PP has been particularly prominent in these two areas since the causal link between pollution resulting from a specific activity (chemical, radioactive, thermal, etc.) and damage to freshwater or saltwater ecosystems may be quite complex and hence difficult to demonstrate. This is the case in particular where several polluting activities discharge a wide variety of substances that are likely to have impacts on the same watercourse and also when chemical companies or households discharge chemicals that have a cumulative effect. In addition, decision-makers are confronted with a tyranny of small decisions owing to the fact that upstream polluters include not only major industries but also small and medium-sized companies, farmers, as well as households. Unless a serious catastrophe occurs,¹⁰⁹ identifying the cause accurately is a quite challenging task.

¹⁰⁸ This includes marine and coastal waters, inland surface waters, and transitional waters.

¹⁰⁹ See, e.g., Directive 2012/18/EU of 4 July 2012 on the control of major-accident hazards involving dangerous substances [2012] OJ L197/1, Art 3(13).

Moreover, as far as international law is concerned, the two disciplines share some common features. For instance, in December 1970 the United Nations General Assembly (UNGA) adopted two resolutions that resulted in the codification of customary law with respect to the law of the sea and the law of international watercourses.¹¹⁰ Ultimately, two agreements of major significance for the conservation of ocean and freshwater resources have been adopted: the 1982 UN Convention on the Law of the Sea (UNCLOS), on the one hand, and the 1997 New York Convention on the Law Relating to the Uses of International Watercourses for Purposes other than Navigation (UN Watercourse Convention), on the other. Since these two agreements were largely based on customary law, they do not refer to the PP, either expressly or implicitly. However, several regional agreements enshrine this principle, most notably the 1992 Helsinki Conventions on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Watercourse Convention).

3.2.2 Oceans

3.2.2.1 *International hard law and soft law*

That the PP originally featured more prominently in the regulation of marine pollution will come as no surprise due to the failure of the assimilative capacity approach, which expresses the ability of marine ecosystems to absorb waste discharges without suffering alteration. This approach is much more permissive than the preventive approach. Although the PP is not explicitly mentioned in UNCLOS,¹¹¹ it has steadily expanded its dominance in the field of marine pollution, where an abundance of ecological data on pollution has yielded little understanding, but much concern. During the 1980s, it was invoked in decisions adopted by both the Paris and Oslo Commissions.¹¹² Later on, the decisions adopted by States within the North Sea Ministerial Conferences marked a genuine application of the PP in marine international law. Conscious that damage to the North Sea ‘can be irreversible or remediable only at considerable expense and over long periods’, the State Parties to the Conferences decided to apply the PP by reducing polluting emissions of substances that are persistent, toxic, and liable to bioaccumulate at source by the use of the BAT, even when there is no conclusive evidence of a causal relationship between the inputs and the effects.¹¹³

¹¹⁰ D Freestone and SM Salman, ‘Ocean and Freshwater Resources’, in *The Oxford Handbook of International Environmental Law* (OUP, 2007) 338.

¹¹¹ A Fabra, ‘The LOSC and the Implementation of the Precautionary Principle’ 10:1 (1999) YBIEL 15–24.

¹¹² Paris Commission Recommendation of 22 June 1989; Oslo Commission Decision 89/1 on the Reduction and Cessation of Dumping Industrial Wastes at Sea, in response to the risks inherent in this method of eliminating industrial wastes.

¹¹³ The 1984 Bremen Ministerial Declaration of the International Conference on the Protection of the North Sea, the 1987 London Ministerial Declaration of the Second International Conference on the Protection of the North Sea, the 1990 Hague Declaration of the Third Conference on the Protection of the North Sea, and the 1995 Esbjerg Declaration of the Fourth Conference on the Protection of the North Sea.

Since the beginning of the 1990s the PP has been set out in the 1990 London International Convention on Oil Pollution Preparedness, Response, and Cooperation (OPRC Convention),¹¹⁴ as well as a number of regional marine conventions: the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention),¹¹⁵ the 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area,¹¹⁶ the 1976 Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (as amended in 1995),¹¹⁷ and the 1980 Athens Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (as amended in 1996).¹¹⁸ Since the mid-1990s the principle has been applied to new areas and activities such as coastal management¹¹⁹ and the international fisheries sector.¹²⁰

As a matter of course, the scope of precaution varies tremendously from one agreement to another. The 1976 Barcelona Convention, OSPAR and HELCOM agreements endorse a rather stringent version of the principle ('shall apply the PP'), whilst it has been framed in hortatory terms rather than prescriptive language in other MEAs.¹²¹

In addition, the OSPAR and HELCOM agreements are probably among the most flexible MEAs concerning the marine environment as regards the level of proof required in order to trigger precautionary measures. Both agreements call upon the parties to take precautionary measures 'when there are reasonable grounds for concern' (OSPAR) or 'where there is reason to assume' (HELCOM) that the marine environment will be impaired. In contrast to Principle 15 of the Rio Declaration, which submitted the PP to 'serious or irreversible damage', the OSPAR and HELCOM agreements do not apply any threshold requirements to threats of serious or irreversible damage: it is sufficient that a substance may give rise to a hazard to human health or harm living resources or marine ecosystems in order for the principle to be implemented.

As to the extent of the damage, thresholds vary significantly. According to several definitions, the PP should only apply to risks entailing non-negligible damage. Thus, the 1976 Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (as amended in 1995) only recognise recourse to the principle in order to avert 'threats of serious or irreversible damage'. For other agreements,

¹¹⁴ Preamble.

¹¹⁵ Art 2(2)(a).

¹¹⁶ Art 3(2). See M Pylhäla et al, 'The PP and the Helsinki Commission' in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 143–53.

¹¹⁷ Art 4(3)(a).

¹¹⁸ Recital 5 of the Athens Protocol as amended in Syracuse on 7 March 1996 (not yet in force).

¹¹⁹ Agenda 21, para 17.21.

¹²⁰ See Subsection 3.3.

¹²¹ For instance, the Preamble of the OPRC Convention merely notes the 'importance of precautionary measures and prevention in avoiding oil pollution in the first instance'.

damage is specified much more broadly. By way of illustration, in encompassing any harm to living resources and marine ecosystems, OSPAR transcends the narrower scope of the 'no harm rule'.¹²²

That said, the binding character of the PP is restricted to but a few regional agreements.

In deciding to drastically reduce the discharge of pollutants into the Baltic Sea, the Baltic Marine Environment Protection Commission (HELCOM) embraced the PP. It departed from the sound science approach, according to which a specific threshold must be met by a pollutant as regards the impact of the ensuing damage. Several provisions of the Convention are testament to the validity of the PP. For instance, whilst the 1974 Helsinki Convention required a proven effect of pollution before any preventive measures could be adopted ('the introduction of substances or energy into the marine environment *resulting in hazard*'), the 1992 Helsinki Convention changed that definition of pollution. The notion covers henceforth 'the introduction of substances or energy which *is liable to create hazards*'. This means that it is no longer the proven effect but the potential risk of a threat that is decisive when deciding when preventive measures should be taken.¹²³

3.2.2.2 *International case law*

In the *Mox Plant* case¹²⁴ Ireland requested provisional measures to immediately suspend the authorization of the Mox plant at the Sellafield nuclear power station in Cumbria. Ireland argued, among other things, that the United Kingdom had breached its obligations under various UNCLOS articles, including failing to take the necessary measures to prevent, reduce, and control pollution of the marine environment of the Irish Sea from intended or unintentional releases of radioactive materials and wastes from the plant. According to Ireland, the PP required the United Kingdom to demonstrate that no harm would arise from discharges of these Mox operations. ITLOS did not find that the urgency of the situation required prescribing the provisional measures requested by Ireland. Nevertheless, the Tribunal considered that 'prudence and caution require that Ireland and the UK co-operate in exchanging information concerning risks or effects of the operation of the Mox plant and in devising ways to deal with them, as appropriate'.¹²⁵

Likewise, in a case opposing Malaysia to Singapore as regards the ecological threats entailed by impoldering projects carried out close to the Malaysian territory, ITLOS held that 'given the possible implications of land reclamation on the

¹²² G Winter, 'International Principles of Marine Environmental Protection', in M Salomon and T Markus (eds), *Handbook on Marine Environmental Protection* (Springer, 2018) 585.

¹²³ Pylhäla, 'Helsinki Commission' (n 116) 148.

¹²⁴ *MOX Plant (Ireland v UK)* [2001] ITLOS Rep 10, Provisional Measures.

¹²⁵ Order no 10, para 84. As Judge Wolfrum stated in his Separate Opinion, 'Ireland could not, for several reasons, rely on the precautionary principle or approach in this case even if it were to be accepted that it is part of international customary international law'. If ITLOS had followed Ireland's argument it would have had to decide on the merits, thus reaching beyond the scope of provisional measures.

marine environment, prudence and caution require, the parties to 'establish mechanisms for exchanging information and assessing the risks or effects of land reclamation works ...'.¹²⁶

In its advisory opinion, the Seabed Disputes Chamber of ITLOS held that the PA, as a 'non-binding statement', 'is an integral part of the general obligation of due diligence of sponsoring States', which is applicable even outside the scope of the regulations at issue.¹²⁷

3.2.3 Watercourses

3.2.3.1 *International law*

Although the 1997 UN Watercourse Convention does not proclaim the PP, the principle was set out during the early 1990s in a flurry of MEAs concluded by several European countries.¹²⁸ In particular, the more environmentally friendly 1992 UNECE Watercourse Convention,¹²⁹ the 1994 Charleville-Mézières Agreement concerning the Protection of the Scheldt and Meuse Rivers (the Scheldt and Meuse Agreements), the 1994 Sofia Danube Convention,¹³⁰ the 1996 amended Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities,¹³¹ and the 1998 Rotterdam Rhine Convention¹³² enshrine several environmental principles, including the PP. This subsection focuses on the substantive and procedural obligations that may be incumbent on the State parties as a result of the PP having been enshrined in the UNECE Watercourse Convention as well as within the Scheldt and Meuse Agreements.¹³³ We will then discuss the ICJ case law and some domestic cases.

3.2.3.1.1 Status of the PP in the UNECE Water Convention and in the Scheldt and Meuse Agreements *Legal status.* The wording of the UNECE

¹²⁶ *Case concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v Singapore)* [2003] ITLOS Rep 12, Provisional Measures, 8 October 2003.

¹²⁷ *Responsibilities and Obligations of States Sponsoring Persons and Entities with respect to Activities in the Area* [2011] ITLOS Rep 17, AO, para 131.

¹²⁸ As far as the 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (hereinafter UNECE Water Convention) is concerned, thirty-nine States—predominantly European—are parties to it, many of which have a substantial interest in achieving a sustainable management of transboundary watercourses and international lakes. This participation could help to crystallize the PP as a customary rule, at least on a regional level.

¹²⁹ N de Sadeleer and M Abbas Khayli, 'The Role of the Precautionary Principle in the Convention on the Protection and Use of Transboundary Watercourses and International Lakes', in A Tanzi et al (eds), *The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes* (Brill-Nijhoff, 2015) 163.

¹³⁰ Art 2(4).

¹³¹ Recital 5 of the Athens Protocol as amended in Syracuse on 7 March 1996 (not yet in force).

¹³² Art 4.

¹³³ According to both MEAs, measures aiming at avoiding the potential transboundary impact of the release of hazardous substances shall not be postponed on the grounds that scientific research has not fully established a causal link between the discharge of those substances on the one hand and a potentially transboundary impact on the other. See Watercourse Convention, Art 2(5); Charleville-Mézières Agreements, Arts 2(a) and 3(2)(a).

Water Convention and the Scheldt and Meuse Agreements is nearly identical, providing that the contracting parties 'shall be guided' by the PP according to which action to avoid the 'release' or the 'discharge' of hazardous substances that could have a 'potential transboundary impact' 'shall not be postponed on the grounds that scientific research has not fully proved the existence of a causal link between the discharge of those substances' and a possible significant transboundary impact.

As regards the status of the PP, four observations should be made. First, precaution is not branded as an 'approach' but as a 'principle'. Secondly, it is not mentioned in the preambles to these conventions but amongst the operative provisions. Thirdly, since the PP co-exists with the principles of prevention, reduction of pollution at source, and the PPP, there is a considerable degree of cross-fertilization between these various principles. Fourthly, in providing that the parties 'shall be guided' by the PP when adopting the prescribed measures, the two MEAs enhance the interpretative function of the PP. At first sight, these terms might appear to be less exacting than the formula 'shall apply', which is encountered for example in OSPAR.

Scope. Regarding the material scope of the principle, one has to distinguish the causes of transboundary pollution and its impacts.

With respect to the causes, the main target of the PP is the 'release of hazardous substances' into transboundary watercourses and international lakes, which prompts several remarks. It should be noted that numerous hazardous substances are found in the aquatic environment. First of all, whilst the terms 'hazardous substances' are not defined under the Scheldt and Meuse Agreements, in order to qualify as 'hazardous' under the UNECE Watercourse Convention, these substances must feature at least one of five characteristics; that is, toxicity, carcinogenicity, mutagenicity, teratogenicity, and bio-accumulativeness, knowing that their persistence reinforces their hazardous nature.¹³⁴ The absence of any definition of these characteristics constitutes a departure from the EU legislation on dangerous substances, which refers to a broad range of characteristics.¹³⁵ Secondly, the PP applies to discharges into the aquatic environment, which need not be exclusively direct. Indeed, many chemicals can affect water through processes such as water runoff, percolation, and evaporation intermediary environmental media such as soil or air. In this respect, the PP makes even more sense owing to the fact that the management of diffuse pollution is complex and requires careful analysis and understanding of various natural and anthropogenic processes. Thirdly, by regulating the release of hazardous substances, the PP

¹³⁴ UNECE Water Convention, Art 1(6).

¹³⁵ Regarding the EU harmonizing criteria for classification of substances and mixtures, see Parts 2 to 5 of Annex I of the CLP Regulation. The question thus arises as to which law must be relied upon to ascertain which substances are hazardous.

addresses the discharge of a number of chemicals, pesticides, and biocides into the aquatic environment, but excludes, *inter alia*, non-hazardous solid waste, the latter being a source of significant watercourse eutrophication.¹³⁶ Fourthly, these MEAs seek to achieve the qualitative management of water as no quantitative threshold is provided for: this implies that the applicability of the PP does not vary depending on whether say one or ten tonnes of hazardous chemicals have been released.¹³⁷

In terms of impacts, the PP aims to protect the main elements of freshwater ecosystems, that is, fauna, flora, soil, air, water, and climate. This comprehensive approach is appropriate given the interactions between the various environmental components.¹³⁸ The purpose of avoiding pollution to transboundary watercourses and international lakes mirrors the no harm customary rule.¹³⁹ In addition, the protection of human health is also one of the main concerns of the PP in the Watercourse Convention, given its inclusion among the principles that are supposed to guide the prevention, control, and reduction of water-related diseases.¹⁴⁰ However, the impact of the release of chemicals must not only be transboundary, but also significant. Nonetheless, neither MEA requires that the damage must be irreversible, a condition that would have considerably restricted its scope given that water pollution is reversible.

Table 3.1 compares the risk thresholds set out under the Watercourse and OSPAR Conventions.

As far as personal scope is concerned, point sources of pollution must be regulated.¹⁴¹ Accordingly, the PP does not apply exclusively to State parties; private operators may also be subject to precautionary measures.¹⁴²

Substantive obligations. Where applicable, the PP calls for preventive and control measures, which are not predetermined and can take the form of, *inter alia*, authorizations, restrictions, bans, notifications, surveillance, or a requirement for BAT to be used.¹⁴³ In addition, the various EU laws concerning chemicals discussed above illustrate how the PP can be made more specific. As stressed earlier, the PP is inextricably linked to other environmental principles such as the PPP and

¹³⁶ Case C-258/00 *Commission v France* [2002] ECR I-5959.

¹³⁷ Freestone and Salman, 'Ocean and Freshwater Resources' (n 110) 357.

¹³⁸ *Pulp Mills on the River Uruguay* (Argentina v Uruguay) [2006] Provisional Measures ICJ Rep 113, para 188.

¹³⁹ See Chapter 2, Section 2.1.1.

¹⁴⁰ Protocol on Water and Health to the 1992 Watercourse Convention, Art 5(a).

¹⁴¹ UNECE Water Convention, Art 3(1)(b) and (d).

¹⁴² Operators of industrial undertaking discharging hazardous substances are admittedly covered by the Protocol on civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters (not in force), Art 3(1). However, the preventive approach is missing on the grounds that the operators' liability exclusively applies to harm caused by 'the transboundary effects of an industrial accident on transboundary waters' 'when it has occurred' (Art 3(2)). This curative perspective renders the PP nugatory.

¹⁴³ UNECE Watercourse Convention, Art 3.

Table 3.1 Risk thresholds

Thresholds	UNECE Watercourse Convention	OSPAR Convention
Hazardous activities	Release of substances into the watercourses	Introduction of substances or energy, directly or indirectly, into the marine environment
Level of uncertainty regarding the causal link	Inability of scientific research to fully prove the existence of a causal link between the substances and the damage	No conclusive evidence of a causal relationship between the inputs and the effects
Damage	‘Significant transboundary impact’ on the international watercourse	<ul style="list-style-type: none"> • hazards to human health, • harm to living resources and marine ecosystems, • damage amenities • interference with other legitimate uses of the sea

the rectification of pollution at source as a priority. Indeed, financial resources are necessary in order to prevent and abate water pollution. Furthermore, the PP not only buttresses preventive and control measures when faced with uncertainty, but also enhances the use of alternative non-polluting technologies, product substitution, and clean production methods.¹⁴⁴ Finally, no obligation to carry out a CBA or a proportionality test is provided for, which contrasts with Principle 15 of the Rio Declaration.

3.2.3.1.2 Case law of the international courts In the *Gabčíkovo-Nagymaros*¹⁴⁵ case, Hungary invoked the PP to justify unilateral suspension of the construction of dams on its section of the Danube, on the grounds that the project was likely to cause significant or irreversible damage to the environment. To justify its suspension of the treaty obligations it had jointly engaged in with the former Czechoslovakia, Hungary had to fulfil the requirements of a state of necessity: on one hand, the state of necessity had to be occasioned by an ‘essential interest’ of the State; on the other hand, the interest had to have been threatened by a ‘grave and imminent peril’.¹⁴⁶ A State invoking a ‘grave and imminent peril’ does not have to show current material damage. However, Hungary had to demonstrate a state of

¹⁴⁴ Baltic Sea Convention, Annex II.

¹⁴⁵ *Gabčíkovo-Nagymaros* (Hungary v Slovakia) [1997] Judgment ICJ Rep 7.

¹⁴⁶ *Ibid*, para 52.

necessity occasioned by an essential State interest threatened by a 'grave and imminent peril'.¹⁴⁷

While recognizing the seriousness of the environmental concerns put forward by Hungary to justify its refusal to observe the treaty it had concluded with the former Czechoslovakia, the ICJ refused to accept the existence of a 'grave and imminent peril' because of the uncertain nature of the dangers invoked by the Hungarian authorities. Consequently, a state of necessity can be invoked only if there is a sufficient degree of certainty and inevitability that a peril will materialize, a requirement that renders precaution nugatory.¹⁴⁸

In *Pulp Mills*,¹⁴⁹ Argentina claimed that the 1975 Uruguay–Argentina Statute adopted a precautionary approach whereby the burden of proof should be placed on Uruguay to establish that the operation of the paper mill near the Rio de la Plata would not cause significant damage to the aquatic environment. It also argued that the burden of proof should not be placed on Argentina alone as the applicant, because the 1975 Statute imposes an equal onus to persuade on the claimant and the defendant. The ICJ dismissed the argument put forward by Argentina. It considered that 'while a PA may be relevant in the interpretation and application of the provisions of the Statute, it does not follow that it operates as a reversal of the burden of proof'. Moreover, it held that nothing in the 1975 Statute indicated that it placed the burden of proof equally on both Parties.¹⁵⁰

Regarding human rights protection, it should be noted that in *Tătar*, when confronted with contradictory scientific assessments concerning the impact on health of discharging in waste waters sodium cyanide, the ECtHR referred to the PP when condemning the superficial nature of the investigation into the risks incurred by the local population, which had been carried out prior to the issue of the authorization for a gold mine.¹⁵¹

In the *Indus Waters Kishenganga* arbitration, a case where Pakistan was contending with India's right to divert the waters of the Kishenganga/Neelum, the Permanent Court of Arbitration (PCA) did not consider it 'appropriate, and certainly not "necessary," for it to adopt a precautionary approach and assume the role of policymaker in determining the balance between acceptable environmental change and other priorities, or to permit environmental considerations to override the balance of other rights and obligations expressly identified' in the 1960 Indus Waters Treaty concluded by India and Pakistan.

¹⁴⁷ Ibid. See R Higgins, 'Natural Resources in the Case Law of the International Court', in A Boyle and D Freestone (eds), *International Law and Sustainable Development: Past Achievements and Future Challenges* (OUP, 1999) 103–11.

¹⁴⁸ It must however be noted that the UNECE Water Convention was not applicable in the case at hand.

¹⁴⁹ *Pulp Mills* (n 138).

¹⁵⁰ Ibid, para 164.

¹⁵¹ *Tătar v Romania*, 67021/01, 27 January 2009, esp. paras 109–20.

The Court's authority is more limited and extends only to mitigating significant harm. Beyond that point, prescription by the Court is not only unnecessary, it is prohibited by the Treaty. If customary international law were applied not to circumscribe, but to negate rights expressly granted in the Treaty, this would no longer be "interpretation or application" of the Treaty but the substitution of customary law in place of the Treaty.¹⁵²

3.2.3.2 Domestic law

Since international law is restricted to transboundary watercourses, wastewater discharge management remains primarily a matter of national competence. States have thus considerable discretion in tackling uncertainties. There are numerous examples in national case law concerning the manner in which courts take account of uncertainty.

In the United States, with regards to the Clean Water Act (CWA), early court decisions gave substantial deference to the Environmental Protection Agency (EPA) to take action to prevent harm even before evidence of cause and effect had been assembled. In other words, they held that certain environmental or health risks justify the abatement of hazards despite the absence of evidence of actual harm. In *Reserve Mining Co. v US EPA*, a landmark case concerning unknown health effects of discharges of taconite tailings, the Eighth Circuit Court reversed its earlier decision¹⁵³ and endorsed precautionary measures. It found that the 'public's exposure to asbestos fibres in air and water creates some health risk' that justified the 'abatement of the health hazard on reasonable terms as a precautionary and preventive measure to protect public health.'¹⁵⁴ The Court was satisfied that 'under an acceptable but improved medical theory [asbestos fibres] may be considered as carcinogenic' and a reasonable medical concern as regards public health had therefore been established¹⁵⁵ and ruled: 'In the context of [the CWA], we believe that Congress used the term "endangering" in a precautionary or preventive sense, and, therefore, evidence of potential harm as well as actual harm comes within the purview of that term.'

In a similar case the Minnesota Supreme Court held that, even though there was no evidence of the level at which asbestos posed a risk in drinking water, the regulatory agency was free to apply a worst-case standard until better evidence became available.¹⁵⁶ That being said, the 1980 *Benzene* case put an end to this precautionary era.¹⁵⁷

¹⁵² *The Indus Waters Kishenganga arbitration (Pakistan v India)* PCA [2013], para 112.

¹⁵³ The Court first held that such discharges 'may or may not result in detrimental health effects, but for the present that is unknown'. As the plaintiffs had failed to prove a demonstrable health hazard, discharges could continue, and populations carry on being exposed. *Reserve Mining Company v United States*, 498 F.2d 1073, 1083–84 (8th Cir. 1974).

¹⁵⁴ *Reserve Mining Co. v EPA*, 514 F.2d 520 (8th Cir. 1975).

¹⁵⁵ *Ibid.*, at 529.

¹⁵⁶ *Reserve Mining Co. v. Minnesota Pollution Control Agency*, 267 N.W.2d 720 (Minn. 1978).

¹⁵⁷ See Subsection 3.5.

In *Rossi*, the French *Conseil d'État* (CE) questioned the legality of a prefectural decision which found water abstraction works to be in the public interest and established a narrow safety perimeter around the abstraction site. The CE adjudged that the administration could not base its decision on scientifically proven data alone: 'the fact that a fluorescine infiltration test may not have confirmed such risks and that the hydrogeological report ... may not have considered the narrow safety perimeter insufficient do not in themselves demonstrate that there is no need to enlarge the said safety perimeter in order to guarantee the quality of the waters in question.'¹⁵⁸ This judgment can be seen as implementing the PP, since the CE in effect reproaches the administration for not having demonstrated that there was no need to enlarge the safety perimeter when the risk of infiltration had not been established with certainty. The judgment thus marks a profound change in perspective concerning the legality of administrative action on the protection of water catchment. In case of doubt, an administration must be able to prove that it is not necessary to go beyond what has been laid down or fall short of what has been authorized.

As far as Belgian law is concerned, the Constitutional Court applied similar reasoning with respect to a Flemish regional law that 'was progressively dismantling gravel quarrying in Limbourg province with a view to halting environmental damage.'¹⁵⁹ The judgment explicitly stressed that a regulatory measure may always be reversed, while the continuation of quarrying could have irreversible consequences for the ecosystem under threat:

the legislator must weigh the environmental benefits and threats posed by quarry works and thus has sole responsibility for determining whether or not the environmental impact of these works should be considered negative on the whole and, if necessary, to decide if they should be halted as soon as possible ... All the more so since, if the environmental discussion later results in a reappraisal of current conclusions, the legislator can always reconsider this measure rather than allowing quarry works to continue with the risk of irreversible damage occurring.

Thus applied, the PP has served to guide the reasoning of the Belgian *Cour constitutionnelle* (CCt) towards recognition of certain legal measures taken to deal with damaging activities even when scientific proof about the effects of those activities on the aquatic environment was not conclusive. This decision is all the more

¹⁵⁸ CE fr., 4 January 1995, *Ministre de l'Intérieur c/ M Rossi*. The Administrative Court of Versailles adopted a similar position in a separate borehole case (TA Versailles of 8 October 1996). It held that insofar as the impact assessment was at variance with the opinions submitted by specialized services, 'the prefect should have had more thorough studies carried out to complete the dossier, particularly concerning the foreseeable future effect of borehole exploitation on underlying waters.' That is, uncertainty is no excuse for incomplete investigations.

¹⁵⁹ Bg CCt, 25 April 1995, no. 35/1995.

remarkable as it was handed down at a time when the precautionary principle was not recognized in Belgian law.

3.2.4 Concluding remarks

In conclusion, although a considerable body of law has been enacted in the area of water pollution law, some MEAs refer to the PP. Moreover, ITLOS has been quite cautious in addressing uncertainties. All in all, it should be noted that the scope of the PP as stated and framed in the UNECE Watercourse Convention and in other MEAs concerning various regional seas and the pollution of transboundary watercourses has not been rendered nugatory by the stipulation of various thresholds, such as a requirement that the damage be irreversible. However, these MEAs have a limited regional scope. That said, although the current legal status of the PP in international law is far from clear, these MEAs undoubtedly add dynamism to the trend towards its recognition as a customary international rule.¹⁶⁰

3.3 Fisheries management and conservation

3.3.1 Introductory remarks

The dire condition of fisheries is the legacy of poor decision-making by fisheries authorities in the face of great uncertainty. Our knowledge and understanding of the marine environment is quite fragmentary. In addition, an array of complex factors generate uncertainty, stemming from the scientific data being gathered and processed (measurement, estimation, and modelling uncertainty) to the socio-economic factors affecting regulatory decision-making (decision and implementation uncertainty).¹⁶¹ In particular, the state of many fish stocks is poorly understood, especially in the high seas. Likewise, scientists are unable to forecast the abundance of stocks far into the future (unpredictability of their abundance). Fisheries are prone to variable catch rates, and environmental variations that influence the state of the stocks are themselves unpredictable. By the same token, high levels of uncertainty extend to by-catch and by-product species, and the impact of fishing on the wider marine environment in many fisheries. This situation is aggravated by unregulated and illegal fishing, in particular on the high seas. The main challenge is not that of proper legal regime but of implementation.¹⁶²

¹⁶⁰ See CE Foster, *Science and the Precautionary Principle in International Courts and Tribunals* (CUP, 2011) 21.

¹⁶¹ For instance, illegal, unreported, and unregulated fishing (IUU) constitutes not only a serious threat to fish stocks but also increases the risk of errors.

¹⁶² When IUU fishing goes unchecked, the system upon which fisheries management decisions are based becomes flawed. See Council Regulation 1005/2008 establishing a Community system to prevent, deter and eliminate IUU.

Of most relevance is that fisheries authorities have always faced a dilemma when attempting to strike a balance between short-term economic gains and long-term conservation of stocks. In juggling precautionary attitudes, ecosystem resilience, and socio-economic risks and benefits, decision-makers are called on to reconcile the irreconcilable. Whereas too precautionary an approach entails a loss of earnings, the absence of precaution increases the risk of long-term loss in production and of stock collapse if over-harvested.

The numerous uncertainties compound the risk of errors.¹⁶³ On the one hand, where the stocks are overestimated, they face the risk of being over-fished since there will be some time before the information on the adverse effects of fishing comes to light and action to correct the mistakes may be taken. On the other hand, where conservation measures are delayed on the grounds that the information to assess at what level the fish stock may be harvested sustainably is lacking, the stocks are likely to be over-exploited.¹⁶⁴ Though stocks following their collapse are likely to recover, that recovery can be extremely slow. In contrast, when stocks are underestimated, socio-economic problems may arise.

The PA has been proposed in response to the difficulties faced by experts and decision-makers alike. In effect, the approach recognizes the inability of science to provide full certainty concerning impacts on the fish stocks and their ecosystems. However, whilst the underlying rationale of precaution is similar for fisheries and pollutants, its implementation in fisheries is not the same as for pollutants and other environmental risks.

Following the 1992 Rio Conference on Environment and Development, the PA was introduced to fisheries conservation and management both in treaties and in non-binding documents.¹⁶⁵ Since the mid-1990s the approach has been widely applied in fisheries.¹⁶⁶ The questions asked in this section concern how fisheries authorities have implemented the PA. In answering this question, focus shall be placed on the following issues: first, the status of precaution in international treaties

¹⁶³ T Henriksen, 'The Precautionary Approach and Fisheries: A Nordic Perspective', in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 155.

¹⁶⁴ According to the Food and Agriculture Organization (FAO), in 2013 58.1 per cent were fully fished and 31.4 per cent of fish stocks were overfished. The percentage of stocks fished at biologically unsustainable levels is still increasing. FAO, *The State of World Fisheries and Aquaculture* (FAO, 2009) 50.

¹⁶⁵ Given the reluctance of several States to commit themselves to the PP, the concept of 'approach' finally prevailed on the grounds that it involves less stringent obligations (see the Report of the International Council of the Exploration of the Sea (ICES) Study Group on 'The Precautionary Approach to Fisheries Management, ICES CM 1997'). That being said, the concepts of 'principle' and 'approach' are intertwined in fisheries law. For instance, the PA is paradoxically listed as one of the 'general principles' to be applied by states to ensure the achievement of long-term conservation and sustainable use of straddling and highly migratory fish stocks (UNFSA, Art 5(e)). With respect to the EU Common Fisheries Policy, the precautionary approach 'derives from the precautionary principle' referred to in TFEU, Art 191(2) (Regulation (EU) 1380/2013, Preamble, para 10).

¹⁶⁶ F Orrego-Vicuña, *The Changing International Law of High Seas Fisheries* (CUP, 1999) 157–64; D Freestone, 'International Fisheries since Rio: The Continued Rise of the Precautionary Principle', in Boyle and Freestone, *International Law and Sustainable Development* (n 147) 135–64; S Kaye, *International Fisheries Management* (Kluwer Law Int'l, 2001) 163–265.

and EU law, and its implementation in decision-making processes; and secondly, the review by courts of precautionary decisions in several legal systems.

3.3.2 International law

The 1995 UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA) was the first fisheries agreement to apply a PA to conservation, management, and exploitation measures.¹⁶⁷ Subsequently, precautionary obligations have been incorporated into the conventions of several Regional Fisheries Management Organisations (RFMOs),¹⁶⁸ though few of these regional conventions expressly refer to the approach. Moreover, express references to the PA don't necessary mean that it is effectively applied.¹⁶⁹

UNFSA applies only to straddling and highly migratory fish stocks that occur within and outside the Exclusive Economic Zones (EEZs). In other words, these stocks occur both on the high seas and in areas under national jurisdiction.¹⁷⁰ This agreement introduced several concepts into the law of the sea (among which are sustainable development, the utilization of high seas fisheries in harmony with environmental requirements, and the PA) that are directly related to environmental law. Though UNCLOS embodies the principle of preventive action, UNFSA moves one step further in embracing precaution. Articles 5(c) and 6 as well as Annex II to the Agreement apply the PA to the conservation and management of fish stocks. Deemed to be the UNFSA's most innovative provisions, they call into question the unrestricted freedom of fishing on high seas.¹⁷¹

UNFSA defines the PA as follows:

States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used

¹⁶⁷ Art 6(2) embodies this approach: 'States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.' For example, D Nelson, 'The Development of the Legal Regime of High Seas Fisheries' in Boyle and Freestone, *International Law and Sustainable Development* (n 147) 128. See also J Cooke and M Earle, 'Towards a Precautionary Approach to Fisheries Management' (1993) 3 RECIEL 252–9; SM Garcia, 'The Precautionary Principle: its Implications in Capture Fisheries Management' (1994) *Ocean and Coastal Management* 99–125 ;G Hewison, 'The Precautionary Approach to Fisheries Management: an Environmental Perspective' 3 (1996) *Int'l J Marine & Coastal L* 301–32.

¹⁶⁸ Convention on the Conservation and Management of High Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC), Arts 5(c) and 6; Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean (SPRFMO), Art 3(1)(b) and (2).

¹⁶⁹ P De Bruyn, H Murua, and M Aranda, 'The Precautionary Approach to Fisheries Management: How it is taken into account by Tuna RFMOs' (2013) *Marine Policy* 397.

¹⁷⁰ Art 3(1). Whereas, under UNFSA, the PA is not applicable to fish stocks exclusively confined within areas of the high seas or to areas within the jurisdiction of coastal states; under the Code of Conduct, the approach applies to all fisheries irrespective of the jurisdiction of the coastal states (Art 1(3)).

¹⁷¹ F OrregoVicuña, 'International Law of High Seas Fisheries', in O Schram Stokke (ed), *Governing High Seas Fisheries* (OUP, 2001) 24.

as a reason for postponing or failing to take conservation and management measures.¹⁷²

It should be noted that in contrast to other international instruments, where the PP is to be applied when certainty thresholds are exceeded, the PA must be applied under all circumstances in fisheries management.¹⁷³ Although that definition focuses on the 'absence of adequate scientific information', uncertainties about the stock in question also encompass broader environmental conditions and socio-economic issues.¹⁷⁴

Furthermore, the PA is deemed to be an integral part of an ecosystem approach to fisheries management. Accordingly, its scope is wider than the fisheries to be conserved; it applies to the living marine resources as well as the marine environment.¹⁷⁵

The PA is both of a procedural and a substantive nature.

First, conservation measures were postponed until there was adequate information on which to base conservation measures. The UNFSA reflects a significant departure from that traditional approach. It requires that a minimum level of information must be available before a fishery is established. Therefore, managers must reckon upon the best scientific evidence available when designing their management regimes. States will thus collect and make available 'complete and accurate data concerning fisheries activities'.¹⁷⁶ Moreover, the UNFSA makes a significant contribution to precaution in requiring States to implement 'improved techniques for dealing with risks and uncertainties'.¹⁷⁷ In this connection, whenever the data are deemed to be insufficient or incomplete, the authorities are obligated to carry out more research (data collection, collection of and new types of scientific data, monitoring the status of the stocks, etc.).¹⁷⁸ Moreover, data collection and research programmes to assess the impact of fishing on non-target species must be improved.¹⁷⁹ Until research on the specific stock provides relevant information, a PA should ensure that the management authorities set conservative limits taking into account the level of uncertainty.¹⁸⁰

Secondly, in achieving the objectives of long-term conservation and sustainable use of fish stocks, States are called on to set 'precautionary reference points' for the

¹⁷² Art 6(3)(c).

¹⁷³ Henriksen, 'The Precautionary Approach and Fisheries' (n 163) 157.

¹⁷⁴ Art 6 (3)(c). Regarding the broad scope of the concept of uncertainty, see also FAO Code of Conduct, Art 7(5).

¹⁷⁵ Art 6(1). Likewise, States are required to protect biodiversity of the marine environment (Art 5 (g)).

¹⁷⁶ Art 5(j).

¹⁷⁷ Art 6(3)(a).

¹⁷⁸ Art 6(3)(d).

¹⁷⁹ Art 6(3)(d).

¹⁸⁰ Department of the Environment and Water Resources, *Guidelines for the Ecologically Sustainable Management of Fisheries* (Commonwealth of Australia, 2007) 1.

conservation and the management of these stocks. As instruments implementing the PA, two types of points have to be used: limit and target reference points.¹⁸¹

On the one hand, the limit reference points set the lowest acceptable stock size. They correspond to levels where the stock is maintained within what are described as safe biological limits in order to produce maximum sustainable yield (MSY).¹⁸² The difficulty faced in setting these reference points is that many stocks are already depleted beyond MSY. For overfished stocks 'the biomass which would produce MSY can serve as a rebuilding target'.¹⁸³

On the other hand, the target reference points aim at the optimum stock size 'intended to meet management objectives'.¹⁸⁴ Acting as buffer zone, they have to be fixed at a higher biomass and a lower mortality rate. Accordingly, they are more risk-adverse than the previous ones.

In substance, the PA entails the obligation to adopt management strategies with a view to maintaining or restoring stocks 'at levels consistent with previously agreed precautionary reference points'. The stocks have to be maintained within these limits and the risk of exceeding these points must be very low.¹⁸⁵ Two scenarios must be differentiated. When these points are 'approached', states are called on to implement conservation and management measures.¹⁸⁶ In the event that they are exceeded, they have to take measures to ensure that the stock is restored immediately.¹⁸⁷

However, the management authorities are endowed with much discretion. At the outset, in setting the reference points they decide at what level the stock is to be maintained. According to Herinksen, 'the size of the margin will depend on the quality of the scientific information available and the risk the states are willing to take'.¹⁸⁸ Where these thresholds are 'approached' or exceeded they decide the timeframe for and the type of management measures aimed at restoring the fish stocks. The decision to apply moratoria or bans on fishing is left to the State. For instance, the authorities may, depending on the status of the stock, decide to rebuild it over a longer period of time, thereby permitting continued fishery.¹⁸⁹ Nevertheless, in cases of new or exploratory fisheries, States are required by UNFSA to take 'as soon as possible cautious conservation and management measures'.¹⁹⁰

To conclude, UNFSA signals a significant departure from UNCLOS. As a management tool, MSY, as embodied in UNCLOS, is closely related to socio-economic

¹⁸¹ Art 6(3)(b) and (4); Annex II, para 2.

¹⁸² Annex II, para 2.

¹⁸³ *Ibid*, para 7.

¹⁸⁴ *Ibid*, para 2.

¹⁸⁵ *Ibid*, para 5.

¹⁸⁶ *Ibid*, para 4.

¹⁸⁷ Art 6(4).

¹⁸⁸ Henriksen, 'The Precautionary Approach and Fisheries' (n 163) 160.

¹⁸⁹ *Ibid*.

¹⁹⁰ Art 6(6).

costs,¹⁹¹ whereas under UNFSA economic objectives cannot be given higher weighing than environmental objectives. In particular, UNFSA signals a shift in the burden of proof by creating a presumption in favour of conservation.¹⁹²

That being said, UNFSA leaves many questions unanswered. What is the meaning of the term ‘being more cautious’? At what level is a stock outside safe biological limits? Does the level of caution endorsed by the decision-maker correlate with the scientific information available? To what extent do fisheries experts take into consideration uncertainties relating to socio-economic conditions,¹⁹³ ecosystems, and biodiversity?

3.3.3 EU Law

Under EU treaty law, ‘the conservation of marine biological resources’ under the Common Fisheries Policy (CFP) is subject to an exclusive central competence.¹⁹⁴ Such a competence is justified by the fact that fish stocks straddle the national waters of the different coastal Member States. Starting in the 1970s, the CFP has gradually been embracing new conservation and environmental considerations granting the PA a prominent role. Given that the EU is party to UNFSA, the CFP is required to flesh out the PA requirements encapsulated in this treaty.

The allocation of the substantive competences regarding the CFP is somewhat complex. Whilst the European Parliament and the Council establish, in accordance with the ordinary legislative procedure, the ‘provisions necessary for the pursuit of the objectives of ... the CFP’, the Council of Ministers adopts measures specifically ‘on the fixing and allocation of fishing opportunities.’¹⁹⁵ These measures are likely to regulate both access to (e.g. how many vessels may fish) and utilization (e.g. how the fish stocks are to be harvested and quantities to be caught) of the living marine resources and their allocation. Lastly, the European Commission adopts the implementing measures. Regarding the scientific assessment underpinning the exploitation and conservation measures, the European Commission consults the Scientific, Technical and Economic Committee for Fisheries (STECF).¹⁹⁶ ICES

¹⁹¹ UNCLOS, Arts 61(3) and 119(1)(a). The scope of UNCLOS, Art 6(1) according to which the coastal State shall determine the allowable catch of the living resources in its EEZ has been elaborated by ITLOS in its advisory opinion of 2015: Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission [2015] ITLOS Rep 21, AO.

¹⁹² Boyle and Freestone, *International Law and Sustainable Development* (n 147) 158; Henriksen, ‘The Precautionary Approach and Fisheries’ (n 163) 157.

¹⁹³ Art 6(3)(c).

¹⁹⁴ TFEU, Art 3(1)(d). It must be noted that the nature conservation measures are linked to the environmental policy that is listed among the areas of shared competence (Art 4(2)(e) TFEU). CFP measures prevail over domestic nature conservation measures. See Case C-683/16 *Deutscher Naturschutzring* [2018] C:2018:433

¹⁹⁵ TFEU, Art 43(3).

¹⁹⁶ Regulation (EU) 1380/2013 of 11 December 2013 on the Common Fisheries Policy, OJ L 354, 22, Art 23 (hereinafter CFP Fr Reg).

provides the STECF with scientific advice on the conservation and management of marine living resources. Accordingly, the EU draws a clear-cut dividing line between ICES and EU institutions regulatory tasks: whilst the former is responsible for assessing the risks, the setting of acceptable levels of risk would be a matter for the Council of Ministers.

So far, the CFP has fallen short of stopping the overfishing of stocks.¹⁹⁷ In particular, the annual pattern of Council negotiations to set the Total Allowable Catches (TACs) for the year ahead has resulted *de facto* in a dilatory policy of stock management that has failed to safeguard or restore stocks. Council negotiations have regularly resulted in the postponement, mainly on grounds of scientific uncertainty, of the stringent measures needed for stocks to recover. As a result, the CFP has been a far cry from the overfishing reality: TACs are set higher than the ones recommended by ICES, fishing mortality exceeds the stocks' reproductive potential, and the fixing of TACs on an annual basis eschews the implementation of even a medium-term perspective.¹⁹⁸

In adopting the Framework Fisheries Regulation 1380/2013 in 2013, the European Parliament and the Council overhauled the CFP, enhancing its sustainability dimension.¹⁹⁹ The PA has become the cornerstone of this new policy.²⁰⁰ The approach is defined in accordance with Article 6 of the UNFSA: 'the absence of adequate scientific information should not justify postponing or failing to take management measures to conserve target species, associated or dependent species and non-target species and their environment'.²⁰¹

Regarding the risk assessment, it is important to stress the role of ICES, which advises several RFMOs, the EU, and different States for over 135 separate fish and shellfish stocks.²⁰² Though its scientific advice is not binding under EU law,²⁰³ it underpins the proposals of the Commission to the Council.

¹⁹⁷ S Khalilian et al, 'Designed for failure: A critique of the Common Fisheries Policy of the European Union' (2010) 34:6 Marine Policy 1178.

¹⁹⁸ Communication on the application of the precautionary principle and multiannual arrangements for setting TACs, COM/2000/0803 final (hereinafter Communication on the application of the PP). Lately, in the Northern Atlantic and adjacent areas, the number of stocks within safe biological limits has increased. See Communication on the State of Play of the Common Fisheries Policy and Consultation on the Fishing Opportunities for 2020 (COM(2019) 205 final).

¹⁹⁹ CFP Fr Reg.

²⁰⁰ 'The CFP shall apply the precautionary approach to fisheries management, and shall aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield.' (CFP Fr Reg, Art 2(1)).

²⁰¹ CFP Fr Reg, Art 4(3).

²⁰² HELCOM, the North East Atlantic Fisheries Commission (NEAFC), the North Atlantic Salmon Conservation Organization (NASCO), Norway, Iceland, Russia, and the European Commission (EC).

²⁰³ 'The Commission must take into account recommendations ... during the legislative process leading to the adoption of the TACs. However, that does not impose on the legislation an obligation to implement proposals made in those recommendations' (Case C-255/08P *WWF-UK v Council* [2009] C:2009:286, para 45).

Of importance to note is that the use of reference points is identified by Regulation 1380/2013 as a tool in implementing the PA.²⁰⁴ The two parameters that are taken into consideration by ICES in formulating its advice are stated in terms of:

- the level of fishing mortality rate (also known as F);
- and the total biomass of the spawning part of the stock or the availability of breeding stock (also known as B).

ICES reference points include Limit Reference Points (LRPs) as well as Precautionary Reference Points (PRPs), whilst the determination of the Target Reference Points (TRPs) is left to the management authorities. This calls for further explanation.

The LRPs set boundaries which are intended to constrain harvesting within safe biological limits. Above these limits, the state of a fishery is not considered desirable. If an LRP is inadvertently reached, corrective action should be taken.²⁰⁵ LRPs include both 'Blim' and 'Flim' (i.e. B and F limit reference points).

Regarding this first parameter (B), Blim identifies the minimum spawning biomass of the stock below which ICES considers there is a high risk of a serious decline of the stock and from where recovery would be slow. Since 1998, ICES advice frequently refers to a more precautionary biomass value, known as the Bpa (precautionary biomass), which is higher than the first in order to establish a safety margin. Accordingly, Bpa is set on a higher catch harvesting level than the Blim.

For the second parameter (F), Flim aims at reducing the risk of fishing mortality exceeding the level that can produce MSY. In particular, it indicates the upper limit of the fishing mortality rate that if maintained, will take the stock down to the biomass limit. The more intensive the level of fishing, and the higher the level of fishing mortality, the lower the 'residual' potential fertility rate.²⁰⁶ Given that it is not possible to quantify a direct risk of collapse, ICES advice refers to a 'precautionary' value, known as Fpa, which is providing an additional safety margin. As a result, Fpa is set on a lower catch harvesting level than the corresponding Flim.

In providing a safety margin or a buffer zone, the two additional precautionary reference points (Bpa and Fpa) take into account the uncertainties and ensure that the risk that the stock falls under the LRM is low.²⁰⁷ These precautionary points are not fixed but will vary with the level of uncertainty and the willingness to take

²⁰⁴ UNFSA, Art 6(3)(b) and (4); CFP Fr Reg, Art 10(1)(e). A 'reference point' is a value derived through scientific analysis, expressed e.g. in terms of mortality rates or biomass of the spawning part of a stock (UNFSA, Annex II, para 1).

²⁰⁵ Art 6(4).

²⁰⁶ Communication on the application of the PP (n 198).

²⁰⁷ CFP Fr Reg, Art 4(18).

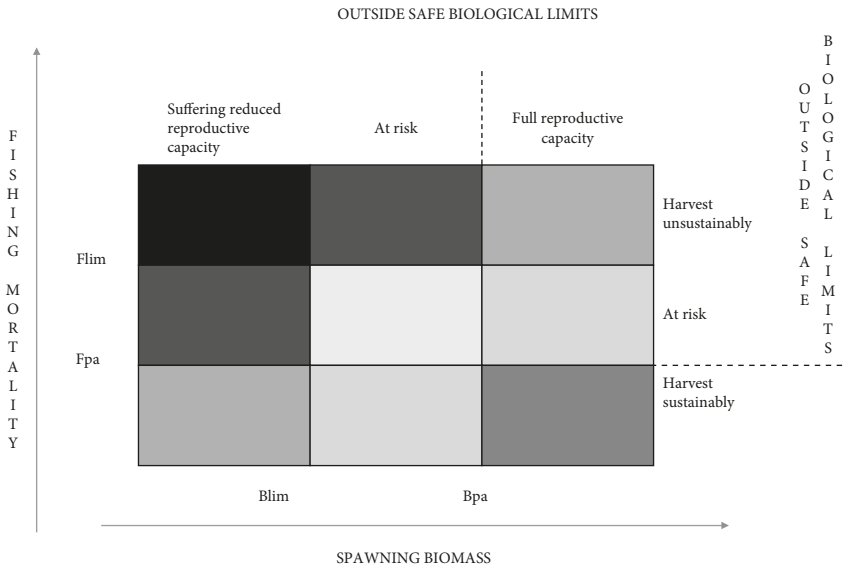


Figure 3.1 Precautionary reference points

risk.²⁰⁸ Because they include any socio-economic considerations, Bpa and Fpa are not deemed to be genuinely scientific. Figure 3.1 illustrates these reference points.

Lastly, the determination of the CFP target reference points is left to the Council of Ministers on the grounds that they are not scientific and were never intended to be scientific.²⁰⁹ They should aim at keeping the spawning biomass at higher levels than and the fishing mortality rate below the precautionary reference points. Within this safety margin there is room for different exploitation strategies. The Council of Ministers must therefore define what it is seeking to maximize, for example, yield by weight, the economic value of the catches, the profits reaped by the fishery, or certain types of jobs.²¹⁰ Therefore, the task of the manager is to identify the level of acceptable risk, a task more complex than calculating reference points: the uncertainty concerning scientific evidence is compounded by the uncertainty related to societal factors.

Regarding risk management, the CFP must ensure that ‘within a reasonable time-frame’ populations of fish stocks can be restored or maintained ‘above biomass levels capable of producing MSY’.²¹¹ In that connection, the adoption of

²⁰⁸ Henriksen, ‘The Precautionary Approach and Fisheries’ (n 163) 162.

²⁰⁹ M MacGarvin, ‘Fisheries: Taking Stock’, in EEA, *Late Lessons from Early Warnings: The precautionary principle 1896–2000* (Environmental Issues Report No. 22, 2001) 24.

²¹⁰ Communication on the application of the PP (n 198), III.

²¹¹ CFP Fr Reg, Preamble, para 7 and Art 2(2).

multiannual plans (MAP) is seen as a 'priority'.²¹² Because they foster long-term approaches, these plans are the most effective means of achieving the objective of sustainable exploitation. In particular, they contain conservation measures to restore and maintain fish stocks above levels capable of producing MSY in accordance with the obligation to apply the PA.²¹³ In addition, in contrast to former plans, they are not stock-specific. This evolution is welcome as stocks are interdependent on each other so cannot be treated in isolation.²¹⁴

The MAP set two reference points. First, they establish 'quantifiable targets such as fishing mortality rates and/or spawning stock biomass' and clear timeframes for achieving these targets.²¹⁵ 'Where targets relating to the MSY ... cannot be determined, owing to insufficient data, the multiannual plans shall provide for measures based on the precautionary approach, ensuring at least a comparable degree of conservation of the relevant stocks.'²¹⁶ Secondly, their 'conservation reference points' aim at restoring the stocks when they fall below safe biological limits. Set in accordance with 'an acceptable level of biological risk or a desired level of yield',²¹⁷ these points must be consistent with the PA.²¹⁸ However, their conservation measures are not entirely risk-adverse given that they are subjected to a proportionality test.²¹⁹ The Council of Ministers is also endowed with much discretion as to which measures to adopt and their design. When is the risk unacceptable? How cautious? In case the reference points are exceeded, there is some discretion regarding the obligation to rebuild the depleted stock. However, the Council is not called on to adopt a moratorium.

3.3.4 Distribution of responsibility between the scientists and management agencies

Is precaution restricted to risk management or does it have to be taken into consideration by scientific experts? In fisheries, the traditional dividing line between the scientific-risk assessors and the decision-makers seems to be blurred. Whilst LRMs should be defined by biologists, the more precautionary PRPs should be worked out jointly by scientists and decision-makers alike.²²⁰ Given that the quantifiable targets are set by the managers, ultimately the decision is political. As a matter of course, the greater the uncertainty, the more cautious the management should be. Table 3.2 illustrates the extent to which their respective tasks are intertwined.

²¹² *Ibid*, Arts 9 and 10. These plans are proposed by the European Commission to the Council which then adopts them.

²¹³ Art 9(1).

²¹⁴ MacGarvin, 'Fisheries' (n 209) 25.

²¹⁵ CFP Fr Reg, Art 10(1)(c), (d).

²¹⁶ *Ibid*, Art 9(2).

²¹⁷ *Ibid*, Art 4 (16).

²¹⁸ *Ibid*, Art 10 (e).

²¹⁹ By virtue of Art 9(4)), 'account shall be taken of their likely economic and social impact'.

²²⁰ Communication on the application of the PP (n 198), I.2.2.

Table 3.2 Distribution of responsibility between the scientists and management agencies

Scientific bodies	Fisheries commissions
Carry out risk assessments	Ensure that stocks are harvested within safe biological limits
Describe and characterize uncertainty associated with the stock status with respect to limit reference points that are merely scientific	Determine management strategies for biomass and fishing mortality based on target reference points that include socio-economic considerations
	Specify timeframes for stock rebuilding and for fishing mortality adjustments
	Enactment of emergency measures

3.3.5 Judicial review of fisheries management decisions

The question we face, in this section, is whether international and domestic courts are willing to reckon on the PP/PA as a benchmark for the judicial review of fisheries decisions.

The ITLOS order of 27 August 1999 in the *Southern Bluefin Tuna* cases seems to view precaution in a much more favourable light than decisions by other international courts. In those cases, there was disagreement between Australia and New Zealand on the one hand and Japan on the other concerning an experimental fishing program for southern bluefin tuna being carried out by the Japanese authorities.²²¹ The complainants alleged that Japan, by unilaterally undertaking experimental fishing, had failed to comply with its obligation to co-operate in conserving southern bluefin tuna stock. The provisional measures requested by New Zealand were, *inter alia*, that the parties' fishing practices be consistent with the PP pending a final settlement of the dispute. Although ITLOS could not conclusively assess the scientific evidence presented by the parties, since there was scientific uncertainty regarding the conservation measures to be taken,²²² it found that action should be taken as a matter of urgency to avert further deterioration of southern bluefish tuna stock. Even though the precautionary principle is not invoked as such,²²³ ITLOS does, in fact, acknowledge it:²²⁴

²²¹ *Southern Bluefin Tuna (New Zealand v Japan; Australia v Japan)* [1999] ITLOS Rep 3 and 4, 528–9, Provisional Measures. For example, HS Schiffman, 'The Southern Bluefin Tuna Case: ITLOS Hears its First Fishery Dispute' 3 (1999) *J Int'l Wildlife L & Pol'y* 318; B Kwiatkowska (2000) 24 *AJIL* 150; K Leggett, 'The Southern Bluefin Tuna Cases: ITLOS Order on Provisional Measures' 9 (2000) *RECIEL* 75.

²²² *Southern Bluefin* (n 221), paras 73 and 74.

²²³ Judge Laing observed that the Tribunal adopted 'the precautionary approach rather than the "precautionary principle"'; he concluded that '... adopting an approach, rather than a principle, appropriately imports a certain degree of flexibility and tends, though not dispositively, to underscore reticence about making premature pronouncements about desirable normative structures' (Separate Opinion of Judge Laing at paras 13 and 19).

²²⁴ A Fabra, 'The LOSC and the Implementation of the Precautionary Principle' 10 (1999) *YbIEL* 17.

Considering that the conservation of living resources of the sea is an element in the protection and preservation of the environment,

...

Considering that, in the view of the Tribunal, the parties should in the circumstances act with prudence and caution to ensure that effective conservation measures are taken to prevent serious harm to the stock of southern bluefin tuna.²²⁵

As a result, ITLOS prescribed a limitation on Japanese experimental fishing in order to prevent further damage to the tuna stock. While it is true that ITLOS urged caution rather than precaution, the fact remains that it prescribes *de facto* precautionary measures.²²⁶ The Tribunal's recommendation indicated an awareness of the environmental rights and duties of States in modern international law, based on the standard of preventing 'serious harm to the marine environment' set out in Article 290(1) of the UNCLOS. This standard broadens the grounds on which provisional measures may be ordered so as to prevent serious harm to the marine environment. Accordingly, the parties were required to refrain from conducting experimental programs that involved catching bluefin tuna.

Regarding the case law of the CJEU, the judgment in *Armand Mondiet* of 24 November 1993 provides a further illustration of the role that the PP can play in decisions taken in the context of scientific uncertainty. Following on from UNGA Resolution 44/225 of 22 December 1989, the Council adopted Regulation 345/92 limiting the length of the driftnets authorized to 2.5 kilometres. A shipowner challenged that restriction on the grounds that no scientific data justified this measure. In addition, they took the view that the measure did not conform to the only information available, although the Regulation provided that conservation measures should be drawn up 'in view of the information that was available'. AG Gulmann concurred with the Commission's argument that 'it is sometimes necessary to adopt measures as a precaution.'²²⁷ The CJEU followed that opinion by ruling that, in the exercise of its powers, the Council of Ministers could not be forced to follow particular scientific opinions.²²⁸ That is, the fact that the benefit to be derived from a ban on driftnets longer than 2.5 kilometres was uncertain did not alter the effect of EU legislation. Along the same lines, the absence of adequate scientific information that is required in order to adopt management measures, does not prevent the EU legislature from adopting, in accordance with a PA, conservation measures for both target and non-target species and their environments.²²⁹ The PA thus

²²⁵ *Southern Bluefin* (n 221), paras 70, 77.

²²⁶ D Freestone, 'Caution or Precaution: "A Rose by any Other Name ..."?' 10 (1999) YbIEL 29.

²²⁷ Opinion of AG M Gulmann in Case C-405/92 *Armand Mondiet* [1993] ECR I-6159, para 28.

²²⁸ Case C-405/92 *Armand Mondiet* [1993] ECR I-6176, paras 31–6.

²²⁹ Case C-128/15 *Spain v Council* [2017] C:2017:3, paras 48–9.

reinforces the Council power to endorse a conservative approach while adopting a common TAC.

Similarly, the Greek prohibition of the use of certain types of fishing net to avoid the destruction of aquatic resources, leading to a reduction in sardine stocks that was going beyond the minimum requirements of the EU CFP framework regulation was deemed to be consistent with the PA. In order for that prohibition to be compatible with the CFP, it had nonetheless to comply with the principles of proportionality and non-discrimination, which are general principles of EU law.²³⁰

Jean-François Giordano is another case in point. This case concerned the non-contractual liability of the EU for Commission emergency measures limiting the fishing of tuna in the Mediterranean Sea. Because these measures were nullified by the General Court (GCt), the claimant sought damages for the harm he allegedly suffered. In particular, the claimant argued that the legislation required the Commission to produce proof of a prior quota set actually being exceeded.²³¹ However the CJEU dismissed that argument, holding that the Commission may adopt emergency measures ‘as soon as there is evidence of a ‘serious threat to the conservation of living aquatic resources’ without having to wait for an allocated quota to be exceeded.²³²

The case law of the Australian Administrative Appeal Tribunal (AAT) provides a unique insight into the implementation of the PP in fisheries management.²³³ The AAT is not only called on to verify whether the Australian Fisheries Management Authority complies with the PP but it is also placed in the position to consider whether the principle can be applied. In brief, the AAT has been reviewing whether the precautionary fisheries measures were justified by a ‘threat of serious and irreversible damage.’²³⁴ The absence of threat of serious or irreversible damage renders the PP inapplicable. However, with respect to new fisheries, it is impossible to determine the existence of such a threat. This leads to a paradox: protective measures are postponed so far as the scientific evidence of harm is not available, ‘by which time serious or irreversible damage may have already been sustained.’²³⁵

Given the limitations of a genuine science-based approach to assess the level of threat, the AAT has been developing a pragmatic approach to the application of the PP with respect to the management of fisheries. Where scientific uncertainty persists as to the nature or the extent of the damage, the AAT has held that a cautious management approach is warranted.²³⁶ In addition, the AAT even endorsed a ‘cautious approach’ to management that can precede the formal invocation of the

²³⁰ Case C-453/08 *Panagiotis I. Karanikolas* [2010] C:2010:482, paras 48–9.

²³¹ Case C-611/12 P *Jean-François Giordano* [2014] C:2014:2282, para 46.

²³² *Ibid.* See also Case C-221/09 *AJD Tuna* [2011] C:2011:153.

²³³ The PP is embodied in the 1991 Fisheries Act, Art 3(1)(b).

²³⁴ *AJKA v AFMA* [2001] ATAA 258. The non-issuance of a licence amounts to a ‘lawful pursuit of the precautionary principle.’

²³⁵ Peel, *The Precautionary Principle in Practice* (n 9) 96.

²³⁶ *Ibid.*, 97.

principle. In particular, the authorities should thus err on the safe side when the fish stock has been overexploited. In that connection, the AAT held that given that the PP was proclaimed as one of the objectives of the Fisheries Management Act, the fishing authority had 'a common interest ... in ensuring the status quo until and unless relevant knowledge can predict an outcome of change in policy. In this situation it is not necessary ... to produce evidence of the extent of depletion to resources under its control'.²³⁷ The Tribunal accepted that non-scientific factors that may provide evidence of risks of environmental degradation and the PP clearly warranted 'a cautious management approach'.²³⁸ Limiting the number of permit holders in the fishery would allow time for the assessment of stock levels.²³⁹

3.3.6 Concluding remarks

Six observations flow from the preceding analysis.

First, the PA introduced in the 1995 UNFSA, the 1993 non-binding Code of Conduct for Responsible Fisheries, and several RFMOs,²⁴⁰ has been applied widely by experts as well as fisheries agencies, and has been acknowledged by international courts as well as domestic jurisdictions. Given the ample State practice, as well as a constant *opinio juris*, precaution can be considered as a norm of customary international law in the area of fisheries.

Secondly, although the enshrinement of the PA in fisheries law is testament to the integration of environmental requirements into a policy related to the exploitation of natural resources, three differences between the PA and the PP in other areas of environmental law have to be highlighted. In contrast to other sectors of environmental law, the PA is not restricted to the risk assessment phase; it is widely applied to management and enforcement as well.²⁴¹ Moreover, as fisheries are characterized by high levels of scientific uncertainty, it is possible to mitigate the impact of uncertainty, but impossible to exclude it altogether.²⁴² Therefore, in contrast to other policies, the PA cannot be set aside until the data becomes more reliable. In addition, the fact that it is difficult to draw a dividing line between uncertainty and ignorance explains why the PA plays a central role in fisheries. Finally, attention should also be drawn to the key difference between the implementation of the PP in the area of pollution control and the PA in fisheries. Whereas the implementation of the PP in pollution control doesn't command any particular action, the PA triggers actions whenever the buffer zone precautionary thresholds are exceeded.

²³⁷ *Dixon and Others and Australian Fisheries Management Authority* [1999] AATA 1024 (21 December 1999).

²³⁸ *Ibid*, para 203. See also *Re Latitude Fisheries Pty and Australian Fisheries Management Authority* [2000] AATA 63.

²³⁹ *Re Atjak Pty and Australian Fisheries Management Authority* [2001] 63 ALD, para 272.

²⁴⁰ Even if they are more elaborate the provisions on the PA correspond to a high degree with the Code of Conduct for Responsible Fisheries, Art 7(5).

²⁴¹ UNGA Resolution 61/105 on sustainable fisheries, 8 December 2006, Art I(5).

²⁴² Communication on the application of the PP (n 198), III.1.1.

Thirdly, it is fair to say that the impact of the PA in fisheries has been less dramatic than previously thought in the 1990s. For instance, whereas precaution led to significant restrictions in the use of large-scale pelagic driftnets, its implementation in the management of fisheries rarely leads to the enactment of bans. Moreover, nothing in the different agreements and various legislation indicates that the PA has priority over competing objectives, such as optimal resource exploitation. Economic efficiency can therefore trump sustainability goals and the PA. Nonetheless, the PA is not 'business as usual'. In accordance with the approach, the fisheries management agencies tend to restrict fishing mortality within safe biological limits by using buffer settings thanks to the enactment of PRPs and TRPs. Any non-compliance with these thresholds should trigger ameliorative action. Accordingly, the new generation of fisheries instruments, beginning with UNFSA, endorse a more proactive and ecosystemic approach to decision-making.²⁴³ In contrast to a swath of MEAs, this is a significant step forward.²⁴⁴

On the whole, the PA has also obliged risk assessors and decision-makers alike to pay heed to uncertainty. The more uncertain the stock is, the more restrictions the management authority should impose on harvest of the fish stock concerned. In contrast, the more reliable the data is, the less significant the buffer zone becomes.

At EU level, the PA has called into question the conventional way of determining TACs. Indeed, the PA has paved the way for a multi-annual management programme that is more compatible with a cautious approach than stock-specific plans.²⁴⁵ Moreover, thanks to the implementation of precautionary reference points, the scientific assessments provided by ICES offer a wider safety margin and reduce the risk of stock collapse.

Fourthly, the above analysis confirms that the PP could entail a shift of burden of proof from the administration to the proponent of new technology. As illustrated in the case *Jean-François Giordano*, the burden of proof can shift from the European Commission having to determine the recovery measures to be taken when reference points are exceeded, to the operators opposing these measures.²⁴⁶ It follows that managers are not obliged to prove the negative outcomes in cases where thresholds are exceeded, and that they are endowed with a wide margin of appreciation.

Fifthly, the PA is not isolated in fisheries law. It goes hand in hand with other concepts. It is complementary to MSY. Indeed, to achieve MSY, populations need to be maintained within safe biological limits according to a PA. On the other hand,

²⁴³ A Al Arif, 'Exploring the Legal Status and Key Features of Ecosystem-based Fisheries Management in International Fisheries Law' 27:2 (2018) RECIEL 12.

²⁴⁴ R Barnes, 'Fisheries and Marine Biodiversity', in M Fitzmaurice et al (eds), *Research Handbook on International Environmental Law* (E Elgar, 2010) 547.

²⁴⁵ Conclusions, Communication on the application of the PP (n 198).

²⁴⁶ Henriksen, 'The Precautionary Approach and Fisheries' (n 163) 157

given that overfishing remains the most significant threat to biodiversity,²⁴⁷ there is a close link between the PA and the ecosystem approach.²⁴⁸

Lastly, although the PA represents ‘a major change in the traditional approach of fisheries management, which has tended to react to management problems only after they arrive at crisis levels,’²⁴⁹ its implementation performance has hitherto been rather mixed.²⁵⁰ Whether the PA weighs powerfully in the trade-off between competing objectives such as the sustainable maximization of the yield and the long-term conservation of the stocks remains to be seen.

3.4 Nature

3.4.1 Introductory remarks

Biodiversity faces a major crisis at both European and world level, the implications of which have still not been fully appreciated. All over the world, most natural or semi-natural, continental, marine, and coastal ecosystems (including essential services, e.g. pollination or water and air purification) have now been subject to significant changes as a result of human activity. Having become increasingly fragmented as a result of transport or energy infrastructure, and subject to intensive urbanization and cultivation, polluted and eutrophied, ecosystems sink, losing their ecological capacity to perform functions as well as their natural and cultural specificity. For animal, plant fungi, and all species this results in fragmentation and isolation of their habitats, and represents one of the most serious threats to their long-term survival. Because of the degradation of their habitats, they are suffering an unprecedented rate of extinction, which is exacerbated by additional threats (poaching, excessive hunting). On a more global scale, global warming and the depletion of the ozone layer risk precipitating much more profound changes to the distribution, structure, and functions of ecosystems, as well as to habitats and species.²⁵¹ Scientists expect that these disruptions will cause an unprecedented

²⁴⁷ Barnes, ‘Fisheries’ (n 244) 542–63.

²⁴⁸ Arrangements predating the 1995 UNFSA ignore the ecosystemic dimension and biodiversity issues. However, the new arrangements focus more on these issues: Regulation 2013, Arts 2(2)(3); 9(2) (5); 1980 Convention on the Conservation of Antarctic Marine Living (CCAMLR), Art II; SPRFMO, Art 3 (2); UNGA Resolution 61/105 on sustainable fisheries, 8 December 2006, Art I (5) and (7); Regulation 1380/2013, Art 7(e). Among the different EU environmental legislative instruments, the Marine Strategy Framework Directive (Directive 2008/56/EC) endorses an ecosystem approach in obliging the Member States to achieve a good environmental status of the EU’s marine waters by 2020. That status is determined by a range of ‘qualitative descriptors’, among which is to maintain the exploitation of fish and shellfish stocks within safe biological limits (Annex I, 3). The threshold values have to be set on the basis of the PP, reflecting the potential risks to the marine environment (Commission Decision (EU) 2017/848, Art 4).

²⁴⁹ Freestone, ‘Caution or Precaution’ (n 226) 30.

²⁵⁰ O Schram Stokke, ‘Conclusions’ in Schram Stokke, *Governing High Seas Fisheries* (n 171) 337–8.

²⁵¹ D Laffoley and JM Baxter (eds), *Explaining Ocean Warming: Causes, Scale, Effects and Consequences* (IUCN, 2016).

drop in the wealth of specific and genetic diversity. It will come as no surprise that a sixth extinction is underway in this new human-dominated geological age, the Anthropocene.²⁵²

Attempts to conserve habitats and their species must grapple with a wide range of uncertainties and knowledge gaps.²⁵³ Most strikingly, scientists are still struggling to ascertain the number of species there are.²⁵⁴ The difficulties are compounded by the lack of sufficient data as well as the fact that modelling the functioning of ecosystems and understanding the complex relationship between human activities and the state of preservation of ecosystems and species remain complex issues.²⁵⁵ Indeed, there are still major gaps within our understanding of how ecosystems and species interact with one another and react to new threats. In some cases, uncertainties cannot be reduced simply by gathering more accurate data; in other words, the uncertainty is intractable. Moreover, although science plays a key role in nature conservation, decisions concerning the exploitation of ecosystems stop far short of scientific advice.²⁵⁶

3.4.2 International law

Over the past four decades, international law has been enriched by a raft of international agreements intended to put a stop to the *sinking of Noah's Ark*. However, the existence of these MEAs should not lull us into thinking that all areas of biodiversity are now well protected. Conservation objectives vary from one agreement to the next, such that no harmonization, even on a geographical level, is assured. Although particular areas of biodiversity are well covered on a continental scale (including migratory or the most endangered vertebrate species, international watercourses, semi-inland seas), others have only recently been brought under international law (landscapes), whilst yet others are practically ignored (micro-organisms or fungi, fundamental ecological processes, animal genetic resources). Lastly, the proliferation of international legal instruments protecting different aspects of biodiversity leads to inefficiency.²⁵⁷

That being said, in proclaiming that 'where potential adverse effects are not fully understood, the activities should not proceed' the 1982 World Charter on Nature

²⁵² L Simon, SL Lewis, and MA Maslin, 'Defining the Anthropocene' 519 (2015) *Nature* 171.

²⁵³ R Cooney and B Dickson (eds), *Biodiversity and the Precautionary Principle* (Earthscan, 2005).

²⁵⁴ According to current estimates, there are 8.7 million species. This means that 86 per cent of existing species on Earth and 91 per cent of species in the ocean still await scientific description. C Mora et al, 'How Many Species are there on Earth and in the Ocean?' 9 (2011) *PLoS Biology*.

²⁵⁵ P Opdam, M Broekmeyer, and F Kistenkas, 'Identifying Uncertainties in Judging the Significance of Human Impact on Natura 2000 Sites' 12 (2009) *Env Science & Policy* 912–21.

²⁵⁶ S Andresen et al., 'The Precautionary Principle: Knowledge Counts but Power Decides?', in R Cooney and B Dickson (eds), *Biodiversity and the Precautionary Principle* (Sterling, 2012) 41.

²⁵⁷ A García Ureta, *Derecho Europeo de la Biodiversidad* (Iustel, 2010) 755; J Razzaque, 'Concluding Remarks', in E Morgera and J Razzaque (eds), *Biodiversity and Nature Protection Law* (E Elgar, 2017) 489.

implicitly acknowledged a precautionary approach.²⁵⁸ Later on, the PP has now become the cornerstone of several of these agreements.²⁵⁹ For instance, in 1994 the principle was explicitly endorsed at the Ninth Conference of the Parties to the Convention on International Trade in Endangered Species (CITES), as well as in several of the Agreements on the conservation of migratory species, established under the Convention on Migratory Species (CMS).²⁶⁰ Moreover, the adoption in 1992 of the CBD represented a watershed in the development of the international law on biodiversity. The Preamble of that convention also provides that ‘where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat.’ Although this statement is not binding, being set out in the preamble to the agreement and not its operative provisions, it is not however devoid of legal effects (interpretative function).²⁶¹ One must ask whether the ecosystem approach, as developed under the CBD, should not influence the PP. By contrast, being premised on the paradigm of State sovereignty over its national resources, international agreements in the area of forestry and agriculture do not contain any reference to precaution.

Although the ICJ did not focus on the PP in its judgment in *Whaling in the Antarctic*, during the course of the proceedings the parties in dispute referred to this principle in terms of whether or not Japan’s whaling practices complied with it. Invoking the PA, New Zealand ascribed a limited role to Article VIII on the conduct of scientific research, adding that lethal methods could only be used when they created no risk of an adverse effect to whale stocks. In particular, it argued that States parties are required to act with ‘prudence and caution’, particularly when ‘information is uncertain, unreliable or inadequate’, so as to avoid ‘any harm’. Australia asserted that the establishment of sanctuaries also reflects the increasing importance of the precautionary approach in the International Whaling Commission (IWC)’s management and conservation of whales. On the other hand, Japan argued that it was conducting scientific research in accordance with a PA in order to improve the sustainability of whale stocks. In his Separate Opinion, Judge Cançado Trinidad stressed that, with the passage of time, the PP will set in motion a move towards ‘the conservation of living marine resources as a common interest.’²⁶²

²⁵⁸ UNGA Resolution 37/7, 28 October 1982, para 11(B).

²⁵⁹ The embodiment of the PP in the CPB is discussed in the subsection on GMOs (section 3.6.2).

²⁶⁰ 1995 Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), Art 2(2); Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), Art 2(4); Canberra Agreement on the Conservation of Albatrosses and Petrels, Art 2(3).

²⁶¹ See Case C-67/97 *Bluhme* [1998] ECR I-8033, paras 36 and 38.

²⁶² *Whaling in the Antarctic* (Australia v Japan: New Zealand intervening) [2014] ICJ Rep, Separate Opinion of AA Cançado Trinidad, para 71.

3.4.3 EU law

Rules on the conservation of nature are by no means lacking in the EU legal order.²⁶³ Given that the PP is one of the foundations of the high level of environmental protection, nature conservation requirements must be strictly interpreted.²⁶⁴ It will come as no surprise that the CJEU has sought to pursue a precautionary approach in a number of bird protection cases. An illustrative example of this is a judgment concerning the hunting season of wild birds in France, where the Court favoured a determination of the end of the hunting season in a manner that guaranteed the optimal level of protection for avifauna.²⁶⁵ It judged that in the absence of ‘scientific and technical data relevant to each individual case’—that is, in cases of uncertainty—Member States should adopt a single date for ending the season, equivalent to ‘that fixed for the species which is the earliest to migrate’, and not ‘the maximum period of migratory activity’. This means that so long as a degree of uncertainty remains concerning the timing of pre-mating migrations of migratory birds, the strictest method of determining the close of hunting should override methods attempting to accommodate hunting interests on the basis of scientific approximation. By the same token, the capture of thrushes in Spain with limed twigs cannot be authorized because it is by definition indiscriminate; in effect, other non-targeted bird species are likely to be captured. Though there is an obligation to release these species, there is nevertheless uncertainty about their ‘chances of survival’ after being ‘treated’.²⁶⁶

The setting aside of habitats plays a key role in bird conservation. By ruling against Spain in *Marismas de Santoña* for not having protected wetlands of importance for certain migratory species of birds, in conformity with the Birds Directive,²⁶⁷ the CJEU again adopted a precautionary approach. As no reduction in the number of protected birds had been observed, the Spanish authorities disputed that the destruction of a valuable ornithological site breached the requirements of the Directive. However, their argument was rejected on the grounds that the obligation to preserve the natural habitats in question applied whether or not the population of protected birds was disappearing from these areas.²⁶⁸ The obligations on Member States ‘... exist before any reduction is observed in the number of birds or any risk of a protected species becoming extinct has materialised’.²⁶⁹ In so ruling, the Court considered the context of uncertainty resulting from the fact that destruction of a natural habitat does not necessarily translate into an immediate decline in its animal populations.

²⁶³ N de Sadeleer, ‘EU Biodiversity Law’, in Morgera and Razzaque, *Biodiversity and Nature Protection Law* (n 257) 413–30.

²⁶⁴ Case C-127/02 *Waddenzee* (n 18), para 44.

²⁶⁵ Case C-435/92 *Association pour la protection des animaux sauvages* [1994] ECR I-67, para 21.

²⁶⁶ Opinion of AG Geelhoed in Case C-79/05 *Commission v Spain* [2004] C:2004:507, para 40.

²⁶⁷ Directive 79/409/EEC codified by Directive 2009/147/EC on the conservation of wild birds.

²⁶⁸ Case C-355/90 *Commission v Spain* [1993] ECR I-6159, para 28.

²⁶⁹ *Ibid*, para 54.

The implementation of the Habitats Directive 92/43/EC is also underpinned by the PP. Five developments within the case law must be highlighted.

First, the designation of conservation sites under the Habitats Directive can give rise to difficulties with respect to migratory species. In particular, Article 4(1) of the Directive places a high evidentiary burden on State authorities.²⁷⁰ Given the inadequate data held in relation to cetaceans, the PP must be applied when designating marine conservation sites. Accordingly, the designation of offshore marine sites should not be precluded owing to the paucity of available data as to whether the site is 'essential' for life and reproduction.²⁷¹

Secondly, the sites that have been designated as parts of the Natura 2000 network are not subject to absolute protection. However, in order for a project or plan to be authorized, Article 6(3) of the Directive provides for a specific environmental impact assessment (EIA) procedure of 'plans or projects' 'likely' to have 'a significant effect' on a conservation site.²⁷² The question arose as to which plans or projects are 'likely' to significantly affect a Natura 2000 site. There is clearly a paradox here: since the impact of a plan or a project can only be identified as being significant based on an impact assessment, it is difficult to know how the decision-maker can determine in advance that such a plan or project would not have significant effects without having previously carried out an assessment.²⁷³ In this regard, precaution must play a key role in the screening of such plans and projects.

Thirdly, the assessment procedure is triggered not by a certain risk, but by the likelihood of the occurrence of significant effects on the integrity of the site. In 2004, the CJEU handed down a landmark judgment in a case assessing the validity of the Dutch EIA on fishing activities taking place within bird protection areas. According to the Court in the well-known *Waddenzee* case, since the impact study regime covers plans and projects 'likely' to affect a site, the wording of this provision implies that the conductor of the study must be able to identify, according to the PP, even those damages which are still uncertain.²⁷⁴ In addition, the Habitat Directive's authorization regime requires that the competent authority should ensure that the project at stake will not adversely affect the integrity of the site concerned. Moreover, the assessment 'may not have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the proposed works on the protected

²⁷⁰ Art 4(1) requires that 'for aquatic species which range over wide areas, such sites will be proposed only where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction.'

²⁷¹ S Lukand and S Gregeson, 'Marine Species and Management in the EU', in C-H Born et al (eds), *The Habitats Directive in its EU Environmental Law Context* (Routledge, 2015) 407–9.

²⁷² N de Sadeleer, 'Assessment and Authorisation of Plans and Projects Having a Significant Impact on Natura 2000 Sites', in B Vanheudesen and L Squintani (eds), *EU Environmental and Planning Law Aspects of Large-Scale Projects* (Intersentia, 2013) 237.

²⁷³ E Truhle-Marengo 'How to Cope with the Unknown: A Few Things about Scientific Uncertainty, Precaution, and Adaptive Management', in Born et al, *The Habitats Directive* (n 271) 340.

²⁷⁴ Case C-127/02 *Waddenzee* (n 18), para 44.

area concerned.²⁷⁵ Accordingly, the authorization can only be passed where the assessment demonstrates the absence of risks for the integrity of the site. ‘Where doubt remains as to the absence of adverse effect on the integrity of the site’, the Directive requires, in line with the precautionary principle, the competent authority to refrain from issuing the authorization.²⁷⁶ In accordance with the logic of the PP, authorities can, if needs be, order additional investigations in order to remove the uncertainty.²⁷⁷

Although it is likely to restrict economic and property rights, this authorization criterion ‘integrates the precautionary principle.’²⁷⁸ Conversely, a less stringent criterion would not be as effective in ensuring the fulfilment of the conservation objectives set out by the EU law-maker.²⁷⁹ Of course, it must be remembered that the strict interpretation endorsed by the CJEU is a consequence of the manner in which the authorization regime for projects endangering threatened habitats has been formulated by law-makers.

In the *Puszczka Białowieska* case, the CJEU held that ‘having regard to the precautionary principle, where a plan or project not directly connected with or not necessary to the management of a site may undermine the site’s conservation objectives, it must be considered likely to have a significant effect on that site.’²⁸⁰ It follows that the mere fact that a plan or a project departs from the objectives set out by the manager of the Natura 2000 site is sufficient to entail significant effects and, as a result, to trigger the assessment procedure. Whenever the reality and the seriousness of the potential risks of adversely affecting the conservation and integrity of a Natura 2000 site are not fully identified, assessed, and, where appropriate, ruled out, the national authorities cannot adopt the plan, without also infringing the PP.²⁸¹ Hence, the mere probability that a plan or a project might have a significant effect is sufficient to require an appropriate assessment. If the developers want to avoid carrying out an appropriate assessment, they must prove to a point of certainty that their activity will not impact the protected habitat, not the other way around.

²⁷⁵ Case C-164/17 *Grace and Sweetman* [2018] C:2018:593, para 39; Case C-461/17 *Brian Holohan* [2018] C:2018:883, para 34.

²⁷⁶ Case C-127/02, *Waddenzee* (n 18), para 57. This interpretation has been confirmed in Case C-6/04 *Commission v UK* [2005] C:2005:626; Case C-98/03 *Commission v Germany* [2006] C:2006:3; Case C-418/04 *Commission v Ireland* [2007] C:2007:780; Case C-304/05 *Commission v Italy* [2007] C:2007:532; Case C-226/08 *Stadt Papenburg* [2010] C:2010:10; Case C-239/04 *Commission v Portugal* [2006] C:2006:665; Case C-209/02 *Commission v Austria* [2010] C:2010:602; Case C-258/11 *Sweetman* [2013] C:2013:220, paras 41 to 43. See further ER Stokes, ‘Liberalising the Threshold of Precaution—Cockle Fishing, the Habitats Directive, and Evidence of a New Understanding of “Scientific Uncertainty”’ 7 (2005) ELR 206; A García-Ureta and J Cubero Marcos ‘Directiva de Hábitats: Principio de precaución y evaluación de planes y proyectos’ 70 (2004) *Revista Vasca de Administración Pública* 361.

²⁷⁷ Opinion of AG Kokott in Case C-127/02 *Waddenzee* (n 18), paras 99–111.

²⁷⁸ Case C-127/02 *Waddenzee* (n 18), para 58.

²⁷⁹ *Ibid.*

²⁸⁰ Case C-441/17 *Commission v Poland* [2018] C:2018:80, para 112.

²⁸¹ Opinion of AG Bot in Case C-441/17 *Commission v Poland* [2018] C:2018:80, para 169.

Fourthly, the PP can also influence the conditions for seeking interim relief in relation to national measures that jeopardize the integrity of Natura 2000 sites. Regarding illicit forestry works that took place in the Polish Natura 2000 Puszcza Białowieska site the Vice-President of the CJEU, ‘taking into account the PP’, ordered the suspension of the operations at issue,²⁸² and later the Grand Chamber of the Court granted interim relief of the contested measure on the grounds that the pending main proceedings appeared to be serious.²⁸³ Indeed, the Commission’s obligation to establish a *prima facie* case in the main proceedings ‘without reasonable substance’ is fulfilled where the defendant State is unable to show the Commission’s arguments based on infringements of different provisions of the Habitats and of the Birds Directives are wholly unfounded.²⁸⁴ In addition, the two substantive requirements that must be met in order for interim measures to be granted—the urgency related to the damage likely to arise and the balance of interests—were also assessed with reference to the PP.²⁸⁵

As regards protected species, a *pro dubio natura* approach also prevails. In accordance with the PP, a Member State must refrain from authorizing the killing of wolves where there is doubt as to whether or not such a derogation will be detrimental to the maintenance or restoration of populations of such an endangered species at a favourable conservation status.²⁸⁶

Lastly, as far as the free movement of goods is concerned, the CJEU ruled in *Bluhme* that a Danish wildlife measure prohibiting the import of any species of bee other than the endemic subspecies *Apis mellifera mellifera* into a Baltic island was justified under Article 36 of the TFEU, notwithstanding the lack of conclusive evidence establishing both the nature of the subspecies and its risk of extinction.²⁸⁷ In so doing, the Court took implicitly into consideration the precautionary approach regarding the preservation of genetic diversity flowing from the CDB, a mixed international agreement.²⁸⁸

3.4.4 French law

Where the authorization of activities liable to jeopardize habitats and their species is not backed up by scientific evidence that dispels any lingering uncertainties, it will run counter to the PP. By way of illustration, in allowing the hunting in Guadeloupe of the White-crowned Pigeon, the Prefect committed a manifest error of appraisal when applying the PP enshrined in Article 5 of the French Environmental Charter, given that the authorization at issue was not

²⁸² C-441/17 R, *Commission v Poland* [2017] C:2017:622, para 25.

²⁸³ *Ibid*, para 43.

²⁸⁴ *Ibid*, paras 41–2.

²⁸⁵ *Ibid*, paras 60, 61, and 63.

²⁸⁶ C-674/17 *Luonnonsuojeluyhdistys Tapiola* [2019] C:2019:851 para 69.

²⁸⁷ Case C-67/97 *Bluhme* [1998] ECRI-8033.

²⁸⁸ *Ibid*, paras 36 and 38.

supported by any scientific study of the population dynamics of this endangered species.²⁸⁹

3.4.5 US law

In a celebrated judgment, *Tennessee Valley Authority v Hill*, the Supreme Court (SCt) had to rule on the prohibition by a federal judge of continued construction of a dam which would have resulted in the extinction of an endemic fish, the Snail Darter, whose habitat was protected under the Endangered Species Act (ESA).²⁹⁰ The Court considered that, if there was any question about the survival of the endangered species, actions threatening its conservation should be prohibited because:

The value of this genetic heritage is, quite literally, incalculable ... From the narrowest possible point of view, it is in the best interests of mankind to minimize the losses of genetic variations. The reason is simple: they are potential resources. They are keys to puzzles which we cannot solve, and may provide answers to questions which we have not yet learned to ask ... The institutionalization of caution lies at the heart of the Act.

This demonstrates that, when passing the ESA, Congress was concerned about the as yet unknown uses of endangered species²⁹¹ and the unforeseeable role that such creatures might play. Consequently, the SCt stressed the nearly absolute priority Congress placed on preserving endangered species. When interpreted in this way, the ESA seems to embody an absolutely precautionary approach: a finding of endangerment follows automatically in order to ensure full protection for the natural habitat of the species. Neither the value of the species nor the economic costs of preservation may be considered.

3.4.6 Australian law

Australian courts have been at the forefront in implementing the principle. Australian case law thus contains a wealth of information on its contents and legal application. The first and most significant judicial consideration of the precautionary principle was carried out in 1993 by Stein J of the NSWLEC in *Leatch v National Parks and Wildlife Service*.²⁹² In order to verify the grounds for administrative decisions, the NSWLEC has had recourse to the PP several times, based on

²⁸⁹ TA Guadeloupe, 19 February 2019, *Association pour la protection des animaux sauvages*, no. 1800780.

²⁹⁰ *Tennessee Valley Authority* (n 63), 180.

²⁹¹ *Ibid*, 179.

²⁹² [1993] 81 LGERA 270. On the other hand, the same Court refused to rescind an administrative decision authorizing logging on a wooded massif, on the grounds that the environmental impact assessment had sufficiently considered the risks to various species of protected animals attendant to the planned exploitation: *Northcompass Inc v Hornsby Shire Council* [1996] NSWLEC 213.

a provision of the legislation relating to national parks and wildlife. On that basis, the Court rescinded an administrative authorization to eliminate a rare species of toad from a natural site that was to be crossed by a high-speed trunk road. It considered that the administration which had granted the disputed authorization had not taken due account of the risk that the species would disappear, and that no lower-risk alternative had been seriously evaluated:

... the precautionary principle is a statement of common sense and has already been applied by decision-makers in appropriate circumstances prior to the principle being spelt out. It is directed towards the prevention of serious or irreversible harm to the environment in situations of scientific uncertainty. Its premise is that where uncertainty or ignorance exists concerning the nature or scope of environmental harm (whether this follows from policies, decisions or activities), decision-makers should be cautious. Given that the Giant Burrowing Frog has only recently been added to the schedule of endangered species by the scientific committee as vulnerable and rare ... caution should be the keystone to the Court's approach. Application of the precautionary principle appears to be most apt in a situation of a scarcity of scientific knowledge of species population, habitat and impacts. Indeed, one permissible approach is to conclude that the state of knowledge is such that one should not grant a licence to 'take or kill' the species until much more is known.

Accordingly, where development threatens habitats and their species, the PP buttresses the need to give consideration to 'conservation of biological diversity and ecological integrity'.²⁹³

3.5 Hazardous substances

3.5.1 Introduction

Hazardous substances²⁹⁴ inevitably affect health and workers' safety, consumer and environmental protection, aspects that cannot easily be dissociated from each other.²⁹⁵ Aiming at reducing health and environmental risks, the chemicals policy

²⁹³ *BGP Properties Pty Ltd. v Lake Macquarie* [2004] NSWLEC 399.

²⁹⁴ In this subsection, the term 'hazardous substances' is used as a convenient shorthand form to refer generically to a broad category of substances or mixture of substances, whether solid, liquid, or gas, which are likely to cause significant acute (immediate) or chronic (long-term) adverse effects to the environment or humans. These include, among others, chemicals, insecticides, biocides, fungicides, rodenticides, petroleum products, and toxic materials. The control of discharges of hazardous substances into the aquatic environment is addressed in the subsection on water pollution, and the management of radioactive substances is dealt with in the subsection on nuclear energy. Lastly, as living organisms, GMOs are treated in a separate subsection.

²⁹⁵ L Krämer, *EU Environmental Law* 8th ed (Sweet & Maxwell, 2016) 224.

has historically been related to a general preference for a certainty-seeking regulatory style in which a formal, science-based, and standardized RA has been singled out as the predominant tool for decision-making. However, while RAs draw extensively on science, data are often incomplete and results may be unclear or contradictory.²⁹⁶ Indeed, as it is difficult to establish causal links between exposure to chemicals and health or environmental effects, there is generally a significant degree of uncertainty in estimates of the probability and magnitude of adverse effects associated with a chemical agent. The variety and complexity pathways of dispersion in the environment, and the bio-accumulation in the food chain are likely to compound this uncertainty. In addition, chemical substances have different properties which may give rise to risks of a different nature.²⁹⁷ As a result of limited knowledge, it is difficult to provide conclusive evidence of a threat to human health or to the environment. Lastly, nature does not reveal its secrets quickly:²⁹⁸ long periods of latency may conceal hazards for decades. DDT, for instance, was once heralded as the ultimate pesticide, then became infamous for its environmental impacts.

In particular, endocrine disrupting substances (EDS) mimicking hormones have challenged the scientific belief that high doses produce more serious effects than low ones.²⁹⁹ Contrary to Paracelsus' belief, the dose is thus only one of the factors that make the poison.³⁰⁰ Consequently, there is no threshold below which the

²⁹⁶ The assessment of the carcinogenicity of the active substance glyphosate is a case in point. In March 2015 the WHO's IARC (Agency for Research on Cancer) published its monograph on that substance, concluding that glyphosate should be classified as 'probably carcinogenic to humans'. In the course of the EU RA of that substance, both EFSA and ECHA concluded that 'glyphosate is unlikely to pose a carcinogenic hazard to humans'. In light of the diverging view between EFSA/ECHA and IARC, the Commission decided to extend the approval period of glyphosate for five years (Commission Implementing Regulation (EU) 2017/2324 of 12 December 2017 renewing the approval of the active substance glyphosate; see Case T-125/18 *Associazione GranoSalus* [2019] T:2019:92). The opposing views of IARC and the two EU agencies can be explained by their diverging methodologies. First, whilst on one hand the IARC looked at both glyphosate—the active substance—and the plant protection products (e.g. Roundup™), the EU assessments, on the other hand, considered only glyphosate, on the grounds that Member States are responsible for authorizing each plant protection product that is marketed in their territories. Secondly, whilst IARC only considered published studies, the EU agencies also took into consideration studies submitted by applicants as part of their dossiers that were not in the public domain. These divergent methodologies explain the differences in how EFSA/ECHA and IARC weighed the available data, e.g. Communication from the Commission on the European Citizens' Initiative 'Ban glyphosate and protect people and the environment from toxic pesticides' C(2017) 8414 final. In *Pilliod et al. v Monsanto Company, et al.*, the California Superior Court held that Roundup's alleged risk of NHL was 'known or knowable in light of the generally recognized and prevailing scientific and medical knowledge'. *Alva and Alberta Pilliod v Monsanto Co.* (Case No. RG17862702, JCCP No. 4953) Cal.1d.

²⁹⁷ Case C-419/17P *Deza* [2019] C:2019:52, para 37.

²⁹⁸ C Cranor, *Toxic Torts* (CUP, 2006) 216.

²⁹⁹ The restrictions placed on several active substances in pesticides having potential endocrine disruptive effects have been challenged in court. This was the case for Fenarimol (Case C-77/09 *Gowan* (n 17)) and Flusilazole (Case T-31/07 *Du Pont de Nemours* [2013] T:2013:167). In *Gowan*, AG Mazak held that in cases of non-existing established and undisputed methodologies, the 'analysis necessarily entails choices of a political and social nature'.

³⁰⁰ A Gides and AM Soto, 'Bisphenol A: Contested Science, Divergent Safety Evaluations' in EEA Report No. 1/2013 (Luxembourg, 2013) 217 and 219.

probability of disrupting effects is considered to be negligible. It comes therefore as no surprise that the uncertainty surrounding the causes and effects of hazardous substances has served to favour the recognition of the PP.

Since environmental issues are peripheral to the regulation of pharmaceuticals,³⁰¹ food and feed additives, as well as cosmetics, the case law related to these substances is commented on in as much as it sheds new light on risk assessment and risk management obligations.³⁰²

3.5.2 International law

The global production and consumption of chemicals has continued to grow despite the rising scientific awareness of their impacts.³⁰³ Therefore, chemicals continue to be released into the environment in large quantities and are ubiquitous in air, water and soil, food and humans. Given that over 280,000 chemicals are used, and only a few dozen are prohibited or restricted, it goes without saying that the highly fragmented international rules fall short in promoting a PA. That said, the PP has been at the core of negotiations on two major international conventions on chemical pollutants. Recognizing the risk posed by persistent organic pollutants (POPs) to human health and the environment, the 2001 Stockholm Convention on POPs establishes the PA as its main objective.³⁰⁴ Precaution also underpins the listing procedure for new POPs.³⁰⁵ In addition, the 2001 London International Maritime Organization (IMO) Convention on the Control of Harmful Anti-Fouling Systems on Ships, which prohibits the use of harmful organotins in anti-fouling paints used on ships, establishes a precautionary mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.³⁰⁶

Equally important, the use of the PP must be complemented by a principle of substitution which requires State authorities to eliminate or reduce risks by

³⁰¹ That said, residues of several pharmaceuticals (painkillers, antimicrobials, antidepressants, etc.) have been found in soils, wildlife, surface, and ground waters and even drinking water. For instance, synthetic oestrogens used in contraceptive pills can have serious impacts on aquatic wildlife. See S Jobling and B Metz, 'EthinyI Oestradiol in the Aquatic Environment', in EEA Report No. 1/2013 (n 300) 279–307.

³⁰² The case law has been influenced by the high number of health disputes. Needless to say, the two spheres, whilst related, are far from being similar. The PP has been construed by courts in the field of health protection, and in particular food safety, with a view to avoiding unduly restrictive practices. All things considered, it is doubtful whether the lessons from the case law relating to health safety, in particular with respect to the obligation to carry out RAs, are really relevant in the resolution of all environmental cases.

³⁰³ Environmental Assembly of the UNEP, *Global Chemical Outlook* (Nairobi, 2019).

³⁰⁴ Art 4.

³⁰⁵ Each Party can propose that the Secretariat list a chemical in Annexes A, B, and/or C. The POPs Review Committee can decide that the chemical is likely, as a result of its long-range environmental transport, to lead to significant adverse human health and environmental effects, such that global action is warranted. However, the lack of full scientific certainty shall not prevent the proposal from proceeding (Art 8(7)(a)). 'Taking due account of the recommendations of the Committee, including any scientific uncertainty', the Conference of the Parties is to decide, 'in a precautionary manner', whether to list the chemical in the Annexes of the Convention (Art 8 (7)(e)).

³⁰⁶ Art 6(3) and (5); Preamble, Recital 5.

replacing one dangerous substance with another less dangerous substance. This principle is being increasingly widely recognized in international law, and can be seen in provisions of the POPs and Anti-Fouling Conventions discussed above.³⁰⁷

On another note, in the dispute over the French ban on asbestos, the WTO Appellate Body (AB) considered for the first time the meaning of ‘like product’ for the purpose of Article III:4 of the General Agreements on Tariffs and Trade (GATT). Canada argued that a distinction should be made between chrysotile fibres and chrysotile encapsulated in a cement matrix. Reversing the Panel’s finding that it was not appropriate to take into consideration the health risks associated with chrysotile asbestos fibres in examining the ‘likeness’ of products under Article III:4 of the GATT,³⁰⁸ the AB held that a difference in toxicity may be sufficient to differentiate for trade purposes between the two categories of asbestos products.³⁰⁹ In addition, it approved the strictest regulatory measure—a ban—on the account that it was not possible to derive effect thresholds. Whether that case law can be extended to substances with less hazardous properties than chrysotile asbestos remains to be seen.

3.5.3 EU law

3.5.3.1 *Introductory remarks*

EU policy regarding the placing on the market of hazardous (or chemical) substances was established in the early days of the environmental debate. It consists of a complex regulatory system made up of an intricate network of regulations, and several features of the resulting risk regulatory framework need to be explained before focusing on the PP.

First, the PP is entangled in a web of varied, fragmented, and complex regulations that harmonize the procedures related to the placing on the market of substances. Although they all aim to reduce the impact of hazardous substances, specific reasons preclude adopting a single regulation to replace them. In effect, some substances are designed to be toxic and are released widely in the environment (pesticides and biocides), others are included in products that come into contact with the human body or are directly ingested (cosmetics and food additives), whereas others are designed to be biologically active in small doses (pharmaceuticals and veterinary medicines).

³⁰⁷ The substitution principle can also be found in OSPAR Decision 90/2 on a harmonized mandatory control system for the use and reduction of the discharge of offshore chemicals, the 1991 Geneva Protocol on volatile organic compounds (VOCs) to the Convention on Long-range Transboundary Air Pollution (CLRTAP), Art 2(5); the 1998 Aarhus Protocol on Heavy Metals to the CLRTAP, Art 3(4); the 2001 Stockholm POPs Convention, Art 5; and the 2001 London IMO Convention on the Control of Harmful Anti-fouling Systems on Ships, Art 6(4)(a)(v).

³⁰⁸ The Panel found that the EU ban constituted a violation of Art III:4 since asbestos and asbestos substitutes had to be considered ‘like products’ within the meaning of that provision.

³⁰⁹ *EC—Measures Affecting Asbestos and Asbestos-Containing Products*, WTO Doc. WT/D135/AB/R (18 September 2000), para 111.

Secondly, given that all these sectors are product-related, the EU institutions have favoured regulations adopted pursuant to Article 114 of the TFEU.³¹⁰ In sharp contrast with other environmental sectors, these regulations increase the centralization of the decision-making process. The preference of regulations based on the treaty provision fostering the functioning of the internal market could be explained by the fact that the more flexible nature of a directive entails a genuine risk of market fragmentation.³¹¹ Given the completeness of their procedures,³¹¹ these regulations lead to a total or a complete harmonization that restricts the Member States' room for manoeuvre.³¹²

Thirdly, although these harmonizing measures were initially motivated primarily by a desire to complete the internal market, the EU institutions have only recently begun to address environmental concerns. In effect, there has been an incremental evolution toward a more preventive regulatory approach based on approved lists at the EU level of substances and Member State authorization. The EU lists are compiled according to the level of 'significant' health and environmental risk that the substances pose, coupled with the authorization of products by national authorities and the mutual recognition of these authorizations. Post-market measures may also be adopted to prevent unsuspected risks. Accordingly, these internal market regulations seek to strike a balance between a high level of protection of human health and the environment and the free circulation of substances in the internal market.³¹³

Fourthly, this web of regulations empowers the Commission to adopt implementing acts in accordance with the comitology procedure on the one hand,³¹⁴ and delegates significant administrative tasks, in particular in the realm of risk assessment, to two EU agencies, on the other. The regulatory decisions in chemicals policy, such as those relating to the registration, authorization,

³¹⁰ Internal market authorization procedures are entangled with environmental issues. By way of illustration, studies of residues and reports of field trials submitted in connection with a procedure for extending the authorization of a product in accordance with the legislation of plant protection products (Art 114 TFEU) are deemed to be 'environmental information' for the purpose of Directive 2003/4, Art 2 on access to environmental information (Art 192 TFEU). In effect, this information 'concerns elements of the environment which may affect human health if excess levels of those residues are present' (Case C-266/09 *Stichting Natuur en Milieu* [2010] C:2010:779, paras 42–3).

³¹¹ Both Regulation 528/2012 concerning the making available on the market and use of biocidal products, OJ L 167, 1 (hereinafter BPR) and Regulation 1107/2009 concerning the placing of plant protection products on the market, OJ L 309, 1 (hereinafter PPPR) confer an exclusive competence on the EU authorities concerning the assessment of the active substances found in these products. See Case T-31/07 *Du Pont de Nemours* (n 299) para 203.

³¹² de Sadeleer, *EU Environmental Law* (n 18) 157–61, 291, 304, 353, and 358–82.

³¹³ Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals, OJ L 396/1, (hereinafter REACH), Art 1(3); PPPR, Art 1(3), and BPR, Art 1. It must be noted that the European Commission is not empowered to undermine the equilibrium sought by the EU law-maker. See Case T-521/14 *Sweden v Commission* [2015] T:2015:976, para 72.

³¹⁴ Accordingly, various rules of secondary law define the PP further in connection with the Commission's implementing powers.

restrictions, classification, and labelling under REACH and CLP Regulations,³¹⁵ are backed by the opinions of the European Chemicals Agency (ECHA), whereas the assessment of the active substances in pesticides is subject to the opinions of the European Food Safety Agency (EFSA). The interaction between these two agencies (risk assessment), the regulatory committees, and the Commission (risk management) is testament to one of the paradigms of ‘administrative constitutionalism.’³¹⁶

At this stage, we have to turn to the status of the PP in this regulatory web. This calls for three observations.

First, most EU legislations on hazardous substances display regulatory features that are permeated by precaution or prudence. We highlight in this section how the pesticides, biocides, and REACH regulations flesh out some elements of the PP. Whereas several of these regulations refer expressly to the PP, others ignore it. By way of illustration, REACH and Regulation (EC) 1107/2009 concerning the placing of plant protection products on the market (hereinafter PPPR) alike refer to the principle,³¹⁷ whilst the CLP Regulation does not mention it. In addition, the EU is party to a number of MEAs that do proclaim the principle.³¹⁸

Secondly, since the PP is binding on the EU institutions and on Member States when their measures fall within the scope of secondary law, EU courts may be called on to review the consistency of measures on hazardous substances with the principle. Needless to say, the case law encompasses a wide range of disputes as well as different types of actions. The compatibility of a domestic precautionary measure with either primary law,³¹⁹ secondary law, or soft law (Communication on the PP) is likely to be reviewed either in an infringement case,³²⁰ in a preliminary ruling proceeding,³²¹ or in an action for annulment. Regarding the references for a preliminary ruling, in interpreting ambiguous provisions of secondary law in light of the PP, the CJEU has been constantly honing its scope. With respect to direct actions, the principle acts as a shield and as a sword. The PP can act as a sword: among the different grounds for reviewing risk decisions, claimants regularly invoke in their actions for annulment the breach by the EU institutions of the PP requirements.³²² It acts as a shield when the EU institutions rely on it with

³¹⁵ REACH and Regulation (EC) 1272/2008 on classification, labelling and packaging of substances and mixtures [2008] OJ L353/1 (hereinafter CLP Regulation).

³¹⁶ Fisher, *Risk Regulation* (n 48).

³¹⁷ REACH, Arts 1(3) and 3 as well as Recitals 9 and 69, and PPPR, Art 1(4).

³¹⁸ The EU is party to the 2001 Stockholm Convention on Persistent Organic Pollutants (POPs) that lays down the PA as its main objective (Preamble, Recital 8; and Arts 4 and 8(7)) and to the 2001 London IMO Convention on the Control of Harmful Anti-fouling Systems on Ships, which establishes a precautionary mechanism to prevent the potential future use of other harmful substances in anti-fouling systems (Art 6(3) and (5); Preamble, Recital 5).

³¹⁹ TFEU, Arts 34–6.

³²⁰ *Ibid.*, Art 258.

³²¹ *Ibid.*, Art 267.

³²² *Ibid.*, Art 263.

the aim of justifying the soundness and the reasonableness of their risk decisions adopted in the face of uncertainty. On another note, the extent to which national authorities are bound by the principle can be gauged by the sheer number of preliminary ruling requests³²³ and actions for infringement.³²⁴

Thirdly, the EU courts have been applying similar tests for reviewing precautionary measures in health disputes as well as in hazardous substances disputes. According to the GCt, the PP is a general EU law principle that empowers the EU institutions 'to take appropriate measures to prevent specific potential risks to public health and safety.'³²⁵ However, one needs to draw a dividing line between, on the one hand, the cases discussed below and, on the other, genuine environmental cases (climate change, waste management, water and nature conservation). With respect to health issues³²⁶ that do prevail in the hazardous substances sector, scientific knowledge is far more advanced than for the environmental sector. Conversely, with respect to environmental cases, the obligation to take account of the most salient scientific findings does not warrant strict rules of evidence.³²⁷ Given that there is no demarcation between genuine health disputes and disputes regarding hazardous substances, we also refer to these health cases.

Table 3.3 highlights the co-existence of the PP and the principle of substitution in several of the regulations we comment upon.

3.5.3.2 *The risk analysis framework*

As far as EU law is concerned, the PP is located within the broader context of risk analysis, which comprises a three-step process: risk assessment, risk management, and risk communication. First, the probability of the occurrence of harm is determined using an RA procedure in which experts examine both hazard and exposure—generally by mathematical modelling—in order to calculate an acceptable or tolerable level of contamination or exposure.³²⁸ Once the RA procedure has been completed, a risk management decision must be taken by politicians. Given that most members of the public share a different understanding of the term risk, risk communication explores the ways in which expert assessments could be communicated to the public so that the tension between public perceptions and expert judgement could be reduced.

³²³ Ibid, Art 267.

³²⁴ Ibid, Arts 258–60.

³²⁵ Cases T-429/13 and T-451/13 *Bayer* [2018] T:2018:624, para 109.

³²⁶ For instance, the PP is expressly defined in Regulation (EC) 178/2002 laying down the general principles and requirements of food law (hereinafter the General Food Regulation or GFL), Art 7.

³²⁷ As stressed by AG Kokott, with respect to subject areas where the PP has not been defined further in connection with the Commission's implementing powers, 'the obligation to take account of the latest scientific findings does not . . . warrant strict rules of evidence': AG Kokott's Opinion in Case C-343/09 *Afton* [2010] C:2010:419, para 34.

³²⁸ This division of powers harks back to the 1983 report of the US National Research Council, *Risk Assessment in the Federal Government: Managing the Process* 5–8 (1983).

Table 3.3 EU Chemical legislations

Substances	Acts	Regulatory approach	Precautionary Principle	Principle of substitution
Existing and new substances	Regulation 1907/2006	Registration, evaluation, authorization and restriction of chemicals (REACH)	Arts 1(3) and 3	Art 60(4)
Substances and mixtures	Regulation 1272/2008	Classification, labelling, and packaging (CLP)	—	—
Pesticides	Regulation 1107/2009	Placing on the market	Art 1(4)	—
Pesticides	Directive 2009/128	Use	Art 2(3)	—
Biocides	Regulation 528/2012	Placing on the market	Art 1(4)	Art 50
Cosmetics	Regulation 1223/2009	Product safety	Art 19(d)	Art 4(2) (c)
Carcinogens	Directive 2004/37	Protection of workers from the risks related to exposure to carcinogens at work	Art 11	Art 4
Food	Regulation 178/2012	General principles of food law (GFL)	Art 6	--

Generally speaking, the EU institutions consider the PP merely as a risk management tool that has nothing to do with RA.³²⁹ Nonetheless, we show below that precaution permeates the two stages of the risk analysis. In fact, the EU courts' reasoning rests on a two-step approach that mirrors the transversality of precaution on the grounds that the principle constitutes 'an integral part of the decision-making processes leading to the adoption of any measure for the protection of human health'.³³⁰

Moreover, as discussed below, the PP implies neither less scientific assessment nor diminished political responsibility. Rather, the EU courts both reinforce and nuance the role played by scientists in decision-making. They strengthen the importance of science by insisting on the requirement to carry out a systematic RA.

³²⁹ The Commission's Communication on the PP reflects the belief that precaution is chiefly a question of the political business of deciding how safe is safe: 'The principle, which is essentially used by decision-makers in the management of risks should not be confused with the element of caution that scientists apply in their assessment of scientific data' (summary, para 4). By the same token, according to the GFL, the PP intervenes exclusively as a risk management tool (Art 7).

³³⁰ Case C-236/01 *Monsanto Agricoltura Italia* [2003] C:2003:431, para 133.

By contrast, they also loosen this linkage in two ways: on the one hand, by recognizing the limits of scientific expertise and, on the other, by obliging EU institutions, ‘while dealing with the first component of the risk assessment’, to clearly define the political objectives at issue. In other words, risk management presupposes that the authorities determine from the outset ‘the level of protection which they deem appropriate for society’.³³¹

Lastly, it should be noted that the manner in which the EU applies the principle must be consistent with the WTO SPS discipline discussed in Chapter 7.

This analysis provides an empirical basis for further discussion in Section 4 on how risk assessment and risk management procedures could be conceptualized in a different manner.

3.5.3.3 Risk assessment

In this subsection we explore what experts must know before decision-makers can reach the conclusion whether or not it is appropriate to regulate a hazardous substance.

3.5.3.3.1 Risk assessment as a prerequisite for taking precautionary action

Risk can be taken seriously provided that appropriate methodological tools are available. The verification of the serious nature of a hypothesis should be undertaken using a specific technique which is recognized as a means of risk assessment. Regarding this obligation, the EU courts clearly stress the need to perform an RA ‘which is as complete as possible given the particular circumstances of the individual case’.³³² Thanks to this assessment, the institutions should be able to examine, ‘carefully and impartially, all the relevant facts of the individual case’.³³³ The ‘detailed assessment of the risk’³³⁴ ‘presupposes, in the first place, the identification of the potentially negative consequences for health’ of the product or the substance.³³⁵ This scientific process consists in the traditional four-stage approach we shall discuss in Section 4: the identification and characterization of a hazard, the assessment of exposure to the hazard, and the characterization of the risk.³³⁶ What matters is that the object of the RA is ‘to appraise the degree of probability of harmful effect on human

³³¹ Case C-473/98 *Toolex* [2000] ECR I-5681, para 45; Case T-13/99 *Pfizer* (n 17) para 151.

³³² Case C- 236/01 *Monsanto Agricoltura Italia* (n 17) para 113; Case T-13/99 *Pfizer* (n 17) paras 155–6; Case E-3/00 *EFTA Surveillance Authority v Norway* [2001]. In that regard, the incomplete analysis of the relevant scientific evidence is apt to vitiate the measure. See Case C-405/07P, *Netherlands v Commission* [2008] ECR I-8301, para 77.

³³³ See, *inter alia*, Case C-269/90 *Technische Universität München* [1991] C:1991:438, para 14; C-326/05 P *Industrias Químicas del Vallés v Commission* [2007] C:2007:443, para 77; C-405/07 P *Netherlands v Commission*, [2008] C:2008:613, para 56; and C-77/09 *Gowan* (n 17) para 57.

³³⁴ Case C-192/01 *Commission v Denmark* [2003] ECR I-9693, para 47.

³³⁵ Case E 3-00 *EFTA Surveillance Authority v Norway* (n 332) para 30; Case C-236/01 *Monsanto Agricoltura Italia* (n 17) para 113; and Case C-192/01 *Commission v Denmark* (n 334) para 51.

³³⁶ Joined Case T-429/13 and T-451/13 *Bayer* (n 37) para 113. See also GFL, Art 3(11). In its communication on the PP, the Commission defines the four components of an RA.

health.³³⁷ Without going into the details of RA methodology, we discuss briefly how the EU courts have been interpreting this requirement to new and existing substances such as chemicals, pesticides, and biocides.

This calls for a closer analysis of the twofold task whose components are complementary:³³⁸

- (i) the obligations related to the performance of a scientific assessment of the risk (3.5.3.3.2 to 3.5.3.3.5); and
- (ii) the determination of the level of risk deemed to be unacceptable (3.5.3.3.6).

3.5.3.3.2 Taking into account uncertainties It may be impossible to carry out a complete RA where such investigations operate at the frontiers of scientific knowledge, the regulators facing a dilemma. On the one hand, they may be tempted to require better RAs by requesting the experts to conduct additional research and by refining their techniques. On the other, the quest for sound science is likely to come at the price of continued exposure to hazardous substances as the regulation is deferred.

Rather than rendering the principle nugatory, the EU courts consider the need to take preventive measures with a view to protecting the environment and human health despite the lingering uncertainties. Indeed, the scientific RA is not required to provide the EU institutions with conclusive scientific evidence of the reality of the adverse consequences of the hazardous substances being released into the environment or the seriousness of the potential adverse effects that may result.³³⁹ The CJEU and the GCt alike express the view that ‘where it proves to be impossible to determine with certainty the existence or extent of the alleged risk because of the insufficiency, inconclusiveness or imprecision of the results of studies conducted, but the likelihood of real harm to public health persists should the risk materialise, the PP justifies the adoption of restrictive measures’.³⁴⁰

It comes as no surprise that scientists usually do not acknowledge that their studies are inconsistent, incomplete, uncertain, or insufficient. In fact, the implementation of precautionary measures arises mostly within conflictual contexts.³⁴¹ Obviously there is not a single scientific view on the existence and the extent of

³³⁷ Case C-192/01 *Commission v Denmark* (n 334), para 48.

³³⁸ Case T-13/99 *Pfizer* (n 17) para 149.

³³⁹ Case T-31/07 *Du Pont de Nemours* (n 299) para 140.

³⁴⁰ Case C-192/01 *Commission v Denmark* (n 334) para 52; Case C-343/09 *Afton* [2010], para 171. See also Case E-3/00 *EFTA Surveillance Authority v Norway* (n 332) para 31. In virtue of GFL, Art 7(1), where ‘the possibility of harmful effects on health is identified but scientific uncertainty persists, provisional risk management measures . . . may be adopted, pending further scientific information for a more comprehensive risk assessment’. If follows that the provisional risk management measures ‘can only occur after the assessment of available information, . . . has been carried out and has revealed scientific uncertainties regarding the possible harmful effects on health . . .’. Case C-282/15 *Queisser Pharma* [2017] C:2017:26, para 55; AG Bobek’s Opinion, para 50.

³⁴¹ In that respect, see the line of reasoning of AG Poiares Maduro in case C-41/02 *Commission v Netherlands* [2004] ECR I-11357, para 33.

the suspected risk.³⁴² Those controversies are exacerbated by the fact that some Member States are increasingly distrustful of the findings of the EU's scientific committees and seek to adhere to the findings of their own scientific bodies to support their protective measures.³⁴³ Accordingly, numerous cases (antibiotics in feed,³⁴⁴ BSE,³⁴⁵ or chemicals) ruled by the CJEU and the GCt illustrate the tensions arising between different scientific bodies, or between a scientific advisory council and an EU institution.

Hence, a situation in which the PP is applied by definition coincides with a situation in which scientific uncertainty persists.³⁴⁶ However, it is not entirely clear what the EU courts had in mind in referring to insufficiency, inconclusiveness, and imprecision. This means that the factors triggering precautionary action are still open to debate.³⁴⁷

A further observation must be made. The EU courts clearly link insufficiency of knowledge with uncertainty as a triggering factor for precautionary measures. In other words, insufficient evidence fosters uncertainty. In that respect, attention should be drawn to the fact that, in interpreting Article 5(7) of the SPS Agreement, the WTO Appellate Body (AB) took the view that the application of the safeguard clause enshrined in that provision, which was previously deemed to reflect the PP,³⁴⁸ 'is triggered not by the existence of scientific uncertainty, but rather by the insufficiency of

³⁴² 'The mere expression of a view by the rapporteur Member State at a particular stage of the evaluation procedure on the identification of a safe substance cannot therefore be regarded as sufficient to give rise to certainty on the part of the applicants that that problem had been completely resolved' (Case T-75/06 *Bayer CropScience* [2008] ECR II-2081, para 164).

³⁴³ J Scott and H Vos, 'The Juridification of Uncertainty: Observations of the Ambivalence of the Precautionary Principle within the EU and the WTO', in Ch Joerges and M Dehousse (eds), *Good Governance in Europe's Integrated Market* (OUP, 2002) 271.

³⁴⁴ Typical in this respect is the ban on virginiamycin which was not based on a single RA highlighting a specific risk to human health. The EU institutions justified their ban invoking a Danish study on laboratory rats providing new evidence on the transfer of antibiotic resistance from animals to human beings, whereas the Scientific Committee for Animal Nutrition (SCAN) contended with the scientific results of that study. The GCt held that the EU institutions were not bound to follow the Committee's opinion because the institutions were sufficiently well informed to conclude that the Danish study on live rats could be considered as major fresh scientific evidence enabling the introduction of a precautionary measure. See Case T-13/99 *Pfizer* (n 17) para 298.

³⁴⁵ Another case in point is the Court's judgment in *Commission v France*, in which the CJEU condemned the French BSE ban that had been unilaterally imposed. On one hand, France argued that the Commission had not taken into account the minority opinions within the ad hoc scientific committee, whilst on the other hand, the Commission contended that the French could rely only on the scientific opinion of their own national experts. Although the French authorities had founded their justification of the prohibition on imports of British beef on the PP, the CJEU, in a judgment on 13 December 2001, did not accept this argument. Finding against France, the Court held that a Member State could not invoke its own scientific expertise and ignore the RA which had been carried out by the Commission in conformity with EU law. See Case C-1/00 *Commission v France* [2001] ECR I-9989, para 88.

³⁴⁶ Cases T-429/13 and T-451/13 *Bayer* (n 13) para 116.

³⁴⁷ According to the Commission, the following factors are deemed to be relevant to trigger a precautionary measure: 'the absence of proof of the existence of a cause-effect relationship, a quantifiable dose/response relationship or a quantitative evaluation of the probability of the emergence of adverse effects following exposure'. For example, Commission's Communication on the PP, para 6.2.

³⁴⁸ *EC—Measures Concerning Meat and Meat Products (Hormones)*, WTO Doc. WT/DS 26 & 48/AB/R (16 January 1998), para 62.

scientific evidence.³⁴⁹ As a result, under the SPS Agreement, a precautionary measure could not be triggered by uncertainty per se but exclusively by insufficient results.

3.5.3.3.3 Jurisprudential requirements regarding the quality of the risk assessment As a matter of course, the law-makers offer no guidance on what should be the most reliable scientific evidence available which needs to be gathered when the experts are coping with scientific uncertainty. Thus, a particularly significant question arises for risk assessors and risk managers alike: how much information is needed in order to reach a precautionary decision? No easy answer can be given to this question. At first glance, the open-textured terms ‘reasonable grounds for concerns’ set out in the Commission Communication leave much discretion to the EU institutions. Thus far, some lessons can be drawn from the case law.

Ratione materiae, the risk management decision has to be based ‘on the most reliable scientific data available’³⁵⁰ or on ‘sufficiently reliable and cogent information’ allowing the authority to understand the ramifications of the scientific question raised.³⁵¹ This detailed risk assessment³⁵² must be based on ‘solid and convincing evidence which, while not resolving the scientific uncertainty, may reasonably raise doubts as to the safety and/or efficacy of the . . . product.’³⁵³ By way of illustration, the failure to take into consideration key studies regarding the link between a substance and Parkinson’s disease vitiates the authorization.³⁵⁴ Lastly, the ‘reliable scientific evidence’ should rely on recommendations made by international,³⁵⁵ EU,³⁵⁶ or national scientific bodies.³⁵⁷

³⁴⁹ *Japan—Measures Affecting the Importation of Apples*, WTO Doc. WT/DS245/AB (30 August 2005), para 184.

³⁵⁰ Case C-236/01 *Monsanto* (n 17) para 113; Case C-192/01 *Commission v Denmark* (n 334) para 51; Case C-616/17 *Blaise* (n 19), para 94; Case T-13/99 *Pfizer* (n 17) paras 196–7. Under the SPS, Art 5(7) safeguard clause, which mirrors precaution, the measure adopted provisionally must be based on the available pertinent information, including that from the relevant international organizations as well as from SPS measures applied by other Members.

³⁵¹ Case T-13/99, *Pfizer* (n 17) para 162; Case T-70/99 *Alpharma v Council* [2002] T:2002:210, paras 173–6; Case T-257/07 *France v Commission* [2011] T:2011:444, para 77; see also, to that effect, Cases T-429/13 and T-451/13 *Bayer* (n 13) para 117.

³⁵² Case C-192/01 *Commission v Denmark* (n 334) para 48; and case C-514/99 *Commission v France* [2000] ECR I-4705, para 55.

³⁵³ Case T-74/00 *Artgodan* [2006] T:2006:286, para 192.

³⁵⁴ Case T-229/04 *Sweden v Commission* [2007] ECR I-2437, para 110.

³⁵⁵ Case T-13/99 *Pfizer* (n 17) paras 300–10. In its case law on food additives, the CJEU has been stressing that Member States should rely on the results of international scientific research and in particular the work of the Community’s Scientific Committee on Food. Another case in point is *Toolex*, where the CJEU highlighted that evidence has been gathered by the IARC as to the risk of cancer entailed by the use of the substance trichloroethylene.

³⁵⁶ As far as national restrictions placed on hazardous substances are concerned, the Commission must take into account the opinion of the EU scientific committee when assessing the proportionality of a Member State’s measure providing for more stringent standards than the ones laid down under a directive, calling into question the validity of the EU standards (Case C-3/00 *Denmark v Commission* [2003] ECR II-2643 paras 109–15).

³⁵⁷ Likewise, national epidemiological studies are also relevant to substantiate the risk (Case C-473/98 *Toolex* (n 331) para 43). Although the risk management is not subject to the same principles and rules in the United States as it is in the EU ‘since the legal and political frameworks are different’, the RA

Ratione temporis, the risk management decision must be backed up by the scientific data available at the time ‘when the precautionary measure was taken.’³⁵⁸ Moreover, references to the latest international research³⁵⁹ as well as new evidence³⁶⁰ on the subject enhance the quality of the decision.³⁶¹ In particular, restrictions placed on approved substances require the existence of ‘new scientific and technical data.’³⁶²

Furthermore, the RA should be undertaken in ‘an independent, objective and transparent manner.’³⁶³ Accordingly, the competent public authority should entrust this task to scientific experts³⁶⁴ who, on completion of the scientific process, provide it with scientific advice,³⁶⁵ which, in the interests both of consumers and industry, should be based on ‘the principles of excellence, independence and transparency.’³⁶⁶ Nonetheless, in light of the uncertainty inherent in assessing public health risks ..., divergent assessments of those risks can legitimately be made, ‘without necessarily being based on new and different scientific evidence.’³⁶⁷

concerning exposure to acrylamide may also be founded on data from the United States. See Case C-199/13 P *Polyelectrolyte Producers* [2014] C:2014:205, paras 38–42.

³⁵⁸ Case T-13/99 *Pfizer*, (n 17) para 145

³⁵⁹ Case C-236/01 *Monsanto*, (n 17) para 113; Case C-192/01 *Commission v Denmark* (n 334) para 51; Case C-473/98, *Toolex* (n 331) para 45; Cases C-154/04 and C-155/05 *Alliance for Natural Health* [2005] ECR I-06451, para 53.

³⁶⁰ Case T-74/00 *Artegodan* (n 353) para 194.

³⁶¹ Of particular importance is the new evidence gathered by Member States’ authorities while assessing requests to depart from EU internal market rules in accordance with Art 114(5) TFEU. Failure to deliver new scientific evidence, which was not already considered at the time of the adoption of the relevant EU threshold, is bound to lead to a rejection of the derogation request. In contrast, a request for maintaining more stringent national measures pursuant to Art 114 (4) TFEU does not require new scientific evidence (Case C-3/00 *Denmark v Commission* (n 356) para 62).

³⁶² PPPR, Art 21(1). Against this background, the GcT ruled that peer-reviewed studies employing an innovative methodology provide the regulators with new knowledge on the effects of neonics on bees. In addition, these studies were deemed to be new on the account that they had been published after the submission of the dossier at the time of the first approval. See Joined Cases T-429/13 and T-451/13 *Bayer* (n 13) paras 172, 178, and 179.

³⁶³ Case T-31/07 *Du Pont de Nemours* (n 299) para 141; Joined Cases T-429/13 and T-451/13 *Bayer* (n 13) paras 115–17.

³⁶⁴ Indeed, the institutions are not empowered to entrust a purely advisory body with the duty to perform the risk assessment, e.g. Case T-13/99 *Pfizer* (n 17) para 289.

³⁶⁵ The CJEU’s decision in *Monsanto* requires that the identification of a health risk posed by a novel food should normally be carried out by ‘specialized scientific bodies’ charged with assessing the risks inherent in novel food (Case C-236/01 *Monsanto* (n 17) paras 78–9 and 84). See also Case T-13/99 *Pfizer* (n 17) para 157.

³⁶⁶ Case T-31/07 *Du Pont de Nemours* [2013] T:2013:167, para 141. In *Pfizer*, those principles were applied to the Scientific Committee for Animal Nutrition (SCAN) (para 209) and to the Standing Committee. Whereas SCAN abided by those principles, the Standing Committee was not considered by the GcT as an independent scientific body in light of the principle of transparency (para 287). See Case T-13/99 *Pfizer* (n 17) para 159. Finally, it should be stressed that those principles are enshrined in the GFL (Recitals 18, 32–6 and Art 6(2)).

³⁶⁷ For example, Case C-3/00 *Denmark v Commission* (n 356) para 63. See P Wennerås, ‘Fog and Acid Rain Drifting from Luxembourg over Art 95(4)’ (2003) EELR 169–78. By the same token, in *Pfizer*, the GcT acknowledged that the EU institutions could pay heed to different Member States’ reports rather than exclusively the opinion of the appointed scientific body (para 308). In Case T-521/14, the GcT held that a scientific consensus is not required to establish the scientific criteria determining the endocrine disrupting substances in virtue of Regulation 528/2012, Art 5(3). As a result, the Commission is free to

Accordingly, the assessors are called upon to investigate as thoroughly as possible, and with an appropriate methodology, those risks with which they are confronted. In so doing, they should be able to reduce any lingering uncertainties and provide the risk managers with a sufficient scientific basis on which they can endorse their safety measures. Rather than formulating firmly established truths, their task is to formulate and transform the remaining uncertainties into functional estimates upon which decisions can be adopted. Therefore, precaution requires the application of the most rigorous scientific criteria with a view to characterizing uncertainties, filling gaps in knowledge, and furthering research. As a result, it could not be argued that precaution in EU law is anti-scientific.

3.5.3.3.4 Exclusion of hypothetical considerations It is settled case law that a preventative measure cannot properly be based on a purely hypothetical consideration of the risk, founded on mere conjecture which has not been scientifically verified.³⁶⁸ Simply put, basic scientific knowledge is necessary. By way of illustration, a generalized presumption of a health risk must be supported by scientific evidence explaining the need to adopt a pre-marketing authorization scheme.³⁶⁹

Risks qualified as residual—that is, speculative risks founded upon purely speculative factors and without a basis in science—are thus excluded from the scope of application of the principle. It follows that a threshold of scientific plausibility must exist. In this way the EU courts aligned themselves with the findings of several decisions handed down by the WTO AB, which has ruled against the PP’s application to hypothetical risks.³⁷⁰

That said, it should be noted that the concept of ‘hypothetical risk’ is fraught with controversy. As has been held by the CJEU, these terms must not be interpreted too broadly. If they are, many precautionary measures would be precluded. In *Solvay Pharmaceuticals*, the CJEU held that a Council decision highlighting the difficulties faced by the scientists to determine the extent of the risk did not amount to a ‘purely hypothetical risk.’³⁷¹ Likewise, the restrictions placed on the use of an active substance of a plant protection product cannot be considered to be based on purely

favour one scientific approach to the detriment of another one (Case T-521/14 *Sweden v Commission* (n 313), para 73).

³⁶⁸ Case T-13/99 *Pfizer* (n 17) para 143; Case T-521/14 *Sweden v Commission* (n 313), para 161. See also case C-36/01 *Monsanto Agricoltura* (n 17) para 106; Case C-192/01, *Commission v Denmark* (n 334) para 49; Case T-392/02 *Solvay Pharmaceuticals* [2003] T:2003:277 para 129; Case C-282/15 *Queisser Pharma* (n 340) para 60; Joined Cases T-429/13 and T-451/13 *Bayer* (n 13) para 116; Case E-3/00 *EFTA Surveillance Authority v Norway* (n 332) para 29. By the same token, the CJEU held that studies on hypothetical emissions of an active substance found in a biocide are not subject to disclosure in virtue of Directive 2003/4/EC on public access to environmental information (Case C-442/14 *Bayer CropScience and Stichting De Bijenstichting* [2016] C:2016:890, para 90).

³⁶⁹ Case C-333/08 *Commission v France* (n 17) para 97.

³⁷⁰ EC—*Hormones* (n 348) para 186; *Australia—DS 21 Measures Affecting the Importation of Salmon*, WTO Doc. WT/DS18/AB/R (20 October 1998), para 129 (hereinafter *Australia—Salmonids*).

³⁷¹ Case T-392/02 *Solvay Pharmaceuticals* (n 368), para 135.

hypothetical considerations when the EU institutions depend on different pieces of evidence such as scientific studies and reports as well as the ongoing work of the OECD.³⁷²

3.5.3.3.5. Taking into account the multifaceted effects of hazardous substances In *Pfizer*, the GCt stressed that the authority must give particular consideration to ‘the severity of the impact on human health were the risk to occur, including the extent of possible adverse effects, the persistency or reversibility of those effects and the possibility of delayed effects as well as of the more or less concrete perception of the risk based on available scientific knowledge.’³⁷³ Likewise, the CJEU has also stressed in other cases that it could be appropriate to take into consideration the cumulative effect of the presence on the market of several sources, including both natural and artificial, of a particular nutrient and of the possible existence in future of additional sources which can reasonably be foreseen.³⁷⁴ In this respect, the EU courts highlighted a particularly sensitive issue given that chemicals cannot be assessed in isolation. In addition, the authorities should request the assessors to emphasize in their studies the possibility of delayed adverse effects, along with the persistency, accumulation, and reversibility of such adverse effects. Against this backdrop, they should look at multi-causal pathways and complex interactions.³⁷⁵ Moreover, the specificity of the risk must be ascertained in the light of geographical, ecological, nutritional, or societal particularities.³⁷⁶

Accordingly, this process should enhance the continuous dialogue between regulators and scientists.³⁷⁷ In this way the GCt and the CJEU alike reject the notion of compartmentalization or demarcation which stems from traditional methods of risk analysis.³⁷⁸ Lately, the CJEU has been offering some leeway to the

³⁷² Case C-77/09 *Gowan* (n 17) para 78.

³⁷³ Case T-13/99 *Pfizer* (n 17) para 153.

³⁷⁴ Case C-192/01 *Commission v Denmark* (n 334) para 50; *EFTA Surveillance Authority v Norway* (n 332) para 29. Regarding the obligation to take into account the known cumulative and synergistic effects in the assessment of an active substance, see PPPR, Art 4(2) and (3).

³⁷⁵ It should be noted that current testing regimes for chemicals are poorly designed to detect indirect effects. See Royal Commission on Environmental Pollution, 24th report, *Chemicals in Products* (London, 2003) 16.

³⁷⁶ Regarding a country’s prevailing eating habits and nutritional needs, see Case 174/84 *Commission v Germany* (*Reinheitsgebot*) [1987] ECR 1227; Case C-192/01 *Commission v Denmark*, (n 334) para 54. According to the objectives of the PPPR ‘Particular attention should be paid to the protection of vulnerable groups of the population, including pregnant women, infants and children’. By the same token, TSCA 2016 requires the EPA to consider risks to susceptible subpopulations in all activities it undertakes.

³⁷⁷ According to Bergkamp, ‘where risk assessors cannot provide the desired information, or can provide only relatively uncertain or ambiguous information, they should make that clear’: L Bergkamp, *European Community Law for a New Economy* (Intersentia, 2003) 511.

³⁷⁸ In *Bayer CropScience*, the CJEU had to assess whether the information regarding the foreseeable emissions into the environment of the residues of the active substance glyphosate could be disclosed in accordance with Directive 2003/4/EC on public access to environmental information. The Court took the view that the information to be communicated encompasses ‘studies which seek to establish the toxicity, effects and other aspects of a product or substance under the most unfavourable realistic conditions

Commission in allowing it to include in the RA other data or methodologies that those strictly required.³⁷⁹

3.5.3.3.6 Setting the level of protection What is considered an acceptable risk is not only a function of the strength of the evidence, but also of the authorities' vision of risk management, which may reflect the public's risk aversion and the pros and cons of alternatives. Accordingly, the determination of the level of risk deemed unacceptable for society is not a rule of thumb. It is settled case law that:

the responsibility for determining the level of risk which is deemed unacceptable for society lies ... with the institutions responsible for the political choice of determining an appropriate level of protection for society. It is for those institutions to determine the critical probability threshold for adverse effects on public health, safety and the environment and for the degree of those potential effects which, in their judgment, is no longer acceptable for society and above which it is necessary, in the interests of protecting public health, safety and the environment, to take preventive measures in spite of the existing scientific uncertainty.³⁸⁰

The question arises as to whether the regulator must determine that a risk is deemed to be unacceptable at one death in ten thousand or at one death in a million. Given that the determination of such safety thresholds reflect ideological preference in order to privilege either human health or the economy, it cannot be deferred to scientists. Moreover, this obligation is subject to the constitutional requirements to ensure a high level of protection of public health, safety, and the environment under treaty law.³⁸¹

which could possibly occur, and studies carried out in conditions as close as possible to normal agricultural practice and conditions which prevail in the area where that product or substance is to be used' (Case C-442/14 *Bayer CropScience and Stichting De Bijenstichting* [2016] C:2016:890, para 91).

³⁷⁹ Given the limits inherent in the methodological criteria for determining the classification of substances' hazards to the aquatic environment, the Commission is required to examine 'carefully and impartially other factors which, although not expressly referred to by the provisions of the regulation at issue, 'are nevertheless relevant' (Case C-691/15P *Commission v Bilbaina de Alquitranes SA* [2017] C:2017:882, para 44). Similarly, in the context of the identification of a substance as being of very high concern under REACH, Annex XV, the Commission can take into consideration other data than those relating to the hazards arising from the intrinsic properties of the substances concerned, such as those relating to human exposure reflecting the risk management measures in force. The substance must be identified in light 'of all the data available ... having regard to the concerns to which their serious effects on health or on the environment give rise' (Case C-323/15P *Polynt SpA* [2017] C:2017:207, para 41).

³⁸⁰ Case T-31/07 *Du Pont de Nemours* (n 299), para 145.

³⁸¹ Regarding the justification of restrictions on active substances in virtue of the high level of protection, see Case C-138/05 *Stichting Zuid-Hollandse Milieufederatie* [2006] ECR I-8339, para 43; Case C-326/05 P *Industrias Químicas del Vallés v Commission* [2007] ECR I-6557, para 74; Case T-334/07 *Denka International v Commission* [2009] ECR II-4205, para 92; Case T-31/07 *Du Pont de Nemours* (n 299) para 145; and Cases T-429/13 and T-451/13 *Bayer* (n 13) para 123.

These requirements essentially amount to a reinvigoration of political decision-making, with decision-makers no longer being able to seek refuge behind a facade of scientific pseudo-certitudes presented by their own experts. They are now forced to show their hand and face up to the consequences of their choices. It falls to them alone to set the level of protection at the outset and thereby assume political responsibility. Thus the decision to act, or to refrain from doing so, now takes place within a political context: the determination of the acceptable level of protection.

3.5.3.4 Risk management

As emphasized above, scientific uncertainty exists whenever there is inadequate theoretical or empirical basis for assigning probabilities to the occurrence or the extent of a risk. Having thus outlined the limits of scientific assessment, we come to the political phase of risk analysis, namely risk management.

In contrast to risk assessment, risk management is the public process of deciding how safe is safe enough. Indeed, societal, economic, traditional, ethical, and environmental factors as well the feasibility of controls might appear as factors legitimizing the regulation of a specific risk.³⁸² Accordingly, preventative measures can be adopted, at very short notice if necessary, 'where such measures appear essential given the level of risk to human health which the authority has deemed unacceptable for society'.³⁸³ Taking precaution seriously involves making judgements which, though they must be informed as far as possible by scientific assessment, may go beyond it. It follows that a risk-management measure could be decided despite the fact that the risk assessors were unable to determine the probability of the occurrence of the risk.³⁸⁴ That said, the restrictive measures have to be proportionate, non-discriminatory, objective, and consistent with similar measures already taken.³⁸⁵

It should also be noted that the discretionary powers of the authorities as regards the type of preventive measure must be exercised in a manner which is consistent with a range of constraints stemming from EU law, some of which were outlined

³⁸² 'Other legitimate factors' may be taken into account by the risk manager. See GFL, Recital 19 and Art 3(12); Regulation (EC) 1829/2003 on GM food and feed, Art 6(6). Likewise, the GCt and the CJEU have upheld the right to balance different factors in a number of cases: Case C-180/96 *UK v Commission* [1996] ECR I-3903; Case T-199/96 *Bergaderm* [1998] ECR II-2805; Cases T-344 and Case C-198/03 *P Commission v CEVA Santé Animale SA* [2005] C:2005:445, para 66. As far as WTO law is concerned, attention to 'other legitimate factors' such as taking into account the real use of the product is deemed to be admissible (*EC—Asbestos* (n 309), paras 162 and 174).

³⁸³ Case T-13/99 *Pfizer* (n 17) para 393.

³⁸⁴ This approach is entirely consistent with the WTO AB's judgment in the *Hormones* case, where it rejected the inclusion of the word 'probability' in the panel's interpretation of the definition of risk assessment, considering that it introduced a quantitative dimension of the notion of risk and therefore implied a 'higher degree or a threshold of potentiality or possibility', whereas the word 'potential' in para 4 of Annex A of the Agreement only relates to the possibility of an event occurring (*EC—hormones* (n 348), paras 183–4).

³⁸⁵ Case C-343/09 *Afton Chemical* (n 17) para 61; Case T-31/07 *Du Pont de Nemours* (n 299) paras 142 and 149.

earlier (e.g. risk assessment, consultation of scientific bodies), and others which will be discussed later (proportionality, impact assessment).

The discussion will be structured in the following manner. It will start by considering the issue of the non-binding nature of scientific opinions (Subsection 3.4.3.4.1), moving on to address the issue of which risks are deemed to be unacceptable (Subsection 3.5.3.4.2). The next subsections will be dedicated to the precautionary procedures (Subsection 3.5.3.4.3) and the pivotal role played by the principle of substitution (Subsection 3.5.3.4.4).

3.5.3.4.1 Scientific opinions: a necessary but insufficient condition for risk regulation As discussed earlier, given that science is the cornerstone of precaution within the field of hazardous substances and other health issues, the decision-making stage is not entirely separate from the scientific stage which is supposed to precede it.

Whereas experts have scientific legitimacy, they have neither democratic legitimacy nor political responsibilities,³⁸⁶ and their opinions are non-binding.³⁸⁷ EU institutions cannot therefore be criticized in cases concerning complex and sensitive public health issues for having taken the time necessary to address the relevant scientific issues and, in particular, for having referred such issues for a second examination by the competent scientific committee even though the act is silent on this point.³⁸⁸ On another note, the institutions ‘may disregard the conclusions’ of the official opinion, ‘even though, in some places, it relies on certain aspects of the scientific analysis in the opinion.’³⁸⁹ In other words, the institutions may avail themselves of those parts of the scientific reasoning which they do not dispute.

The authority applying the PP thus enjoys considerable discretion regarding the methods of analysis. In *Gowan*, the CJEU held that in restricting the period during which a hazardous substance can be placed on the market, the Commission and the Council were not bound by the national report on the substance and the opinion of the EU scientific committee that has been validating this report. The institutions thus remained entitled to adopt different risk management measures from those proposed by the rapporteur.³⁹⁰ Likewise, the PP allows the Commission to regulate

³⁸⁶ Case T-13/99 *Pfizer* (n 17) para 201.

³⁸⁷ Case C-405/92 *Armand Mondiet* [1993] ECR I-6136, paras 31–2; Case C-120/97 *Upjohn* [1999] ECR I-223, para 47.

³⁸⁸ Case C-151/98 P *Pharos v Commission* [1999] ECR I-8157, para 26; Case C-352/98 P *Bergaderm* [2000] ECR I-5291, para 66. When the Commission finds itself facing a situation of continuing scientific uncertainty characterized by divergences between the scientific opinions adopted by the different consultative organs, it does not appear unreasonable for the Commission to await the adoption of a re-evaluation of the risks at stake. In such a situation, the Commission does not disregard in a clear and serious manner the limits of its discretion. Case C-198/03 P, *Commission v CEVA Santé Animale SA* [2005] C:2005:445, paras 82–9.

³⁸⁹ For instance, the Commission can depart from EFSA’s scientific opinion inasmuch it can appropriately justify such departure. See Case T-13/99 *Pfizer* (n 17) paras 199–200.

³⁹⁰ Case C-77/09 *Gowan* (n 17) para 60.

substances to a short deadline. Because this particular institution enjoys a broad discretion in placing restrictions on neonicotinoids,³⁹¹ it was fully entitled to take the view that the PP precluded ‘the setting of a deadline ... that would enable later scientific knowledge to be taken into account.’³⁹²

Some lawyers appear to have been fighting a rear-guard action in constantly submitting new studies that have on the face a certain platina of acceptability but that contribute little or nothing to the resolution of the lingering uncertainties. In so doing, they tend to delay the regulatory process. The Commission is empowered to rebut these studies by producing a credible demonstration that a scientific consensus has emerged on the contested issue. An indefinite postponement of the deadline for evaluating an active substance would run counter to the aim of the regulation.³⁹³ By way of illustration, the GCt held that the completion of a guidance document would ‘necessarily have delayed the Commission’s becoming aware, however imprecisely, as risk manager, of the level of risk posed by the substance covered, and, as a result, the taking of a decision.’³⁹⁴

Lastly, the EU institutions are subject to specific obligations when deciding to set aside a scientific opinion in order to upgrade the level of protection. They ‘must provide specific reasons for their findings by comparison with those made in the opinion and its statement of reasons must explain why it is disregarding the latter.’ In addition, as a matter of procedure, ‘the statement of reasons must be of a scientific level at least commensurate with that of the opinion in question.’³⁹⁵ The GCt has held that the obligation to state the reasons comprehensively is particularly strict in the event of scientific uncertainty.³⁹⁶ Given that understanding RA requires substantial expertise and resources, only few institutions and national agencies can generate new data in order to rebut the contested RA.

Although scientific opinions do not bind the institutions, any unlawfulness of a requested opinion could be regarded as a breach of an essential procedural requirement, thereby rendering the institutions’ decision unlawful. As a result, the courts may be called upon to review the formal legality (internal consistency, statement of reasons) of a scientific opinion, albeit restrictively.³⁹⁷

3.5.3.4.2 Acceptable risk As science is seen as a necessary but insufficient condition for risk regulation, the political actors are allowed a significant degree of discretion in relation to the means of achieving safety objectives in the face of uncertainty. However, their room for manoeuvre is far from being unfettered.

³⁹¹ A class of systemic water-soluble insecticides chemically related to nicotine.

³⁹² Joined Cases T-429/13 and T-451/13 *Bayer* (n 13) paras 306–10.

³⁹³ Case T-75/06 *Bayer CropScience* (n 342) para 41.

³⁹⁴ Joined Cases T-429/13 and T-451/13 *Bayer* (n 13), para 301.

³⁹⁵ Case T-13/99 *Pfizer* (n 17) para 199.

³⁹⁶ *Ibid.*, para 200.

³⁹⁷ *Ibid.*, paras 199–200.

3.5.3.4.2.1 *Weighing of interests and high level of protection* The EU institutions and the Member States must ensure, under Articles 114(3), 168(1), 169(3), and 191(2) of the TFEU, an increased level of protection of human health, consumer protection, and the environment. Given that this undefined constitutional requirement offers no guidance about actions to take in the face of uncertainty, one is driven to the conclusion that the PP does not determine a general level of protection, it simply makes it easier for institutions to enact preventive measures. On this matter, the GCt has held that: ‘it is for the [EU] institutions to determine the level of protection which they deem appropriate for society’.³⁹⁸

- Determining the level of risk deemed unacceptable involves ‘the [EU] institutions in defining the political objectives to be pursued under the powers conferred on them by the Treaty’. It is by reference to that level of protection that the EU institutions may be required to take preventive measures in spite of existing scientific uncertainty. This level does not technically need to be the highest level possible.³⁹⁹
- Likewise, in the absence of harmonization and insofar as uncertainties continue to exist in the current state of scientific research, it is for the Member States to decide on the desirable level of protection of human health and life.⁴⁰⁰ This means that a risk-management decision rests with each Member State that has discretion in determining the level of risk it considers appropriate, in accordance with the PP.⁴⁰¹

Once it is shown that uncertainty persists in the current state of scientific research on the harmful effects for health of certain substances, the margin of discretion of Member States relating to the choice of the level at which they intend to guarantee the protection of public health is particularly large.⁴⁰² The EU courts have already stressed that the competent public authority has, when confronted by uncertainty, to undertake a balancing of its obligations and then decide either to wait until the results of more detailed scientific research became available, or to act on the strength of existing scientific knowledge. Where measures intended to protect human health are at issue, this balancing process depends on the level of risk determined by the authority ‘as being unacceptable for society’ within the context of the

³⁹⁸ Ibid, para 151.

³⁹⁹ On the reasonableness of the obligation to ensure a higher level of environmental protection, see Case C-284/95 *Safety Hi-Tech* [1998] ECR I-4301, para 49.

⁴⁰⁰ Case C-174/82 *Sandoz* [1983] ECR 2445, para 16; Case C-42/90 *Bellon* [1990] ECR I-4863, para 11; Case C-400/96 *Harpegnies* [1998] ECR I-5121, para 33; Case C-192/01 *Commission v Denmark* (n 334) para 42; and C-333/08 *Commission v France* (n 17) para 85. See also EFTA Court, Case E-4/4 *Pedidel* [2005].

⁴⁰¹ Case C-286/02 *Bellio Flli Srl v Prefettura di Treviso* [2004] ECR I-3465, para 58.

⁴⁰² Case C-446/08 *Solgar Vitamin’s France* [2010] C:2010:233, paras 35 and 36; and Case C-282/15 *Queisser Pharma* (n 340) para 60.

particular circumstances of each individual case.⁴⁰³ Moreover, in contrast to many MEAs requiring either significant or irreversible risk,⁴⁰⁴ the EU regulations structured around the PP refer to a risk without such criteria.⁴⁰⁵ Accordingly, they offer a broader margin for manoeuvre to the institutions.

This reasoning is not devoid of legal consequences. One has to bear in mind that the level set out by the law-makers is likely to vary significantly as it can be set either in qualitative or quantitative terms. This wide discretion entails the risk that at the end of the day a low level of protection will belittle the recourse to the PP. In practice, this means that the fact of the decision-maker paying little heed to the level of protection would limit any subsequent recourse to this principle. Conversely, giving the protection of health or the environment precedence over economic considerations at an early stage would enhance the PP. That being said, this discretion is far from being absolute on the grounds that the institutions are obliged to seek a high level of environmental protection.⁴⁰⁶

3.5.3.4.2.2 Balancing economic and environmental interests Nonetheless, the level of environmental and health protection is not the only matter that the decision-makers have to take into consideration. Much importance is conferred to the socio-economic interests. However, a striking feature of the EU courts' case law is that 'the protection of the environment takes precedence over economic considerations, with the result that it may justify adverse economic consequences, even those which are substantial, for certain traders.'⁴⁰⁷

As the courts are silent on what is meant by its assertion by giving 'precedence' to the non-mercantile requirements over economic interests, one could wonder whether that principle must be strictly applied. Put simply, is that principle of giving precedence uncompromising given that it has to be balanced with the principle of proportionality? For instance, in *Bellio F.lli Srl*, the CJEU took the view that even if the need to safeguard public health has been recognized as a primary concern, the principle of proportionality must be respected.⁴⁰⁸

That said, the question of the appropriate means for averting the manifestation of uncertain risks is an open-ended one. Indeed, the various judgments commented on in this section do not address the issue of which measures are to be taken in light of the PP. It is settled case law that it is for the institution concerned to determine

⁴⁰³ Case T-13/99 *Pfizer* (n 17) para 161.

⁴⁰⁴ See Section 3.

⁴⁰⁵ GFL, Art 5. See our previous developments on the level of protection experts have to take into consideration while carrying out their risk assessment.

⁴⁰⁶ Case C-77/09 *Gowan* (n 17) para 71.

⁴⁰⁷ See, to that effect, Case T-392/02 *Solvay Pharmaceuticals* (n 368) para 125; Case T-177/02 *Malagutti* [2004] T:2004:72, para 186; Case T-74/00 *Artegodan* (n 353) para 186; Case T-475/07 *Dow AgroSciences* [2011] T:2011:445, para 143; Case T-483/11 *Sepro Europe* [2013] T:2013:407, para 85; Case T-269/11 *Xeda International* [2014] T:2014:1069, para 138; Case T-584/13 *BASF Agro* [2010] T:2018:279, paras 55 and 168.

⁴⁰⁸ Case C-286/02 *Bellio F.lli Srl* (n 401) para 60.

the level of protection which it considers appropriate for society, depending on the circumstances of the particular case.⁴⁰⁹

3.5.3.4.3 Zero risk and zero tolerance The adoption of a preventive measure ‘cannot be made subject to proof of the lack of any risk, in so far as such proof is generally impossible to give in scientific terms since zero risk does not exist in practice.’⁴¹⁰ Indeed, such measures may be deemed to be disproportionate.⁴¹¹ Within this context one can appreciate the significance both of the recognition by the AB of the WTO that the level of protection adopted within a risk management framework could itself aim for zero risk,⁴¹² and of the European Free Trade Association (EFTA) Court’s admission that a precautionary measure could in exceptional circumstances be directed at a zero-risk level.⁴¹³ US courts have been opposed to a zero-risk approach.⁴¹⁴

Does this reasoning necessarily imply that any policy designed to eliminate risk is undesirable? In our view, one has to distinguish zero risk from zero tolerance.⁴¹⁵ We are of the view that nothing precludes the EU institutions from endorsing a ‘zero tolerance’ policy with regard to certain risk factors for which the producer cannot adduce proof that they are acceptable.⁴¹⁶ In particular, the concept of zero tolerance may, through the PP, result in the total ban of a substance provided that its potential risk is supported by elementary scientific data. Additionally, according to the CJEU’s settled case law on the proportionality of national measures limiting the use of food additives, the determination of the extent to which Member States intend to guarantee the protection of the health and life of persons is—in the absence of an exhaustive harmonization at EU level—their own decision, although they must of course have given consideration to the requirements of the free movement of goods. The margin for manoeuvre reserved to the Member States specifically allows them to set a very high level of protection where technical knowledge is not certain.⁴¹⁷ As convincingly argued by Christoforou, the pursuit of zero risk

⁴⁰⁹ Case T-13/99 *Pfizer* (n 17) paras 151 and 153.

⁴¹⁰ Case T-31/07 *Du Pont de Nemours* (n 299) para 140; see also, to that effect, Case T-392/02 *Solvay Pharmaceuticals* (n 368) para 130.

⁴¹¹ Communication on the PP, para 18. See Case T-13/99 *Pfizer* (n 17) para 145; Case T-70/99 *Alpharma* (n 351) para 158.

⁴¹² EC—*Hormones* (n 348), para 187.

⁴¹³ *EFTA Surveillance Authority v Norway* (n 332), para 23.

⁴¹⁴ In *Corrosion Proof Fittings v EPA*, the US Court of Appeal for the Fifth Circuit emphasized that TSCA was not a ‘zero-risk’ statute. See *Corrosion Proof Fittings*, 947 F.2d 1201, 1224–5 (5th Cir. 1991).

⁴¹⁵ Regarding the ‘zero-risk’ imperative, see Case C-446/08 *Solgar Vitamin’s France* [2010] I-3973.

⁴¹⁶ Case C-121/00 *Hahn* [2002] ECR I-9193, para 93; Case T-392/02 *Solvay Pharmaceuticals* (n 368) para 97.

⁴¹⁷ In a number of cases, the CJEU accepted that a Member State could opt for a tolerance level equal to zero regarding the presence of pathogenic micro-organisms, listeriosis, additives, and fluoride in food (Case 97/83 *Melkunie* [1984] ECR 2367, para 15; Case C-121/00 *Walter Hahn* (n 416), para 31; Case C-331/88 *Fedesa* [1990] ECR I-4023; Case C-446/08 *Solgar Vitamin’s France* [2010] ECR I-3973, para 47). The zero-tolerance approach consisting of the prohibition of any contamination, even accidental, by unauthorized substances in feedstuffs is proportionate (Case C-286/02 *Bellio F.Lli Srl* (n 401), para 61).

does not however mean that one should seek to eliminate all risks; the aim is by contrast to limit their manifestation as far as possible.⁴¹⁸

Finally, it could be argued that the decision to eliminate every risk is an issue involving purely political responsibility, and is as such one in relation to which judicial review should be highly deferential.

3.5.3.4.4 Precautionary procedures The PP has steadily expanded its dominion in the field of secondary law. It has been fleshed out in a broad range of measures ranging from prior authorization schemes,⁴¹⁹ pre-market systems,⁴²⁰ restrictions brought to a marketing licence,⁴²¹ registration of chemicals,⁴²² to bans.⁴²³ By way of illustration, the prior authorization and approval procedures put in place by the PPPR (and, previously, by Directive 91/414) ‘emanate from the principle’.⁴²⁴ By the same token, the obligation to register monomers ‘satisfies’ the PP as referred to in the REACH Regulation.⁴²⁵ Moreover, recourse to the PP does not necessarily imply urgency.⁴²⁶

An authorization scheme indiscriminately covering all hazardous substances without distinguishing possible categories or types of substances is not contrary to the provisions of the GFL Regulation. However, the CJEU held that the risk analysis which the competent national authorities must carry out pursuant to Article 6 of that regulation must still clearly identify the common elements or characteristics of the substances concerned, whose real risk for human health cannot be excluded.⁴²⁷

3.5.3.4.5 Substitution principle The EU has embraced an important element of the PP by recognizing the substitution principle, according to which the mere existence of an alternative substance that appears to be less dangerous than the substance in question is sufficient basis for a prohibition. This principle can be found in both Directive 89/391/EEC regarding the health and safety of workers at work and Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens at work,⁴²⁸ which require employers to eliminate

⁴¹⁸ T Christoforou, ‘The Regulation of GMOs in the EU: The Interplay of Science, Law and Politics’ 41 (2004) CMLRev 637–709.

⁴¹⁹ This is the case of a regime of *prior approval* of the plant protection. See AG Sharpston’s Opinion in Case C-616/17 *Blaise* (n 19) para 50.

⁴²⁰ Case C-77/09 *Gowan* (n 17) para 74

⁴²¹ There is no inconsistency between the grant of a temporary authorization and the simultaneous pursuit of the same authorization. See Case T-392/02 *Solvay Pharmaceuticals* (n 368) para 108.

⁴²² Case C-558/07 *S.P.C.M.* [2009] ECR I- 5783, para 54.

⁴²³ The proportionality principle does not preclude the adoption of bans of hazardous substances in light of the PP. See Case T-13/99 *Pfizer* (n 17) para 457.

⁴²⁴ Case T-31/07 *Du Pont de Nemours* (n 299) para 133.

⁴²⁵ Case C-558/07 *S.P.C.M.* (n 422) para 54.

⁴²⁶ Case T-392/02 *Solvay Pharmaceuticals* (n 368) para 135.

⁴²⁷ Case C-282/15 *Queisser Pharma* (n 340) para 64.

⁴²⁸ This Directive is an individual Directive within the meaning of Council Directive 89/391/EEC of 12 June 1989, Art 16(1) on the introduction of measures to encourage improvements in the safety and health of workers at work.

or reduce risks by replacing one dangerous substance with another, less dangerous, substance.⁴²⁹ Moreover, the principle is enshrined in the BPR and PPPR alike⁴³⁰ as well as in REACH.⁴³¹ The latter Regulation calls on businesses applying for authorization for Substances of Very High Concern (SVHC) which cannot be adequately controlled ‘to analyse the availability of alternatives.’⁴³² Substitution must be articulated with the obligation to grant the authorization provided that the socio-economic benefits outweigh the health and environmental risks.⁴³³ That being said, substitution does not apply either to all applications or to all substances.

The substitution principle can play an important role in assessing the proportionality of measures that distort the free movement of goods. For instance, the CJEU ruled in *Toolex* that a Swedish ban on the toxic substance trichloroethylene, a measure having an effect equivalent to a quantitative restriction within the meaning of Article 34 of the TFEU, was compatible with the Treaty in that it was necessary for the effective protection of the health and life of humans. In particular, the Court emphasized that the system of individual exemptions to the Swedish ban appeared to be appropriate and proportionate in that ‘exemptions are granted on condition that no safer replacement product is available and provided that the applicant continues to seek alternative solutions which are less harmful to public health and the environment.’⁴³⁴ The Court stressed that those requirements were compatible with the ‘substitution principle’, which emerges, *inter alia*, from different workers’ protection directives. Figure 3.2 illustrates this interaction between risk assessment and risk management.

3.5.3.5 Judicial review of the risk management process

3.5.3.5.1 Introductory remarks

The PP is likely to be seen as a double-edged sword. On the one hand, in actions for annulment brought by private parties⁴³⁵

⁴²⁹ Art 4(1).

⁴³⁰ BPR, Art 4(2) c) and PPPR, Art 50. The European Commission is required to define a list of active substances in pesticides considered to be ‘Candidates for Substitution’ (CfS) that go through a comparative assessment.

⁴³¹ Article 55 provides that SVHC ‘are [to be] progressively replaced by suitable alternative substances or technologies where these are economically and technically viable’. Where there are still uncertainties regarding the unavailability of alternatives for a dangerous substance used in varnishes and paintings, the applicant has not met the burden of proof of the absence of an alternative solution required by REACH, Art. 60(4). Consequently, the authorization cannot be granted by the Commission to the undertaking wishing to continue to use the substance. Moreover, the Commission must, in accordance with its duty of diligence, examine the condition concerning the unavailability of alternatives in greater detail. As long as the uncertainties related to the scientific assessment have not been dispelled, the Commission is not entitled to grant an authorization, even a conditional one (Case T-837/16 *Sweden v Commission* [2009] T:2019:144, paras 79, 84, 85). See also G Winter, ‘Risks, Costs and Alternatives in EC Environmental Legislation: The case of REACH’, in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 313–30.

⁴³² Art 60(4). See also Recitals 12, 72, and 73.

⁴³³ Art 60(5).

⁴³⁴ Case C-473/98 *Toolex* (n 331) para 47.

⁴³⁵ TFEU, Art 263(4).

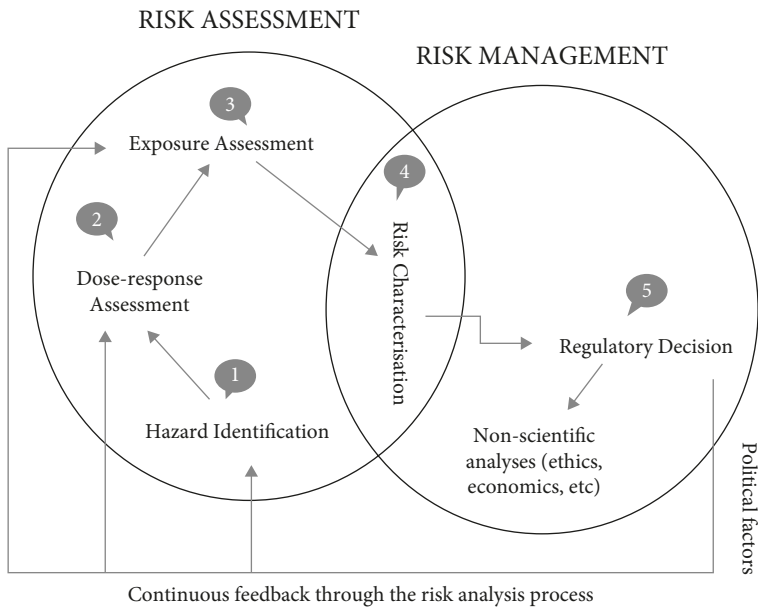


Figure 3.2 Interaction between risk assessment and risk management

against an EU measure aiming at limiting health or environmental risks, the institutions have been regularly invoking precaution to justify the soundness of their measures. On the other hand, in infringement cases brought by the Commission against Member States' health and environmental measures⁴³⁶ hindering free trade in goods, the national authorities have been invoking the principle as a shield.⁴³⁷ To some extent, EU secondary law may encourage the invocation of the principle by national authorities.⁴³⁸ Nonetheless, the fact that the intensity of review exercised by EU courts varies extensively calls for two observations.

First, one needs to draw a dividing line between, on the one hand, the lawsuits brought by a private party against an EU act and, on the other hand, the actions for infringement of EU law brought by the Commission against Member States. With respect to cases regarding actions for annulment, the PP generates a review test of the adequacy of scientific evidence supporting the contested measure. In contrast,

⁴³⁶ Ibid, Art 258.

⁴³⁷ There has been increasing use of the PP by Member States to derogate from the principle of free movement of goods where the matter has not been harmonized or with a view to departing from internal market harmonization in virtue of TFEU, Art 114(4) and (5). See de Sadeleer, *EU Environmental Law* (n 18) 358–81. See to that effect, Case C-3/00 *Denmark v Commission* (n 356) and Joined Cases T-366/03 and T-235/04 *Germany v Austria* [2005] ECR II-4005.

⁴³⁸ Pursuant to PPPR, Art 1(4): 'Member States shall not be prevented from applying the PP where there is scientific uncertainty as to the risks with regard to human or animal health or the environment posed by the plant protection products to be authorized in their territory.'

in adjudicating references for a preliminary ruling regarding the consistency of national restrictions placed on substances with harmonized rules, the CJEU resorts to precaution as an interpretative principle.⁴³⁹

Secondly, the stricter approach endorsed by the EU courts with respect to hazardous substances can be explained by the fact that those cases chiefly deal with the placing on the market of products and substances where a fundamental principle of treaty law,⁴⁴⁰ the free movement of goods, is at stake.⁴⁴¹ In genuine environmental cases (nature conservation, water, and air pollution), the courts have to balance economic freedoms—that is, the right to property, the freedom to pursue a trade or business—against EU public interest—that is, the objective of a high level of health protection. In contrast, in health-related cases, the courts have to weigh EU public interest—the free movement of goods enshrined in Articles 34–36 of the TFEU—against national public interest; the willingness to depart from EU harmonized standards according to Article 114(4)(5) of the TFEU or to maintain a measure impinging on trade according to Article 36 of the TFEU or the rule of reason.⁴⁴² This may explain the more stringent requirements imposed by EU courts on Member States’ measures rather than on the EU institutions’ acts.⁴⁴³

3.5.3.5.2 Judicial restraint in reviewing the exercise of the discretionary power As regard the actions for annulment, it needs merely to be pointed out that the EU courts are fully aware of the difficulties of regulating either in controversial cases or where action is urgently needed. Regarding health and environmental risks, the courts have been stressing that the institutions enjoy a wide discretion in determining the scope of the precautionary measures according to the nature, the seriousness, and the scope of the risk.⁴⁴⁴ In particular, where the EU institutions are called upon to make ‘complex assessments’, they enjoy a wide measure of discretion when they adopt risk management measures.⁴⁴⁵

⁴³⁹ Scotford, *Environmental Principles* (n 47) 147.

⁴⁴⁰ Case C-3/00 *Denmark v Commission* (n 356).

⁴⁴¹ Opinion of AG Poiares Maduro in Case C-41/02 *Commission v Netherlands* [2004] ECR I-11375, para 30. According to the AG, ‘the discretion that Member States are allowed as regards recourse to the precautionary principle is increasingly restricted the further they depart from scientific analysis and the more they rely on policy judgment’, in particular in cases where there is a lack of data because of the novelty of the product or a lack of resources for conducting scientific research (para 33). The Court of justice did not address that issue.

⁴⁴² de Sadeleer, *EU Environmental Law* (n 18) 259–334.

⁴⁴³ A Alemanno, *Trade in Food* (Cameron May, 2007) 107.

⁴⁴⁴ It is settled case law that only manifest and grave failure to have regard to the limits of the discretion conferred to the institutions can result in a sufficiently serious breach of a rule of law capable of resulting in the EU incurring non-contractual liability. See Case T-31/07 *Du Pont de Nemours* (n 299) para 156.

⁴⁴⁵ Case C-180/96 *UK v Commission* (n 382), para 97; Case T-74/00 *Artegoda* (n 353) para 201; Case T-392/02 *Solvay Pharmaceuticals* (n 368) para 126; Case C-77/09 *Gowan* (n 17) paras 55 and 82; Case C-343/09 *Afton* (n 17) para 28; Case C-288/13P *Rüttgers* [2014] C:2014:2176.

Simply put, the EU has a discretionary power that corresponds to its political responsibilities.⁴⁴⁶

Therefore, the EU courts rightly show themselves to be disinclined to penalize institutions for any errors they may have committed in their desire to safeguard the general interest. Hence, review must be limited in cases in which the institutions are required to undertake a scientific RA and to evaluate highly complex scientific and technical facts.⁴⁴⁷ As discussed later, the review must be circumscribed to: (i) the compliance with the relevant procedural rules; (ii) the accuracy of the statement of facts and; (iii) the existence of a manifest error of appraisal or misuse of powers.⁴⁴⁸ In particular, although the review of the merits of the case is rather narrow, the EU courts must verify whether the institution complied with the procedural requirements laid down by the various regulations on chemicals. In that connection, they have to examine 'carefully and impartially, all the relevant facts of the individual case, facts which support the conclusions reached'.⁴⁴⁹

Before the 2000s, the EU courts endorsed a minimal review of both the EU institutions' and Member States' precautionary measures. The courts have shown judicial restraint as they are not entitled to substitute their assessment of the facts for that of the EU institutions on which the Treaty confers sole responsibility for that duty.⁴⁵⁰ It thus comes as no surprise that the CJEU⁴⁵¹ and the GCt⁴⁵² alike have on various occasions rejected lawsuits founded on manifest errors of appraisal committed by the institutions when taking decisions which were not fully justified in the light of prevailing scientific knowledge. Applicants have thus rarely been successful in their challenge against an insufficient or an over-zealous precautionary measure.⁴⁵³ In so doing, the courts gave the EU institutions much leeway.

However, since the landmark *Pfizer* judgment, the courts' review have become much stricter. Unsurprisingly, the case law has become rather erratic as nowadays a procedural standard of review co-exists with a more deferential standard of scrutiny.⁴⁵⁴ Table 3.4 highlights the differences between a deferential review and a more intrusive judicial review.

⁴⁴⁶ Case C-157/96 *NFU* [1998] ECR II-1211, para 61; Case C-331/88 *Fedesa* (n 417), para 14; Case C-368/89 *Crispoltoni* [1990] ECR I-3715, para 42; Case T-429/13 and T-451/13 *Bayer CropScience* (n 13) para 506.

⁴⁴⁷ Case T-13/99 *Pfizer* (n 17), para 169; Case T-31/07 *Du Pont de Nemours* (n 299), para 154.

⁴⁴⁸ Case C-77/09 *Gowan* (n 17) para 56.

⁴⁴⁹ See, *inter alia*, Case C-269/90 *Technische Universität München* (n 333) para 14; Case C-77/09 *Gowan* (n 17) para 57.

⁴⁵⁰ Case T-13/99 *Pfizer* (n 17) para 169.

⁴⁵¹ Case 174/82 *Sandoz* [1983] ECR 2445, para 17; Case C-331/88 *Fedesa* (n 417) para 9; Case C-180/96 *UK v Commission* (n 17) paras 99 and 100; and Case C-127/95 *Norbrook Laboratories Ltd* [1998] ECR I-1531.

⁴⁵² See Case T-199/96 *Bergaderm* [1998] ECR II-2805, paras 66 and 67; Case T-13/99 *Pfizer* (n 17) and Case T-70/99 *Alpharma* (n 351).

⁴⁵³ V Heyvaert, 'Facing the Consequences of the Precautionary Principle in EC Law' 31 (2006) ELR 185.

⁴⁵⁴ GC Leonelli case note under Case C-691/15 P *Balbaina II* 55 (2018) CMLR 1217-50.

Table 3.4 Standards of judicial review of precautionary measures

Paradigm	Prudential regulation paradigm	Evidence-based risk regulation paradigm
Standard of Review	Deferential standard of review	Procedural standard of review
Scientification of the Court's review	Broad discretion of the decision-maker as regards the choice and use of the assessment methodology	Intrusive review of the scientific evidence underpinning the contested measure
Case law	C-77/09 <i>Gowan</i> C-343/09 <i>Afton</i> C-287/13 P <i>Balbaina I</i>	C-691/15 P <i>Balbaina II</i>

A stricter judicial review is likely to require more, rather than less, quantitative analysis. In addition, asking scientifically untrained judges to review the validity of RAs give them 'a complex and difficult task to assess the substantive merits of science.'⁴⁵⁵ Moreover, in placing more stress on grounding regulatory measures on 'good science' rather than on the need to provide effective protection in the face of uncertain risks, a strict judicial review is likely to render the PP nugatory.

3.5.3.5.3 Stricter interpretation of the marketing requirements The PP sheds new light on the duty to place on the market only products not endangering human health. In this respect, the *Paraquat* judgment handed down by the GCt is a case in point. Adjudicating an action for annulment lodged by Sweden against a Commission decision listing Paraquat—a highly poisonous chemical—under Annex I to Directive 91/414/EC⁴⁵⁶ in spite of the hazards entailed by its use, the GCt stressed that the safety requirement had to be interpreted 'in combination with the precautionary principle'. It follows that 'in the domain of human health, the existence of solid evidence which, while not resolving scientific uncertainty, may reasonably raise doubts as to the safety of a substance, justifies, in principle, the refusal to include that substance in Annex I to Directive 91/414.'⁴⁵⁷ The substance may be approved if it is established 'beyond a reasonable doubt' that its use will not have harmful health or environmental effects.⁴⁵⁸

⁴⁵⁵ Cranor, *Toxic Torts* (n 298) 368.

⁴⁵⁶ Paraquat is an active substance used in plant-protection products. Such active substances could be listed under Annex I to former Directive 91/414 (replaced by Regulation (EC) 1107/2009) on pesticides inasmuch as the use of the product, 'in the light of current scientific and technical knowledge', had any harmful effects on animal health.

⁴⁵⁷ Case T-229/04 *Sweden v Commission* (n 354) paras 161 and 224.

⁴⁵⁸ The Court criticized the Commission for claiming that there were no indications of neurotoxicity associated with paraquat and for not considering in its studies the link between paraquat and Parkinson's disease. The active substance was not relisted after the GCt judgment.

In a challenge brought by the European Parliament and Denmark against a general exemption granted by the Commission for the use of a chemical hazardous substance known as a flame retardant, deca-BDE, in electrical and electronic equipment, the applicants argued that the conditions laid down by the EU legislature in Article 5(1) of Directive 2002/95 on the restriction of the use of certain hazardous substances in this equipment had not been met. They claimed that the decision at stake ran counter to the objective pursued by that legislature of establishing the principle of the prohibition of the components referred to in that Directive. In analysing the preamble, the Court reached the conclusion that the intention of the legislature was to prohibit hazardous products referred to in the Directive and to grant exemptions 'only in accordance with carefully defined conditions'.⁴⁵⁹ The Court expressed the view in its *obiter dictum* that:

Such an objective, in compliance with [Article 168 of the TFEU], according to which a high level of human health protection is to be ensured in the definition and implementation of all Community policies and activities, and in compliance with [Article 192(2) of the TFEU], according to which EU policy on the environment is to aim at a high level of protection and is based on the principles of precaution and preventive action justifies the strict interpretation of the conditions for exemption.⁴⁶⁰

In this second judgment, the PP was not applied by the CJEU as a ground for annulment but as an interpretative principle supporting a strict interpretation of the basic safety requirements laid down by the EU law-maker.

Last but not least, these two judgments have thrown into relief the willingness of both the GCt and the CJEU to investigate in detail the scientific evidence underlying the contested decisions to list substances that pose significant risks. Therefore, these judgments are markedly at odds with previous case law according to which judicial review of scientific evidence has to be limited.⁴⁶¹

3.5.3.5.4 Testing the proportionality of the precautionary measure The PP is intertwined with the principle of proportionality, which is one of the general principles of EU law. In fact, most of the important cases decided by the EU courts with respect to precaution were brought by claimants averring that the contested regulation had been adopted in violation of the principle insofar as the measure in question was manifestly inappropriate for realizing the pursued objective and that the

⁴⁵⁹ Case T-229/04 *Sweden v Commission* (n 354) para 170.

⁴⁶⁰ Cases C-14/06 and C-295/06 *EP and Denmark v. Commission* [2008] ECR I-7441, paras 74, 75.

⁴⁶¹ Zander, *The Application of Precaution in Practice* (n 100) 115.

institutions, which had a choice between various measures, had nonetheless not chosen the least restrictive one.

3.5.3.5.5 Adequacy, necessity, and weighing-of-interests tests While the function of the proportionality principle is well understood, its modes of application still give rise to conflicting opinions. According to settled case law, this principle requires that measures implemented through EU provisions should be appropriate for attaining the objective pursued and must not go beyond what is necessary to achieve it.⁴⁶²

First, regarding the appropriateness of an EU harmonized measure, the Member State must demonstrate that the implementation of a precautionary measure is necessary in order to ensure that specific products (novel foods, food additives, enriched foodstuffs) do not present any danger for the consumer.⁴⁶³ *SPCM* is a case in point: the CJEU held that the registration under REACH of monomers has to be regarded as a means of enhancing the protection of the public and professionals down the supply chain.⁴⁶⁴

Second, the necessity test requires a comparison between the various measures which are capable of achieving the desired result, and that the one that causes the least inconvenience be retained. The *Pfizer* and *Alpharma* cases are illustrative of the central role that the necessity test occupies in determining the proportionality of a precautionary measure. The claimants had argued that the EU authorities should have waited, in line with the practice of Canadian and Australian authorities, for the scientific studies to show a sufficient likelihood of risk. As far as the violation of the necessity test was concerned, the GCt replied that:

the institutions cannot be criticised for having chosen to withdraw provisionally the authorisation of virginiamycin as an additive in feedstuffs, in order to prevent the risk from becoming a reality, and, at the same time, to continue with the research that was already under way. Such an approach, moreover, was consonant with the precautionary principle, by reason of which a public authority can be required to act even before any adverse acts have become apparent.⁴⁶⁵

Furthermore, the GCt was persuaded that the use of such antibiotics is not strictly necessary in animal husbandry and that there are alternative methods

⁴⁶² Case C-491/01 *British American Tobacco* [2002] ECR I-11453, para 122.

⁴⁶³ Case C-174/82 *Sandoz* (n 400) para 18; Case C-42/90 *Bellon* [1990] ECR I-4863, para 14; Case C-400/96 *Harpegnies* (n 400) para 34; Case C-236/01 *Monsanto Agricoltura Italia* (n 17) para 107. In the field of proprietary medicinal products, C-368/96 *Generics (UK)* [1998] ECR I-7967, para 66.

⁴⁶⁴ Case C-558/07 *S.P.C.M.* (n 422) para 49.

⁴⁶⁵ Case T-13/99 *Pfizer* (n 17) para 444.

of animal husbandry even if they can lead to higher costs for farmers, and ultimately, consumers.⁴⁶⁶ The Court confirmed that the Regulation satisfied the necessity test.

Third, with a few exceptions, the requirement to balance interests in a strict sense is, as is known, the least well-established test in the Court's jurisprudence.⁴⁶⁷ Averting a violation of the proportionality test *stricto sensu*, Pfizer claimed that a withdrawal of a product's authorization could not be considered proportionate in the absence of a serious and identifiable risk and of proof that the source against which the action was to be undertaken constituted the most probable explanation for the risk that action was intended to confront. Where these conditions are not fulfilled, the balance should tilt in favour of the holders of the marketing authorizations. Due to the great importance accorded to the protection of human health⁴⁶⁸ as contrasted with economic considerations, the GCt nonetheless found that the measure at stake was not disproportionate.

Other judgments highlight that the balance tilted in favour of the environmental and health interests.⁴⁶⁹ Although not referring to the principle, the *Toolex* judgment provides the most striking evidence of a PA to the resolution of a conflict between the Commission and a Member State implementing its own standard.⁴⁷⁰ The Court found that the Swedish regulation was appropriate and proportionate 'in that it offered increased protection for workers, whilst at the same time taking account of the undertakings' requirements in the matter of continuity'.⁴⁷¹ In particular, the Court rejected the Commission's argument according to which the desired objective could have been achieved through a least burdensome measure; the imposition of limit values on exposure to the chemical substance trichloroethylene.⁴⁷² In *Afton*, the Court was asked to rule on whether an EU limit for the presence of a metallic additive likely to cause air pollution in fuel complied with the principle of proportionality. The Court stressed that 'the [EU] legislature could justifiably take the view that the appropriate manner of reconciling the high level

⁴⁶⁶ *Ibid*, para 459.

⁴⁶⁷ See T Tridimas, 'Proportionality in Community Law: Searching for the Appropriate Standard of Scrutiny', in E Ellis (ed), *The Principle of Proportionality* (Hart, 1999) 66.

⁴⁶⁸ See Subsection 3.5.3.4.2.2.

⁴⁶⁹ The regulation of polycyclic aromatic hydrocarbons (PAH) in food is not disproportionate, where the contested regulation is reckoning on an EFSA opinion ascertaining the carcinogenic and genotoxic effects of these substances, in spite of the impossibility of setting out thresholds. Case T-14/16 *Apimab Laboratoires* [2018] T:2018:524, paras 167 and 168.

⁴⁷⁰ Case C-473/98 *Toolex* (n 331) para 47.

⁴⁷¹ *Ibid*. That case arose from a challenge to the Swedish decision to ban the chemical substance trichloroethylene, which had been classified as a category 3 carcinogen under Directive 67/548/EEC on the classification of dangerous substances. Several scientists contended with that classification owing to the hazards entailed by the use of the substance in question. Given that the EC committee was unable to reach agreement on an evaluation of that substance (Opinion of AG Mischo delivered on 21 March 2000, para 63), the Swedish Government decided to ban the substance on the grounds that its use was endangering workers' health, and consequently endorsed a more stringent approach than the one contemplated at the EC level.

⁴⁷² Case C-473/98 *Toolex* (n 331) para 47.

of health and environmental protection and the economic interests of producers of the substance' was to limit its content 'on a declining scale while providing for the possibility ... of revising those limits on the basis of the results of assessment'.⁴⁷³

3.5.3.5.5.1 Proportionality in the light of the duty of re-examination The trend embedded within WTO and EU law requiring institutions to re-examine their precautionary measures in the light of new scientific information is particularly important in this respect.⁴⁷⁴ Indeed, it is still possible for the authority to loosen the straightjacket of precaution when new elements show that the suspected risk does not constitute as important a risk as had initially been feared. *Pfizer* provided further insights into the assessment of the proportionality of a measure likely to be re-examined. Where such restrictions placed by way of the PP on the commercialization of a product are not necessarily definitive, they thus appear all the more appropriate.⁴⁷⁵ The withdrawal of the authorization for virginiamycin as a growth promoter thus constituted a provisional measure which was subject to the EU institutions' duty of re-examination.⁴⁷⁶ Lastly, the CJEU held that by virtue of the GFL, the EU legislature was entitled to adopt 'provisional risk management measures necessary to ensure a high level of health protection and may do so whilst awaiting further scientific information for a more comprehensive risk assessment'.⁴⁷⁷

3.5.3.5.5.2 Proportionality and countervailing risks In *Pfizer* and *Alpharma*, the claimants had highlighted the fact that the prohibition of the use of antibiotics as growth promoters would have significant negative effects on the environment, impacts which had not been taken into consideration by the EU institutions. The GCt replied that the contested regulation was founded 'on a political choice, in respect of which the institutions were required to weigh up, on the one hand, maintaining, while awaiting further scientific studies, the authorisation of a product which primarily enables the agricultural sector to be more profitable and, on the other, banning the product for public health reasons'.⁴⁷⁸

3.5.3.5.5.3 Proportionality, cost-benefit analysis, and impact assessment Restrictions placed on chemicals entail costs. In contrast with US law, the obligation that a CBA of a preventive measure be assessed is rarely stipulated in EU legislation.⁴⁷⁹ This requirement gives rise to numerous questions.

⁴⁷³ Case C-343/09 *Afton* (n 17) para 64.

⁴⁷⁴ As far as EU law is concerned, see GFL, Art 7(2); Communication on the PP, para 6.3.5. As to WTO law, see SPS Agreement, Art 5(7).

⁴⁷⁵ Case T-13/99 *Pfizer* (n 17) para 460.

⁴⁷⁶ *Ibid.*

⁴⁷⁷ Cases C-154/04 and C-155/05 *Alliance for Natural Health* [2005] C:2005:449, para 69.

⁴⁷⁸ Case T-13/99 *Pfizer* (n 17) para 468.

⁴⁷⁹ By way of illustration, with respect to the authorization of SVHC substances, REACH requires that the socio-economic benefits outweigh the risks (Art 60(8)).

As far as the third test is concerned, the GCt considered in *Pfizer* that a CBA was a particular expression of the principle of proportionality in cases involving risk management.⁴⁸⁰ The assessment of the economic ramifications of the decision to withdraw made by the Danish and Swedish bodies nonetheless satisfied this requirement of the principle of proportionality.⁴⁸¹ The proportionality principle was not applied in an excessively strict manner. This seems to be confirmed by the recent *BASF Agro* judgment. The GCt held that the fact that the protection of the environment takes precedence over economic considerations does not preclude the obligation ‘pursuant to the precautionary principle, to carry out an impact assessment’ of the measures.⁴⁸² This is required in accordance with the Communication on the PP, which is a non-binding document. Such an obligation ‘is ultimately no more than a specific expression of the principle of proportionality’.⁴⁸³

3.5.4 Swedish law

Nordic countries are recognized as having achieved an advanced level of health safety, consumer, and environmental protection compared to other European countries. Their policies have a stronger focus on product-based risks than other Western European countries. In particular, Nordic governmental agencies have been developing policies stimulating innovation in safer technologies and products. For instance, Danish and Swedish policies focus on aggressive phase-outs of the most harmful substances based on their inherent hazards and lack of testing, while other Member States’ approaches are more conservative, with rapid screening, and then specific restrictions and government/industry interaction to move towards safer substitutes. However, as soon as the EU law-maker has provided for full harmonization, the domestic measures have to be consistent with the harmonized EU rules. After their accession to the EU in 1992, the Swedish authorities realized that their room for manoeuvre for introducing unilateral restrictions on chemicals had been severely curtailed.⁴⁸⁴ By way of illustration, in *Nordiska Dental* the CJEU stated that the Swedish prohibition on exporting dental

⁴⁸⁰ Case T-13/99 *Pfizer* (n 17) para 468.

⁴⁸¹ *Ibid*, para 410. In contrast, the GCt ruled in 2015 that the listing criteria to identify endocrine disrupting substances were not subject to an impact assessment under the BPR. See Case T-521/14 *Sweden v Commission* (n 313) para 74.

⁴⁸² Case T-584/13 *BASF Agro* (n 35) para 163 and para 169.

⁴⁸³ *Ibid*, para 170.

⁴⁸⁴ By way of illustration, the unilateral proposal made by Sweden to list a particular group of substances (perfluorooctane sulfonates) in an annex to the Stockholm Convention on POPs, had the consequence of splitting the international representation of the EU and compromising the common position not to propose, at that time, to list the substances at issue. The CJEU found that the Swedish proposal was in breach of the duty of loyal co-operation under Art 4(3) Treaty on the European Union (TEU). See Case C-246/07 *Commission v Sweden* [2010] ECR I-3317. By the same token, the Supreme Administrative Court has been reversing a decision taken by the chemicals agency (KemI), and, on appeal by the government, restricting the use of the active substance glyphosate on the ground that the substance was authorized under former Directive 91/414 on pesticides. See Case Ra 2005. The Court held that a concrete RA of the impact of the substance into ground water was missing.

amalgams containing mercury was incompatible with Directive 93/42 concerning medical devices—a ‘new approach’ directive—on the grounds that that Directive covered environmental considerations.⁴⁸⁵ That said, the EU regulations concerning chemicals leave Member States some room for manoeuvre.⁴⁸⁶

Of importance is understanding how the Nordic and EU law regulatory approaches are underpinned by antagonistic fundamentals. On the one hand, the EU chemicals policy and law can be described as *producer oriented* and *product oriented*.⁴⁸⁷ Given that chemicals are regulated by regulations based on Article 114 of the TFEU, the emphasis has always been placed on the functioning of the internal market. Once authorized the substance is benefiting from the principle of mutual recognition. The pivotal question is thus whether the hazardous substance is deemed to be significantly dangerous to justify EU restrictions.⁴⁸⁸ On the other hand, being encapsulated in the Environmental Code, the Swedish chemicals law pursues a genuine environmental policy. In addition, among the sixteen objectives for environmental quality to be achieved by 2020 laid down by the Swedish law-maker lies ‘a non-toxic environment’.⁴⁸⁹ Accordingly, the fundamental starting point is that chemicals cannot be used in as much as they cause damage or detriment to human health or the environment. The law-maker’s aim is thus primarily to minimize the use of dangerous substances and to substitute them with less dangerous ones. That policy also entails the banning of whole categories of substances, regardless of the actual risks associated with their exposure.⁴⁹⁰ Therefore, the restrictions placed on chemicals come first whereas under EU law, these considerations come as a derogation to the internal market rules.

The PP is enshrined in chapter 2, section 3 of the Swedish environmental code:

Persons who pursue an activity or take a measure, or intend to do so, shall carry out protective measures, comply with restrictions and take any other precautions that are necessary in order to prevent, hinder or combat damage or detriment to human health or the environment as a result of the activity or measure. For the

⁴⁸⁵ Case C-288/08 *Nordiska Dental* [2009] ECR I-11031, para 30, noted by L Krämer 7:1 (2010) JEPL 124–8.

⁴⁸⁶ Directive 2009/128/EC on the sustainable use of pesticides does not prevent Member States ‘from applying the precautionary principle in restricting or prohibiting the use of pesticides in specific circumstances or areas’ (Art 2(3)) In adjudicating the constitutionality of a partial ban on glyphosate by the Flemish Region, the Belgian CC took into account that the prohibition at issue was related to the use and not to the placing on the market of the active substance (CCt Bg., no. 38/2019, 28 February 2019, B.5). Sweden has, so far, invoked TFEU, Art 114(4) to maintain more stringent national regulations concerning chemicals only for food colourants, creosote, and cadmium in fertilizers. See de Sadeleer, *EU Environmental Law* (n 18) 259

⁴⁸⁷ A Nilsson, ‘The Precautionary Principle in Swedish Chemicals Law and Policy’ in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 126.

⁴⁸⁸ REACH, Annex XIV.

⁴⁸⁹ Government Bill 2013/14:39.

⁴⁹⁰ Zander, *The Application of Precaution in Practice* (n 100) 186.

same reason, the best possible technology shall be used in connection with professional activities.

It follows that it is not the licensing or supervising environmental authority but the operator who has to demonstrate not only the absence of risk but also that this activity complies with all legal requirements. Accordingly, the operator has to prove that the restrictions placed on their operation are unreasonable.⁴⁹¹

The second paragraph reads:

Such precautions shall be taken as soon as there is *cause to assume* that an activity or measure can cause damage or detriment to human health or the environment.⁴⁹²

Though this paragraph mirrors the PP, it offers no assistance as to the manner in which the precautionary measures should be taken.

Likewise, the Act on Products Hazardous to Health and the Environment of 1973 was inspired by a PA. Environmental authorities should have been able to intervene already when they had:

good reason to suspect a risk for damage. If so, the producer must, to avoid prohibitions or restrictions, as far as possible with respect to present scientific position prove that the suspicion is unfounded. He will otherwise have to accept that the authorities acts according to the assumption that the product is health- and environmentally hazardous. Thus, the uncertainty ... concerning the hazard of a substance will not strike.

In virtue of the duty of care stemming from Article 2(3) the administration can require the users of chemicals in the forest industry to register their substances.⁴⁹³ However, the Supreme Court seems to be somewhat less bold in interpreting this provision. Regarding the regulation of hazardous activities, the Court discarded theoretical as well as entirely insignificant risks.⁴⁹⁴ In addition, it reversed a judgment of the Environmental Appeals Court on the grounds that it would be impossible for the operator to fulfil conditions 'lacking any precision'.⁴⁹⁵

Other provisions mirror the PP. Pursuant to 2 kap. 2 § of the Chemicals Act, 'anyone who conducts or intends to conduct an activity or take action shall acquire

⁴⁹¹ G Michanek, 'Sweden' in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 296.

⁴⁹² Prop. 1973:17 (Governmental Bill), 96 f. The principle is merely mentioned in some judgments of the Environmental Court of Appeal (Miljööverdomstolen) whereas the Supreme Court is silent on the matter.

⁴⁹³ Environmental Appeals Court, 30 March 2005, M 9408-03.

⁴⁹⁴ NJA 2004, s 590.

⁴⁹⁵ T2303-05, NJA 2006, s 188.

the knowledge necessary with regard to the nature and extent of the activity or measure to protect human health and the environment from harm or inconvenience'. This is an obligation of means placed on the operators. Vigorous debate ensued as to how this obligation should be fleshed out in granting licences. The Supreme Court twice nullified licensing conditions prohibiting operators to use raw materials or input chemicals for which there was no documented knowledge of the risk.⁴⁹⁶ The Court took the view that such conditions were hampering legal certainty on the grounds that they did not indicate how in-depth the knowledge was required to be.

Lastly, it must be noted that in contrast to EU law, the Swedish Chemical Agency (KemI) does not reckon on a formal separation between risk assessment and risk management. In effect, the Agency is responsible for both assessing risks and adopting the relevant restrictions.

3.5.5 French law

Article 5 of the French Constitutional Charter for the Environment requires the public authorities to act where the prerequisites for the application of the PP are met. It follows that any failure to act by the public authorities may be censured where the principle calls for the revocation of consent.

On the one hand, French administrative courts endorse a deferential review of the legality of measures restricting the use of chemical substances. By way of illustration, the *Conseil d'État* has dismissed several requests for nullification of precautionary measures (phthalates in toys, the pesticide *gaucho*⁴⁹⁷) on the grounds that the authorities did not commit any error of appraisal in regulating these chemicals⁴⁹⁸ or that the measures were not disproportionate.⁴⁹⁹

On the other hand, the French Constitutional Council (CC) has been endorsing a more deferential review. Regarding the constitutionality of a law banning the use of neonicotinoids (approved as active substances in the EU for use in plant protection products), the applicant deputies objected that the harmful effects of these insecticides had not been sufficiently demonstrated. The CC went on to hold that it did not fall to it 'to call into question the assessment made by the legislature of the consequences that are liable to result ... for public health from the usage of these products'. It therefore refused to review the objective pursued by the French legislature. While recognizing the problems of scientific uncertainty posed by the neonicotinoids, the Council did not review the seriousness of the risks invoked by the law-maker.⁵⁰⁰ In the same vein, it has been limiting the scope of its review of

⁴⁹⁶ NJA 2006, s 421; NJA 2010, s 516.

⁴⁹⁷ This neonicotinoid insecticide was suspected of causing a collapse in bee colonies. See CE fr., 9 October 2002, req. no. 233876, *Union nationale de l'apiculture française*.

⁴⁹⁸ CE fr., 29 December 1999, req. nos 206687 and 207303, *Soc. Rustica Prograin Génétique SA*.

⁴⁹⁹ CE fr., 28 July 2000, req. nos 212115 and 212135, *Assoc. FO Consommateurs et a.*

⁵⁰⁰ CC, 4 August 2016, no. 2016-735 QPC.

the constitutionality of restrictions placed on Bisphenol A. In light of the objective to enhance human health, the restrictions placed on this, an endocrine disrupting substance, were not disproportionate.⁵⁰¹ In particular, it held that it could not ‘call into question the assessment made by the law-maker of the potential health impacts’ of the neonicotinoids. These two judgments show that in order for freedom of enterprise or the right of ownership to be restricted the legislature must pursue a general interest or an objective of constitutional standing and the restrictions imposed on their exercise must not be proportionate.⁵⁰² However, the proportionality review is limited in scope. In addition, there is no need for an explicit review as to whether the prerequisites for the application of Article 5 (‘risk of irreversible and severe damage’) have been met before such a review is carried out.

3.5.6 US law

In the early 1970s, the US Congress adopted a flurry of environmental statutes intended to protect human health and the environment from exposure to toxic substances.⁵⁰³ We briefly discuss here the evolution of the case law regarding the implementation of several provisions of the Occupational Safety and Health Act (OSHA) of 1970 and the Toxic Substances Control Act (TSCA) of 1976. These two acts conferred wide powers to the Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA) in recognition of the complexity and seriousness of the exposure of workers and individuals to chemicals substances. We shall see that the use of a precautionary approach in US law contrasts with that in the EU. At the outset, the federal courts interpreted these statutes in a broad and purposive manner mirroring a PA. However, since the SCt ruling in 1980 in the *Benzene* case, there has been a gradual shift towards data collection and complete risk assessment.

3.5.6.1 *The OSHA of 1970*

The OSHA of 1970 addresses specifically the subject of toxic substances. Its Section 6(b)(5) empowers the Secretary of Labor through the OSHA, in promulgating permanent standards dealing with toxic materials or harmful physical agents, to set the standard that:

most adequately assures, *to the extent feasible*, on the basis of the *best available evidence* that no employee will suffer material impairment of health or functional capacity, even if such employee has a regular exposure to the hazard dealt with by such standard for the period of his working life.

⁵⁰¹ CC, 15 September 2015, no. 2015-480 QPC.

⁵⁰² V Goessel-Le Bihan, ‘Le Conseil constitutionnel botte-t-il en touche? Lorsqu’il ne statue pas sur l’article 5 de la Charte?’ 33:6 RFDA 1049.

⁵⁰³ N Ashford, ‘The Legacy of the Precautionary Principle in US Law’, in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 361.

The Federal courts noted the ability of the OSHA to act when information was 'on the frontiers of scientific knowledge' and the right of the agency to issue regulations that are 'technology forcing' in nature, even if some companies might be put out of business by such regulations.⁵⁰⁴ For example, in *AFL-CIO v Hodgson*, a case regarding OSHA regulation of asbestos exposures, the District of Columbia Circuit Court of Appeals noted that:

some of the questions involved in the promulgation of these standards are on the frontiers of scientific knowledge, and consequently as to them insufficient data is presently available to make a fully informed factual determination. Decision making must in that circumstance depend to a greater extent upon policy judgements and less upon purely factual analysis.⁵⁰⁵

One might regard this as an articulation of the permissive use of the PP.⁵⁰⁶

In a subsequent case, *The Society of Plastics Industry, Inc v OSHA*,⁵⁰⁷ concerning an industry challenge to a very stringent OSHA standard of allowing no more than 1 ppm exposure over an eight-hour period to the carcinogen vinyl chloride, the Second Circuit Court of Appeals reiterated the rationale in *Industrial Union* above, adding, '[u]nder the command of OSHA, it remains the duty of the Secretary to act to protect the working-man, and to act where existing methodology or research is deficient.' Ashford considers that the Court of Appeals applied a PA that appeared to be mandatory, rather than permissible, even under industry protests that achieving the standard was not technologically feasible.⁵⁰⁸

However, *Industrial Union Department v American Petroleum Institute* heralded the end of this precautionary case law regarding toxic substances regulation.⁵⁰⁹ In a case involving the industry challenge to an OSHA regulation of the carcinogen benzene at 1 ppm over an eight-hour period,⁵¹⁰ the SCt dismissed the OSHA's argument that the science was too uncertain to set out the level at which benzene becomes carcinogenic. In fact, OSHA had concluded that it should not wait for scientific certainty while workers were at risk by being exposed to benzene levels that could feasibly be reduced.⁵¹¹

⁵⁰⁴ E Fisher, 'The Risks of Quantifying Justice: The Use of the Substantial Evidence Test in Judicial Review of OSHA Rule-Making', in R. Baldwin (ed), *Law and Uncertainty: Risks and Legal Processes* (Kluwer Law Int'l, 1997) 293–311.

⁵⁰⁵ *AFL-CIO v Hodgson*, 99 F.2d 467 (1974).

⁵⁰⁶ Ashford, 'The Legacy of the Precautionary Principle' (n 503) 362.

⁵⁰⁷ *The Society of Plastics Industry, Inc v OSHA*, 509 F.2d 1301 (2nd Cir. 1975).

⁵⁰⁸ Ashford, 'The Legacy of the Precautionary Principle' (n 503) 362.

⁵⁰⁹ *Society of Plastics Industry, Inc v OSHA* (n 507), 1308. Regarding other cases, see Fisher, 'The Risks of Quantifying Justice' (n 504) 110.

⁵¹⁰ *Industrial Union Department AFL-CIO v American Petroleum Institute*, 448 US 607, 656 (1980).

⁵¹¹ H Latin, 'Good Science, Bad Regulation, and Toxic Assessment' 5 (1995) *Yale Journal on Regulation* 109.

The SCt ordered the OSHA to demonstrate, on the basis of substantial evidence, that a hazard represented a 'significant risk' before setting out an occupational health standard.⁵¹² Where scientific knowledge is imperfect and the precise quantification of risks is therefore impossible, the burden of proving the significance of the risk is thus on the Agency and not on the industry. The SCt acknowledged, nonetheless, that imposing the burden of demonstrating a significant risk of harm on the Agency would not strip it of its ability to regulate carcinogens, nor would it require the Agency to wait for deaths to occur before taking any action. The requirement that a 'significant' risk be identified is therefore not a mathematical straitjacket.⁵¹³ Although the Agency's findings must be supported by substantial evidence, it is not required to support its finding that a significant risk exists with anything approaching scientific certainty; it has 'some leeway where its findings must be made on the frontiers of scientific knowledge'. So long as those findings are supported by a body of reputable scientific thought, the Agency is free in its RA of hazardous substances 'to use conservative assumptions in interpreting the data with respect to carcinogens, risking error on the side of overprotection rather than underprotection.'⁵¹⁴ The emphasis was thus placed on substantial evidence demonstrating the existence of a significant risk rather than on deliberation.⁵¹⁵

Taken up by other courts, the *Benzene* case law has had a chilling effect on environmental and occupational health regulation in the United States, hindering the OSHA as well as other agencies from issuing further health protection measures.⁵¹⁶ The courts found that there was no place for political judgment.⁵¹⁷ OSHA was called on to 'demonstrate substantial evidence for all matters of determinable fact' and articulate its reasons for choosing between scientific predictions.⁵¹⁸ As a result, the agency felt obliged to devote significant financial and human resources to developing voluminous scientific dossiers based on quantified RA to support their standards. Criticisms of judicial review of agency actions have increased in recent years, with time-and-resource intensive assessments characterized as 'ossification'

⁵¹² *Ibid*, 639–40 per Justice Stevens. The Court noted that: 'Congress was concerned, not with absolute safety, but with the elimination of significant harm . . . As we read the statute, the burden was on the Agency to show, on the basis of substantial evidence, that it is at least more likely than not that a long-term exposure to 10ppm of benzene represents a significant risk of material health impairment.'

⁵¹³ *Ibid*, 655.

⁵¹⁴ *Ibid*, 656.

⁵¹⁵ Fisher, *Risk Regulation* (n 48) 113–15.

⁵¹⁶ Agencies now interpret this decision to mean that they must have quantitative estimates of risk before regulating. See, e.g., CF Cranor, 'Asymmetric Information, Precautionary Principle and Burdens of Proof', in C Raffensperger and J Tickner (eds), *Protecting Public Health & the Environment: Implementing the Precautionary Principle* (Island Press, 1999) 91.

⁵¹⁷ Fisher (n 48) 117.

⁵¹⁸ *International Union, Uaw v Pendergrass*, 878 F.2d 389 (DC Cir. 1989) at 492.

of a previously flexible regulatory process,⁵¹⁹ forcing regulatory agencies to emphasize narrow issues that may not have particular policy importance.⁵²⁰

Additional court decisions, such as those made by the Fifth Circuit court on formaldehyde in consumer products and the EPA's regulation of asbestos under the TSCA (after ten years of studying the problem), have heightened the reluctance of administrative agencies to take precautionary action to protect public health without quantitative estimates of risk. A 'substantial evidence' standard of review has been applied in a case involving the OSHA's Air Contaminants Standard. The Eleventh Court of Appeals nullified the OSHA regulation establishing baseline standards for 428 chemical substances because the Federal Administration failed to establish a significant risk for each substance and failed to establish economic and technical feasibility on a substance-by-substance basis.⁵²¹ The Court's rejection of generic rule-making forced the OSHA to develop an elaborate record for each chemical. Noting that an EPA ban on asbestos failed to examine the effect of non-asbestos brakes on automotive safety in light of credible evidence that non-asbestos brakes could significantly increase the number of highway fatalities, a Federal court decided to suspend the EPA standard.⁵²²

All in all, the activist approach endorsed by some federal courts in the 1970s has been abandoned since the early 1980s in favour of the hard-look doctrine that has been reinforced by the fact that Congress progressively narrowed down the discretion of the regulatory agencies to adopt more detailed rules.⁵²³

3.5.6.2 *The TSCA of 2016*

One of the main structural flaws of the original TSCA was the requirement for EPA to demonstrate that the benefits of regulating a chemical outweighed the costs in determining whether or not that chemical entailed 'unreasonable risk of health or environmental injury' within the meaning of Section 6, which allows the Agency to regulate substances presenting these risks. The burden was thus placed on the Agency to address costs, benefits, and the availability of alternatives at the RA stage. These burdensome hurdles had to be cleared before the EPA could take action.⁵²⁴

⁵¹⁹ T McGarity, 'Some Thoughts on "Deossifying" the Rulemaking Process' 41 (1992) *Duke LJ* 1; JS Applegate, 'The Precautionary Preference: An American perspective on the precautionary Principle' 3 (2000) *Hum Ecol Risk Ass* 431.

⁵²⁰ R O'Leary, 'The Impact of Federal Court Decisions on the Policies and Administrations of the U. S. Environmental Protection Agency' 41 (1989) *Administrative Law Review* 549; S Rose-Ackerman, *Controlling Environmental Policy* (Yale UP, 1994) 134.

⁵²¹ *AFL-CIO v OSHA*, 965 F.2d 962 (11th Cir. 1992).

⁵²² *Corrosion Proof Fittings v EPA*, 947 F.2d 1201, 1224-5 (5th Cir. 1991).

⁵²³ The Data Quality Act of 2000 requires the regulatory agencies to rely on accurate and established information when adopting regulations, compounding the risk that science-based regulations be challenged.

⁵²⁴ Excerpted from N Ashford and R Hall, *Technology, Globalization, and Sustainable Development: Transforming the Industrial State* (Routledge, 2018) 548-52

The revised TSCA⁵²⁵ makes a clear demarcation between risk assessment and risk management—prohibiting the consideration of CBA at the RA stage but requiring consideration of those factors during the risk management stage. The amended statute defines as ‘high-priority’ those chemicals that the EPA concludes, without consideration of costs or other non-risk factors, may present an unreasonable risk of injury to health or the environment because of a potential hazard and a potential route of exposure under the conditions of use, including an unreasonable risk to a potentially exposed or susceptible subpopulation identified as relevant. The risk determination must henceforth be based solely on health and environmental considerations.⁵²⁶

The EPA is then required, according to a specified timeframe, to perform a risk evaluation for each chemical designated as a high-priority substance, to determine whether the chemical actually poses an unreasonable risk. As before, ‘unreasonable risk’ is not defined. In limiting the determination to whether the chemical ‘presents’ an unreasonable risk, and removing the original statutory requirement that the EPA also regulate chemicals that ‘will present’ an unreasonable risk, the amended statute arguably restricts the EPA’s ability—and obligation—to be proactive and to look beyond current uses of a chemical.

If the EPA makes the determination that a chemical does present an unreasonable risk, the agency is required to regulate that chemical, according to a specified timeframe, ‘to the extent necessary so that [sic] the chemical substance or mixture no longer presents such risk’. The aforementioned requirement that the EPA selects ‘the least burdensome requirements’ to accomplish that goal has been deleted. However, the EPA is required to consider, ‘to the extent practicable,’ (i) the benefits of the substance; (ii) reasonably ascertainable economic consequences of the rule; (iii) the costs, benefits, and cost-effectiveness of the proposed action as weighed against at least one regulatory alternative; and (iv) in the case of a ban or phase-out, whether ‘technical or economically feasible alternatives’ will be available as a substitute. These considerations are likely to add time-consuming complexity to the EPA’s analysis, thus raising the spectre of the regulatory inertia that has plagued TSCA in the past.

3.5.6.3 *Concluding remarks*

Despite the fact that the PP enables the adoption of risk reduction measures even where there is a suspicion of risk, assessment procedures regarding the placing on the market of hazardous substances still call for absolute certainty. In particular, unlike waste management policy, the RA procedures are cumbersome, time-consuming, and expensive, as they require analysis of an enormous quantity and

⁵²⁵ Frank R Lautenberg, Chemical Safety for the 21st Century Act (HR 2576).

⁵²⁶ The risk is to be determined ‘without consideration of costs or other non-risk factors (Sections 4(f)(2), 5(a)(3), 5(b)(4), 5(e)(1), 6(b)(1)).’

variety of data.⁵²⁷ In postponing the implementation of desirable risk reduction measures, an overly comprehensive and protracted RA process pays lip service to the PP. In fact, the more information that is required, the longer and more costly the RA is, and the longer it takes before the regulatory measures can be adopted.⁵²⁸ Since the early 1980s, both environmental and occupational law in the United States have experienced a reversal of fortune, and the PA endorsed at an early stage by the federal courts has been emasculated. As a result, the US regulatory approach is far less precautionary than the EU one. The risk reduction measures achieved hitherto by the EU chemicals policy appear relatively modest in the context of the human and financial resources required by the assessment procedures.⁵²⁹ In addition, in harmonizing the marketing approval procedures and not the production of hazardous substances, the policy is not preventive enough.⁵³⁰ In spite of the improvements brought by REACH, only a new regulatory paradigm will rectify the situation. In contrast, Nordic countries have been at the forefront of developing new environmentally friendly technologies with a view to reducing the hazards from chemical substances for many years.

That said, the PP should play a pivotal role in the assessment and regulation of hazardous substances. Indeed, in its report on chemicals, the Royal Commission on Environmental Pollution held that ‘our failure to understand the interactions between synthetic chemicals and the natural environment, and most of all our failure to compile even the most basic information about the behaviour of chemicals in the environment, is a serious matter.’⁵³¹ With respect to a number of hazardous substances, current scientific knowledge is not such that a level can be established below which risks to health cease to exist. Given that indeterminacy and ignorance characterize the risks posed by a significant number of substances, the uncertainties are unlikely ever to be eliminated. Moreover, precaution is best implemented through a systematic process of substitution that entails the replacement of hazardous substances with ones of lower hazard or a non-chemical alternative.⁵³²

As far as EU law is concerned, the case law of the CJEU we analysed earlier is not as sophisticated as several scholars claim.⁵³³ The rationale of the various judgments commented on is that scientific uncertainty constitutes the essence of the PP. The examination of these judgments demonstrates that the scientific expertise

⁵²⁷ In spite of the fact that problems still occur due to unforeseen risks, regulators continue to argue strongly that control must be on the basis of known risks.

⁵²⁸ L Koch and N Ashford, ‘Rethinking the Role of Information in Chemicals Policy: Implications for TSCA and REACH’ 5 (2005) ELNI Rev 24.

⁵²⁹ Krämer, *EU Environmental Law* (n 295) 243.

⁵³⁰ In regulating the impacts of substances and not their production, the EU policy appears rather at odds with the principle that environmental damage should as a priority be rectified at source. M Pallemerts, *Toxics and Transnational Law* (Hart, 2003) 232.

⁵³¹ Royal Commission on Environmental Pollution, *Chemicals in Products* (n 375).

⁵³² *Ibid.*, 97, 163.

⁵³³ Fisher, *Risk Regulation* (n 48) 229–41; Scotford, *Environmental Principles* (n 47) 171.

in dispute clearly lies on the frontiers of scientific knowledge.⁵³⁴ Accordingly, the issue is not only how much information the decision-makers must gather before they can regulate, but also when they can regulate given the current state of scientific knowledge. In that context, it must be kept in mind that the PP did not take root in virgin soil, as it exists alongside other general principles of EU law. Against this background, the EU courts have been developing a range of rather systematic tests for reviewing the validity of precautionary measures. Moreover, whilst the US courts have been endorsing a hard-look review since the *Benzene* SCt judgment, the EU courts are still more deferential.

The question arises as to whether the EU risk analysis model is rigid or flexible.⁵³⁵ Though much emphasis has been placed on the performance of a risk assessment, the requirements regarding the quality of the scientific expertise laid down by the EU courts are drafted in a somewhat convoluted manner. Accordingly, the RA methodology can be tailored according to the specificity of the hazardous substance. Moreover, though they play a central role, risk assessors don't have the final word on the grounds that they have neither democratic legitimacy nor political responsibilities. Accordingly, the decision-makers are endowed with much leeway in determining the high level of protection.⁵³⁶ The determination of the acceptable risk involves not only the appraisal of an array of interests but also the different facets of the risk (cumulative, synergetic effects). Therefore, there is no one-size-fits-all approach to risk analysis. In addition, comitology, the institutional device that controls the implementing powers of the Commission,⁵³⁷ offers ample room for deliberation and allows each Member State to put forward its own political agenda. A further illustration is the requirement to carry out an impact assessment that doesn't amount to a CBA.⁵³⁸ Accordingly, in contrast to US law nothing precludes the determination of the acceptable risk in qualitative terms.

Against the background of the cases discussed earlier, the debate on the acceptable level of protection must be more firmly rooted in each legal system's constitutional traditions. Although prevented from adopting a purely hypothetical approach to risk and orienting their decisions towards a level of 'zero risk',⁵³⁹ EU

⁵³⁴ In contrast, the European Commission has approved potentially unsafe pesticides, thereby disregarding data gaps in the RA and ignoring concerns raised by the EFSA. See European Ombudsman Decision, Case 12/2013/MDC.

⁵³⁵ Fisher claims that through the lenses of 'administrative constitutionalism' this model shifted from a 'deliberative constitutive paradigm' to a 'rational instrumental paradigm'. It occurs to us that the EU approach to a precautionary regulation of hazardous substances is a mix of a 'deliberative constitutive paradigm' and a 'rational instrumental paradigm'.

⁵³⁶ With respect to the TSCA, risks above the benchmark of more than one case out of million people exposed to a given carcinogen are deemed unacceptable by the EPA and other agencies (US EPA Guidelines for Carcinogen RA. EPA/630/P-03/001F (2005). By the 1990s, that benchmark was considered excessive and a lesser level risk of one in one thousand was introduced with respect to other statutes (Clean Air Act amendments of 1990).

⁵³⁷ TFEU, Art 291.

⁵³⁸ Case T-584/13 *BASF Agro* (n 35) paras 170–2.

⁵³⁹ Case T-13/99 *Pfizer* (n 17) para 145.

institutions must still ensure, under Articles 114(3), 168(1), 169(3), and 191(2) of the TFEU, an increased level of protection of human health, consumers, and the environment.⁵⁴⁰ The incremental shifting of the burden of proof in EU law is testament to the willingness to flesh out these constitutional obligations.⁵⁴¹

Last but not least, the PP blurs the dividing line between risk assessment and risk management. In effect, it is not very easy to trace the boundary between the scientific domain and the political approach to risk management, as there is no natural boundary between the two spheres which inevitably become intertwined at different stages in the decision-making process.⁵⁴² In reality, as will be discussed in the next section, assessment and management overlap in a permanent reciprocal interplay. Accordingly, the assessment of a risk often results from a managerial decision; conversely, new assessments are made following management decisions. As a result, this separation is by no means watertight. It follows that the authorities should be afforded a certain leeway in taking into account factors other than the strict scientific evidence. Accordingly, the courts' review should be limited when authorities intervene in cases permeated with uncertainties.

In conclusion, in the absence of a more comprehensive and a swifter system of regulating hazardous substances, the replacement of expensive and cumbersome RA processes by more innovative methods, and without a more prominent role for substitution, the current regulatory systems are unlikely to prevent significant environmental impacts.

3.6 GMOs

3.6.1 Introductory note

Faith in biotechnology was initially so unwavering that its deployment in agriculture was supposed to herald a bright future in which modern intensive agriculture would be able to satisfy the growing need for food, exacerbated by the ever-increasing population. Its enormous possibilities, lightning progress, and seemingly limitless applications have led to significant agricultural changes.

⁵⁴⁰ On the reasonableness of the obligation to ensure a higher level of environmental protection, see Case C-284/95 *Safety Hi-Tech* (n 390) para 49

⁵⁴¹ By way of illustration, it is the notifier who has to demonstrate that, on the basis of the information submitted to the EU authorities, the safety requirements laid down by the pesticides legislation are met. See Case T-31/07 *Du Pont de Nemours* (n 299) para 154. Under REACH, it is for manufacturers, importers, and downstream users to ensure that they manufacture, place on the market, or use such substances in a way that does not adversely affect human health or the environment (REACH, Recital 19 and Art 1(3)).

⁵⁴² Royal Commission on Environmental Pollution, *Chemicals in Products* (n 375) 6, 8, 11, 33, 45, 46, 162. In the United States, the EPA was taking the view in 1997 that the RA and risk management must take place side by side in order for the risk manager to be informed as to how the assessment has been carried out. See the Presidential and Congressional Commission on Risk Assessment and Risk Management, *Final Report*, vol. 2, 1997.

However, GMOs have repeatedly been a matter of much controversy, especially in Europe. The extent to which GMOs pose a risk of adverse effects for the environment or human health is disputed and remains uncertain. The biological characteristics associated with GMOs (reproductive capabilities, spread, persistence) compound the difficulties in assessing their effects. As regards the deliberate release of GMOs, both the likelihood of undesired effects and the magnitude of assumed effects are unknown since the plant under consideration is new or has only been studied for a relatively short period of time. Uncertainty can be caused by insufficient information concerning the behaviour of the GMO that is to be released, ecological complexity, as well as the limited methods for detecting and monitoring the impacts of the GMO.⁵⁴³ Therefore, the predictive ability of RAs is limited. As the EU GCt has held, 'GMOs constitute a constantly evolving area of research and there is no doubt that new scientific information is likely to become available in the future.'⁵⁴⁴ Moreover, value judgements affected by socio-cultural factors account for a divergence in views between decision-makers, who tend to be risk-adverse, and others who are more tolerant of risk.⁵⁴⁵ Scientific uncertainties are compounded by the following dilemma: do the benefits of the particular technology outweigh the potential risks?

It thus comes as no surprise that the ultimate avatar of the Promethean myth, biotechnology, has been the favoured field for implementation of the PP in international, EU, and domestic law, at least in Europe. There are two key differences between the EU legal system and third country systems such as the US one. Whereas the EU operates according to a regulatory process, US law considers the final product, irrespective of the process concerned. Moreover, whilst the United States have adopted a permissive approach (authorized unless proven risky), since the early 1990s the EU has pursued a precautionary approach (prohibited unless proven safe). Accordingly, under EU law, the person that intends to introduce a GMO bears the burden of proving that it is harmless. By contrast, the permissive US approach implies that the authorities must furnish proof that the GM crop constitutes a risk.⁵⁴⁶ The more stringent EU precautionary regulatory approach is thus likely to hinder the free movement of GM products imported from third States.

For the convenience of representation, we have chosen in this section some illustrations of the ways in which the PP has been fleshed out in different legal orders. Given that detailed analysis of the regulations commented upon in this section are widely available elsewhere, no attempt will be made to cover all aspects of the

⁵⁴³ AI Myhr and T Traavik, 'The Precautionary Principle Applied to Deliberate Release of GMOS' 11 (1999) *Microbial Ecology in Health and Disease* 68.

⁵⁴⁴ Case T-164/10 *Pioneer Hi-Bred International*, EU:T:2013:503, para 71.

⁵⁴⁵ Peel, *The Precautionary Principle in Practice* (n 9) 170.

⁵⁴⁶ A Saab, 'GMOs', in E Lees and J Viñuales (eds), *The Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 512.

subject matter. Like hazardous substances (Subsection 3.2 above) environmental issues are often intertwined with health concerns.

3.6.2 International law

Sanitary and phytosanitary (SPS) measures, by their very nature, may result in restrictions on trade. Such restrictions placed on biotech products amount to SPS measures that are falling within the scope of the SPS Agreement which encourages Member countries to implement international standards.⁵⁴⁷ For instance, national measures based on the Codex Alimentarius standards are presumed to be consistent with the WTO Agreement. The SPS Agreement requires its members to base their SPS measures on an RA,⁵⁴⁸ as appropriate to the circumstances.⁵⁴⁹ Members shall not maintain SPS measures without sufficient scientific evidence, except as provided for in paragraph 7 of Article 5.⁵⁵⁰ That paragraph sets out four requirements which must be met in order to adopt and maintain a provisional SPS measure. These requirements have been strictly interpreted by the AB.⁵⁵¹ There is some debate as to whether the PP that is at the core of the Cartagena Protocol on Biosafety (CPB) adopted under the auspices of the Convention on Biological Diversity (CBD) conflicts with the SPS Agreement that leaves little space for taking into account uncertainties.

As the first binding international agreement dealing with modern biotechnology, the CPB articulates what may be the most advanced expression of the PP in any MEA.⁵⁵² The CPB specifically focuses on the transboundary movement of GMOs, which are called 'living modified organisms' (LMOs). The Parties to the Protocol reaffirmed Principle 15 of the Rio Declaration on Environment and Development in several of its operative provisions.⁵⁵³ In addition to referring to the principle, the CPB expressly authorizes Parties to refuse the import of LMOs on a precautionary basis.⁵⁵⁴ Furthermore, Annex III (4) reflects the principle at the level of RA, as it states that 'lack of scientific knowledge shall not necessarily be interpreted as indicating a particular level, an absence of, or an acceptable risk.'

The PP is not formulated as an obligation in the CPB, but merely as the right to take a precautionary measure. Furthermore, that right is limited by the obligation

⁵⁴⁷ Art 3(2).

⁵⁴⁸ See the Codex Alimentarius principles for the risk analysis of foods derived from modern biotechnology (CAC/GL 44-2003).

⁵⁴⁹ Art 5(1).

⁵⁵⁰ Art 2.2.

⁵⁵¹ *Japan—Measures Affecting Agricultural Products*, WTO Doc. WT/DS76/AB/R (22 February 1999), para 86–94.

⁵⁵² P-T Stoll, 'Controlling the Risks of GMOs: the Cartagena Protocol on Biosafety and the SPS Agreement' 10 (1999) YbIEL 98; S Shaw and R Schwartz, 'The Cartagena Protocol on Biosafety and the WTO' 10:4 (2000) RSDIE 536–42; C Hutchison, 'International Environmental Law Attempts to be "Mutually Supportive" with International Trade Law' 4:1 (2001) J Int'l Wildlife L & Pol'y 1–34.

⁵⁵³ Art 1.

⁵⁵⁴ Arts 10(6) and 11(8).

of the importing Party to review its decision in the light of new scientific evidence on request by an exporting country. Furthermore, given that LMOs intended for use as food or feed or for processing are not subject to the informed agreement, the scope of the CPB is narrower than the EU legislation. Nevertheless, the insertion of precautionary provisions in the CPB is significant for potential trade conflicts concerning LMOs. The recognition of the PP could run counter the SPS Agreement: whereas the CPB refers to the ‘uncertainty’ and ‘insufficiency’ of scientific knowledge,⁵⁵⁵ in virtue of Article 5(7) of the SPS only ‘insufficiency’ can trigger the adoption of provisional measures. Moreover, unlike Article 5(7), the CPB doesn’t require these measures to be provisional.⁵⁵⁶ WTO DSBs might therefore have to take those provisions into account when interpreting ambiguous provisions of the SPS Agreement, such as Article 5(7).⁵⁵⁷ This cross-fertilization between the Protocol and CBD and a WTO agreement will put flesh on the acknowledgement in the CPB’s preamble that trade and environmental agreements should support one another.

3.6.3 EU law

Unlike a number of other countries, the EU is endowed with a rather sophisticated set of legislation designed to regulate the production, transport, deliberate release, labelling, and traceability as well as the trade in GMOs. The scope of this legislation focuses on the process of genetic modification rather than the end-product. It follows that the authorization schemes encompass more GMOs than the CPB. With respect to the authorization schemes, the GMOs can only be placed on the market after having undergone a stringent science-based RA on a case-by-case basis. Both EU law and the CPB share the same principle. The PP has been fleshed out in a broad range of measures ranging from notification procedures,⁵⁵⁸ prior authorization schemes,⁵⁵⁹ restrictions to the use or the sale of a product,⁵⁶⁰ as well as safeguard clauses.⁵⁶¹ This more intrusive regulatory approach has come in for

⁵⁵⁵ Art 10(6).

⁵⁵⁶ M Lee, *EU Regulation of GMOs* (E Elgar, 2008) 227.

⁵⁵⁷ In the biotech case commented on below, the EU nevertheless failed in its attempt to invoke the precautionary provisions of the Protocol in order to take steps beyond the temporarily permitted measures of SPS Agreement, Art 5(7).

⁵⁵⁸ Observance of the PP is reflected in the GMO notifier’s obligation to immediately notify the competent authority of new information regarding the risks of the product they have been placing on the market and the competent authority’s obligation to immediately inform the Commission and the other Member States about this information. See Case C-6/99 *Greenpeace France* (n 22), para 44.

⁵⁵⁹ Communication from the Commission on the PP (n 23).

⁵⁶⁰ Case C-6/99 *Greenpeace France* (n 22), para 44.

⁵⁶¹ According to case law, ‘the safeguard clause must be understood as giving specific expression to the precautionary principle’. See Case C-6/99 *Greenpeace France* (n 22) para 55; Case C-236/01 *Monsanto Agricoltura Italia* (n 17), para 110; and Case C-36/11 *Pioneer Hi Bred Italia* [2003] C:2012:534, paras 51–5.

considerable criticism from countries that adopt a more lenient approach towards food and environmental safety issues.⁵⁶²

While Directive 2009/41 on the contained use of genetically modified (GM) micro-organisms shares a certain number of mechanisms with the Seveso Directive,⁵⁶³ one fundamental difference nevertheless remains. Directive 2009/41 introduces a new stage in risk prevention by requiring users of modified micro-organisms to assess the risks their activities pose to human health and the environment even when they are still in doubt.⁵⁶⁴ Its Article 4(4) reflects precaution, as it provides for containment and other protective measures appropriate to a higher classification ‘until such time as less stringent measures have been justified by appropriate data.’⁵⁶⁵

The deliberate release of GMOs, including their cultivation, has been embroiled with controversy. In the early 1990s, the deliberate release of GMOs was regulated by Directive 90/220, which was designed to control both experimental and market releases of GMOs. This Directive represented a conceptual revolution by anticipating risks that were poorly understood. This constituted a genuine paradigm shift from both scientific and legal points of view. However given a number of dysfunctions, the Member States decided in 2001 to impose a *de facto* moratorium on the placing on the market of all new GMOs, based on the PP. Furthermore, several Member States enacted safeguard clauses with a view to banning the cultivation of GM crops that had already been approved by the European Commission. The United States, supported by Canada and Argentina, have challenged before the Panel the moratorium itself, the lack of action regarding certain products, as well as the practice by EU Members of resorting to EU internal safeguard clauses. In 2006, in the longest report in the history of the WTO, the EC-Biotech Panel found against the EU for violating the SPS Agreement.⁵⁶⁶ The sheer length of this report together with the complexity of the subjects discussed clearly mirror the antagonistic views towards biotech regulation.

The Panel concluded that ‘the EC applied a *de facto* across-the-board moratorium on the final approval of biotech products between June 1999 and 29 August 2003 that resulted in undue delay in the processing of biotech applications’. Furthermore, the Panel ruled that the availability of assessments of the

⁵⁶² M Cantley and M Lex, ‘Genetically Modified Foods and Crops’ in Wiener et al, *The Reality of Precaution* (n 64) 39–64.

⁵⁶³ In the framework of the latter Directive, technological risks are sufficiently well known to allow the adequate preparation of safeguard measures, so that a system of preliminary authorization and the elaboration of emergency and public information plans are sufficient to allow the authorities to ensure an acceptable level of safety.

⁵⁶⁴ Especially Recital 9: ‘Whereas the precise nature and scale of risks associated with genetically modified micro-organisms are not yet fully known and the risk involved must be assessed case by case ...’.

⁵⁶⁵ Recital 11.

⁵⁶⁶ *EC—Measures Affecting the Approval and Marketing of Biotech Products*, WTO Doc. WT/DS291/R (21 November 2006).

risks entailed by several GMOs provided ‘sufficient scientific evidence’, therefore precluding the implementation of Article 5(7).⁵⁶⁷ The Panel dismissed the EU’s assertion that the concept of ‘insufficiency’ had to be interpreted with reference to national concerns and the chosen level of protection. It considered only the relationship between the scientific evidence and the obligation to carry out an RA under Article 5(1). The EU had contended that the GATT and the SPS Agreement should be read in light of the subsequent CPB and its PP, whilst the applicants contended that the SPS Agreement should be read on its own terms. The Panel avoided the question by declaring that neither the CPB nor the CBD were pertinent to the dispute before it because some of the countries involved in the dispute were not parties to those agreements.

As regards the safeguard measures put in place by six Member States, the Panel was not convinced by the need to improve the already existing RAs carried out by the EU scientific committees: ‘Where a risk assessment has been performed, and that risk assessment meets the standard and definition of (the SPS Agreement), it does not cease to be a risk assessment ... merely because a particular Member judges that the risks have not been assessed with a sufficient degree of precision.’⁵⁶⁸

As a result, the Panel concluded that the safeguard measures were inconsistent with Article 5(7) of the Agreement. Since this provision was inapplicable, the Panel found that the EU had not acted consistently with its obligations under Articles 5(1) and 2(2) of the SPS Agreement with regards to all of the internal measures at issue, because they were not based on RAs that satisfied the definition under the SPS Agreement and hence could be presumed to be maintained without sufficient scientific evidence.

In order to put an end to the 1999 moratorium, Directive 90/220 was replaced in 2001 by Directive 2001/18,⁵⁶⁹ which was supplemented in 2003 by Regulation 1829/2003 that applies exclusively to genetically modified (GM) food and feed (hereinafter FFReg 1829/2003). Accordingly, the EU marketing regime is centred around two axes, the first concerning the deliberate release of GMO into the environment in general (Deliberate Release Directive 2001/18 (hereinafter DRD))⁵⁷⁰

⁵⁶⁷ Ibid, para 4.602. The Panel reached the conclusion that Art 5.7 was not an exception on the basic obligation in Art 2.2 but an autonomous right, an interpretation that has implications for the burden of proof.

⁵⁶⁸ Ibid, para 73226.

⁵⁶⁹ One of the objectives of the EU law-maker was to speed up the authorization process. Nevertheless, the complexity of the authorization process can lead to delays. By way of illustration, on account of the Commission’s procrastination in dealing with its application concerning the placing on the market of maize 1507, Pioneer Hi-Bred International obtained before the GCt the condemnation of this institution for failure to act (TFEU, Art 256). The GCt held that the Commission infringed its duty of diligence: Case T-164/10 *Pioneer Hi-Bred International* [2013] T:2013:503.

⁵⁷⁰ The harmonization is not total. To the extent to which the EU legislature has not regulated the organisms obtained by means of techniques/methods of mutagenesis that have conventionally been used in a number of applications and have a long safety record, Member States have the right to subject them either to the DRD or to specific obligations. See Case C-528/16 *Confédération paysanne* [2018] C:2018:583, para 78, case note of H Somsen 9 (2018) EJRR 701–18.

which endorses a horizontal approach) and the second concerning specifically GM food and animal feed (Regulation 1829/2003/CE which pursues a vertical approach).⁵⁷¹ The scope of these two pieces of legislations differ: whereas the Directive applies to the deliberate release of all GMOs ‘as or in products’, including non-foods (e.g. growing GM potatoes for processing into industrial starch such as the Amflora, flowers that have no food or feed purposes, etc.), FFRReg 1829/2003 applies exclusively to GM food and feed (GM maize, soybean, sugar beet).⁵⁷² These two legislative acts attempt to strike a balance between the functioning of the internal market and the treaty requirements of a high level of consumer and environmental protection.⁵⁷³ Nonetheless, given that the authorizations can be granted in as much as the GMO is deemed to be safe for human health and the environment,⁵⁷⁴ both the DRD and FFRReg 1829/2003 mirror a low tolerance of adverse effect.⁵⁷⁵ Accordingly, they aim at to achieve a high level of protection.

Qualifying an organism as a GMO hinges on genetic alteration realized ‘in a way that does not occur naturally by mating or natural recombination.’⁵⁷⁶ In so doing, the DRD places greater emphasis on the process than on the intrinsic genetic identity of the organism.

Having been developed following the entry into force of the DRD, the new mutagenesis techniques allow genes to be edited in organisms with a high level of precision. The risks associated with the use of those new mutagenesis techniques might prove to be similar to those resulting from the production and release of a GMO through transgenesis. However, Article 3(1) in conjunction with Annex IB of the DRD exempts organisms obtained through mutagenesis. A question therefore arose as to whether organisms produced as a result of the new mutagenesis techniques could be classified as GMOs within the meaning of the DRD. The fact that the Directive was definitively out of step with this technological evolution suggested that the answer might be no. On the other hand, these organisms were subject to a requirement of notification, an RA, and authorization procedures that already applied to organisms obtained through transgenesis, thus suggesting the opposite conclusion.

⁵⁷¹ N de Sadeleer, ‘Marketing and Cultivation of GMOs in the EU. An Uncertain Balance between Centrifugal and Centripetal Forces’ 4 (2015) EJRR 532–558; N de Sadeleer, ‘National Control of GMO Cultivation in the EU. The Path to Reconciliation of Opposed Interests’ 1 (2018) N J of Env L 27–54; G Winter, ‘Cultivation Restrictions for GM Plants’ 1 (2016) EJRR 120–43.

⁵⁷² However, GMOs may be authorized by virtue of a single authorization granted in accordance with Regulation 1829/2003/CE (known as the ‘one door one key’ approach), though the risk assessment must be performed in accordance with the DRD.

⁵⁷³ TEU, Art 3(3); TFEU, Arts 191(2) and 152.

⁵⁷⁴ Directive 2001/18/EC, Recital 47 and Art 4(1); Art 4(1) and 16(1); FFRReg 1829/2003, Art 4(1) and 16(1).

⁵⁷⁵ T Christoforou, ‘The Regulation of GMOs in the EU: The Interplay of Science, Law and Politics’ 41:3 (2004) CMLR 637–709; Lee, *GMOs* (n 556) 75.

⁵⁷⁶ Art 2(2).

The CJEU could have endorsed a literal interpretation of the DRD by emphasizing that Article 3(1), in conjunction with Annex IB, exempts organisms obtained through mutagenesis. However, in *Confédération paysanne*, the Court held that ‘such an interpretation would fail to have regard to the intention of the EU legislature . . . to exclude from the scope of the directive only organisms obtained by means of techniques/methods which have conventionally been used in a number of applications and have a long safety record’.⁵⁷⁷

A teleological interpretation prevailed in the end. Drawing on Recital 17, according to which the Directive should not apply to organisms obtained through certain techniques of genetic modification that have conventionally been used in a number of applications and have a long safety record, the CJEU concluded that, unlike older techniques, the new mutagenesis techniques do not have a long safety record.⁵⁷⁸ Furthermore, this interpretation is supported by the objective of EU law-makers of seeking to protect human health and the environment ‘in accordance with the PP’; first of all when GMOs are deliberately released into the environment and also when they are subsequently marketed as or within products.⁵⁷⁹ It follows that organisms obtained by means of new mutagenesis techniques that have appeared or have been mostly developed since the DRD was adopted fall within the scope of that Directive. In establishing such a presumption of risk, the balance struck by the CJEU tilts towards a pre-emptive logic.

Moreover, a number of the DRD provisions of the decision-making process implicitly implement the PP. First of all, the principle is proclaimed in Recital 8, in Articles 1 and 4, and in Annex II on the RA.⁵⁸⁰ Secondly, product approvals for GMOs will expire within ten years and can only be renewed if monitoring carried out during this period shows no negative results. Applicants must carry out an environmental RA of the GMO being proposed for authorization. The definition of ‘environmental risk assessment’ incorporates the thrust of the PP by specifying that ‘direct or indirect, immediate or delayed risks’ shall be evaluated by the national competent authority.⁵⁸¹ Thirdly, in *Greenpeace*, a case concerning marketing approval for GM maize, the CJEU held that the PP implied that the former EC Directive 90/220 relating to the placing on the market of GMOs (replaced by the DRD) should be interpreted in such a way that gives full weight to environmental protection requirements.⁵⁸²

⁵⁷⁷ Case C-528/16 *Confédération paysanne* (n 570) para 51.

⁵⁷⁸ In his opinion, AG Bobek dismissed that Recital 17 could play a role in interpreting the scope of the Directive (para 94).

⁵⁷⁹ Case C-528/16 *Confédération paysanne* (n 570), para 52.

⁵⁸⁰ J Kauppila, ‘GMOs and Precaution in Finnish and Swedish Law’ in de Sadeleer, *Implementing the Precautionary Principle* (n 52) 250.

⁵⁸¹ Recital 47, Arts 4(1) and 2(8), and Annex II.

⁵⁸² Case C-6/99 *Greenpeace France* (n 22). The PP allowed the CJEU to recognize the right of a Member State to oppose the marketing of GMOs due the emergence of new risks (para 45). It follows that the PP took the form of an interpretative principle of law, which served to correct the effect of a

Although the PP is not expressly stated, the FFReg 1829/2003 authorization scheme is also permeated by precaution. In effect, all GM food and feed are subject to an authorization, whereas, in sharp contrast, the former Regulation 258/97/CE provided for a simplified procedure for foods which were substantially equivalent to existing food.⁵⁸³ Moreover, the applicant is required to assess the ‘direct, indirect, immediate or delayed effects’ of the GM they are intent upon placing on the market. The PP requires that any evidence supporting the authorization of GM products be examined. This is particularly the case where the Commission concludes that the evidence adduced by a non-governmental organization (NGO) requesting that the marketing of a new GM feed be reviewed is substantial and liable to raise serious doubts as to the lawfulness of that authorization. That interpretation follows from the fact that the Commission is bound by the PP.⁵⁸⁴

The EFSA—which plays a primary role in assessing the risks associated with the GMOs subject to a requirement of authorization⁵⁸⁵—and national institutes have been at loggerheads over the level of uncertainty associated with the cultivation of various GMOs.⁵⁸⁶ In particular, the EFSA has ruled that it had no authority to include ethical and social considerations within its assessments.⁵⁸⁷ Despite significant opposition from a number of Member States, the European Commission has, to date, tended to follow the EFSA’s scientific opinions when authorizing GM applications submitted to it.⁵⁸⁸ Due to persistent differences of opinion between the EU institutions and the Member States, a limited number of authorizations for deliberate dissemination have been granted by the European Commission.⁵⁸⁹ These authorizations entail a right to free circulation across the internal market.

Given the opposition of many sectors to the cultivation of GMOs, Member States and the European Commission have been constantly fighting a turf war regarding the possibility of cultivating the authorized GMOs. The assertion of free movement

provision according to which the French State was bound by the authorization granted by the European Commission. In other words, the PP appears capable of modifying the meaning even of relatively clear text.

⁵⁸³ Though the CJEU held that the former simplified procedure did not contravene the PP that was already taken into consideration in the authorization and safeguard procedures (Case C-236/01 *Monsanto Agricoltura Italia* (n 17), para 133), that simplified procedure was dogged by controversy.

⁵⁸⁴ Case C-15/17 *TestBioTech* [2016] C:2016:736, paras 85–6.

⁵⁸⁵ Regulation 178/2002, Recital 34.

⁵⁸⁶ By way of illustration, the Italian Government submitted scientific studies to the European Commission that had been carried out by the national agricultural and environmental research councils in support of a ban on the cultivation of GM maize MON 810. See the Opinion of AG Bobek delivered on 30 March 2017, Case C-111/16 *Fidenato* [2017] C:2017:248, para 19. However, the EFSA was unable to identify any new science-based evidence in the documents provided by the Italian Government in support of the emergency measures relating to maize MON 810 that could justify the emergency measures requested.

⁵⁸⁷ M Geelhoed, ‘Divided in Diversity: Reforming the EU’s GMO Regime’ 18 (2016) Cambridge Yb Eur Legal Studies 25.

⁵⁸⁸ M Weimer, ‘Risk Regulation and Deliberation in EU Administrative Governance. GMO Regulation and Its Reform’ (2015) ELJ 5.

⁵⁸⁹ The most renowned being for maize MON810.

of the authorized products in both the horizontal Directive 2001/18 and the vertical Regulation 1829/2003 does not affect the right of the Member States to limit their circulation in having recourse to the safeguard clauses provided for under the two acts.⁵⁹⁰

Testament to the PP,⁵⁹¹ these safeguard clauses were relied on by several national authorities in order to oppose the cultivation of various GMOs that had been authorized by the European Commission. Nonetheless, since these clauses depart from the general principle of free movement of goods,⁵⁹² they have been interpreted narrowly by the Commission as well as by the CJEU, in particular in cases concerning the cultivation of maize MON 810. Against this backdrop, the CJEU has called on Member States to justify the action taken by them with reference to the conclusions of their RAs.⁵⁹³ It follows that the restrictive measures can be adopted only 'if the Member State has first carried out a risk assessment which is as complete as possible given the particular circumstances of the individual case'.⁵⁹⁴

The articulation of the safeguard clauses provided for under the DRD and FFReg 1829/2003 has led to interpretative difficulties. In the French 2011 *Monsanto* case, the maize MON 810 had been authorized on the basis of Directive 90/220 (replaced by the DRD), and was subsequently the subject of an application for renewal of authorization under FFReg 1829/2003. The CJEU held that the GM maize did not fall within the scope of Directive 2001/18 and, as a result, could no longer be the subject of safeguard measures provided for under that Directive. As a result, the Member State invoking the safeguard clause must comply with both the substantive conditions laid down in Article 34 of FFReg 1829/2003 and the procedural conditions provided for in Article 54 of the GFL, to which Article 34 of FFReg 1829/2003 refers. The requirements stemming from the later provision are much more stringent for the national authorities than the former safeguard

⁵⁹⁰ DRD 2001/18, Art 23(1); FFReg 1829/2003, Art 34.

⁵⁹¹ Case C-6/99 *Greenpeace France* (n 22), para 44; Case C-236/01 *Monsanto Agricoltura Italia* (n 17), para 111. With respect to the safeguard clause contained in Regulation 258/97, Art 12 (concerning novel foods and novel food ingredients) (repealed by Regulation 1829/2003) 'the safeguard clause must be understood as giving specific expression to the precautionary principle ... [Thus] the conditions for the application of that clause must be interpreted having due regard to this principle' (Case C-236/01 *Monsanto Agricoltura Italia* (n 17), para 110).

⁵⁹² TFEU, Arts 34–6.

⁵⁹³ Case C- 236/01 *Monsanto Agricoltura Italia* (n 17), para 113.

⁵⁹⁴ *Ibid*, para 114. In particular, the Court went one step further by not endorsing a literal interpretation of the safeguard clause laid down in the novel food regulation. Strictly speaking, that safeguard clause did not entail 'a risk assessment which is as complete as possible' of the risks at stake. Such requirement mirrors judicial activism where the court substitutes itself for the law-maker. In addition, as regards scientific proof, the Court appears to have been much more demanding in *Monsanto Agricoltura Italia* case (n 17) than in the previous *Greenpeace* case (Case C-6/99 *Greenpeace France* (n 22)). Indeed, in *Greenpeace* the Court expressed the view that Member States could enact precautionary measures in the light of the PP relying on 'new informations' as to the extent of the risk to human health and the environment.

clause.⁵⁹⁵ In this judgment, the CJEU did not invoke the PP whereas previously it had not hesitated to interpret the safeguard clause provided for under Regulation 258/97/EC (which has now been replaced by FFReg 1829/2003) with reference to this principle.⁵⁹⁶

In *Fidenato*, a criminal case in which several farmers, including Fidenato, were prosecuted for having cultivated GMOs authorized in accordance with the EU legislation but prohibited in Italy,⁵⁹⁷ one of the questions posed by the referring Italian court concerned the relationship between Article 34 of FFReg 1829/2003 and the PP.⁵⁹⁸ The CJEU was therefore required to assess whether the conditions applicable to the adoption of emergency measures listed in Article 34 were exhaustive. AG Bobek took the view that it follows from Article 34 of FFReg 1829/2003, read in conjunction with Articles 53 and 54 of the GFL, that interim protective measures may be taken by the Member States where it is evident from new scientific information that a product that has already been authorized presents a significant risk which clearly endangers human health, animal health, or the environment.⁵⁹⁹ Conversely, where it is not evident that GM products are likely to constitute a 'serious risk', neither the Commission nor the Member States have the option of adopting emergency measures such as a prohibition on the cultivation of maize MON 810. Endorsing this opinion, the CJEU held that the PP does not allow the requirements laid down in Article 34 to be disregarded or modified, since those foods have already gone through a full scientific assessment before being placed on the market.⁶⁰⁰ In other words, Member States do not have the right to prohibit the use of GM seeds unless there is evidence that they pose 'serious risks' that were not assessed previously in the RA.

As a matter of fact, since Member States face lingering uncertainties regarding the health or environmental impact of GM crops cultivated for the purposes of the production of food or feed, it would be difficult, or even impossible, for them to demonstrate that it is evident from new scientific information that the product at issue represents a 'serious risk'. Needless to say, the *Fidenato* judgment renders the PP nugatory in the area of GM food and feed. This seems to be paradoxical since GM food and feed risks are subject to a higher level of scientific uncertainty, given their novelty, than traditional food and feed.

⁵⁹⁵ The Italian Supreme Administrative Court has held that, pursuant to EC Regulation 1829/2003, Art 34, without having adopted adequate management measures, the farming of GMO maize MON 810 did not comply with the requirements of the PP (Consiglio di Stato, Branch III, Decision No. 605 of 6 February 2015). In consequence, in the case at hand, the Court upheld the adoption of an 'emergency measure' taken at national level by the Italian Ministry of Health Protection, pursuant to FF Reg 1829/2003, Art 34.

⁵⁹⁶ Case C-236/01 *Monsanto Agricoltura Italia* (n 17), para 112.

⁵⁹⁷ The Italian decree prohibiting the cultivation of GMOs had been adopted after its request for an emergency ban on GM seeds was turned down by the European Commission.

⁵⁹⁸ Case C-111/16 *Fidenato* (n 586).

⁵⁹⁹ Opinion of AG Bobek, para 48.

⁶⁰⁰ Case C-111/16 *Fidenato* (n 586), para 52.

In conclusion, since GMOs must undergo a rigorous RA,⁶⁰¹ and the authorization procedure is embedded in a precautionary approach, there is no autonomous place for the PP.⁶⁰²

On another note, Article 114(5) of the TFEU authorizes the Member States, insofar as certain conditions are fulfilled, to ‘introduce’ more stringent measures than those provided for by an EU measure related to the functioning of the internal market.⁶⁰³ These measures must be based on ‘new scientific evidence.’ The question arose as to whether an Austrian province could ban GMOs on its territory with the aim of protecting nature as well as organic farming pursuant to that paragraph. The European Commission contended that the scientific evidence gathered by the Austrian authorities in the light of the PP was not ‘new scientific evidence’ in the sense of paragraph 5. AG Sharpston took the following view in her Opinion: ‘Having regard to ... the precautionary principle ... no amount of precaution can actually render that evidence or that situation new. The novelty of both situation and evidence is a dual criterion which must be satisfied before the precautionary principle comes into play.’⁶⁰⁴ The CJEU dismissed the appeal lodged by the Austrian authorities. EFSA’s findings concerning the absence of scientific evidence demonstrating the existence of a specific problem had correctly been taken into consideration by the Commission.⁶⁰⁵ In other words, the PP does not prevail over the obligation for the Member State to bear the burden of the proof as regard the novelty of the scientific evidence. This interpretation is controversial given that the internal market treaty provision (Article 114 of the TFEU) should not prevail over another provision that has a transversal dimension (Article 191(2) of the TFEU).

3.6.4 Comparative law

The courts of the Member States of the EU have been adjudicating a number of cases in which the PP was invoked. This subsection comments on different landmark judgments handed down by German, Italian, and French courts.

In a judgment of 27 January 1995 the Administrative Appeals Court of Hamburg specified the scope of the PP set out in Section 6, no. 2 of the Genetic Engineering Act (*Gentechnikgesetz (GenT)*), which requires an operator to take steps to protect against and prevent the occurrence of potential dangers. After recalling that the concept of the current level of science and technology could be reviewed by the

⁶⁰¹ In *Pioneer Hi Bred*, AG Bot held that Italian cultivation prohibitions are subject to ‘the provision of strict proof’ that technical measures would not suffice (para 61).

⁶⁰² By the same token, in *Codacons*, a case regarding the labelling of infant GM food, the Court found that there was no room for calling into question its interpretation of the labelling requirements ‘on the basis of the precautionary principle.’ The Court stressed that given GMOS may be placed on the market provided they have been considered safe, stricter labelling requirements would not enhance the safety of the consumers. Case C-123/03 *Codacons* [2005] ECR I-3465, paras 63, 99.

⁶⁰³ See de Sadeleer, *EU Environmental Law* (n 18) 358–77.

⁶⁰⁴ Opinion of AG Sharpston in Joined Cases C-439/05 P and C-454/05 P *Land Oberösterreich* [2005] ECR I-7441, para 134.

⁶⁰⁵ Joined Cases C-439/05 P and C-454/05 P *Land Oberösterreich* (n 604), para 64.

court, the Court stressed that this concept comprises both the prevention of danger (*Gefahrenabwehr*) and precaution against risks (*Risikovorsorge*).⁶⁰⁶ The Court then recalled the case law of the Federal Administrative Court in the *Whyl* case, which conferred a power of assessment upon the administrative authorities. It inferred from this that its judicial review should be limited to verifying that the contentious assessment was based on sufficient information and non-arbitrary assumptions.

This case law, which assigns a significant degree of discretion to the administrative authorities in cases of scientific uncertainty, was confirmed by the Bundesverwaltungsgericht, or the German Federal Administrative Court (BverwG). On 15 April 1999 the BverwG ruled that the competent authorities charged with issuing operating permits for genetics laboratories under the *GenT* enjoyed the same freedom to evaluate evidence as that accorded to the administrative authorities under the *Atomgesetz*.⁶⁰⁷ In keeping with the BverwG's reasoning in the *Whyl* case, administrative courts will exercise their jurisdiction to control the procedural aspects of RA. They may henceforth go beyond the earlier limits of merely formal control (e.g. verifying if all relevant scientific literature has been cited, although without being allowed to determine how scientific facts have been integrated into an administrative decision).⁶⁰⁸ In addition, while they can verify whether competent authorities have taken all relevant aspects of an issue (such as non-mainstream scientific studies) into account and have accordingly come to a reasonable conclusion, they cannot decide what measures are necessary to comply with the PP.

In its judgment of 24 November 2010 on the validity of the *GenT*, the *BVerfG* held that, in view of the fact that 'the scientific knowledge is, to date, not conclusive in assessing the long-term consequences of genetic engineering, the legislature has a particular duty of care, and must adhere to the mandate in Article 20a GG to protect natural resources, *inter alia* out of responsibility for future generations'.⁶⁰⁹ The *BVerfG* stressed that in order to guarantee co-existence between GM cultivation and traditional cultures, in adopting the *GenT* the legislature introduced a precautionary duty and requirements of good professional practice when dealing with GMOs.⁶¹⁰ Such a duty is consistent with the constitutional right to occupational freedom on the grounds that law-makers took into account the uncertainty stemming from the current state of science and technology.⁶¹¹ Moreover, the PP is stipulated as the principle that should take precedence within environmental protection policies.

⁶⁰⁶ OVG Hamburg, 27 January 1995 (1995) 2 Z. Umweltrecht 93.

⁶⁰⁷ See Subsection 3.7.

⁶⁰⁸ *BVerfG*, 15 April 1999, 7B278.98, (1999) DVBL 1138. See G Roller, 'Environmental Law Principles ...' in Sheridan and Lavrysen, *Environmental Law Principles in Practice* (n 65) 157.

⁶⁰⁹ *BVerfG* 231, 241.

⁶¹⁰ Section 16b *GenT*.

⁶¹¹ *BVerfG* 222.

Within the ambit of the constitutional review of legislation on the co-existence between transgenic and conventional agriculture, the Italian Constitutional Court has accepted that it is possible to limit freedom of enterprise in order to avoid 'disproportionate damage to the environment and health', and such limitations may be based on the principle of prevention and the PP.⁶¹² However, a limitation of this type may only be imposed after the situation of scientific uncertainty has been established, which must be demonstrated through experimental proof obtained by national or international bodies. In the absence of such proof, it will amount to a purely political choice, which must be censured.⁶¹³

In a case involving transgenic maize placed on the market by Monsanto Europe, the *French Conseil d'État* (CE) directly applied the PP when reviewing the legality of the authorization. Greenpeace France lodged a claim to suspend the execution of an Agriculture Ministry order which would have registered three varieties of genetically modified maize in the catalogue of species and varieties of plants grown in France. In his Opinion of 25 September 1998, Commissaire du Gouvernement J-H Stahl cast doubt on whether the PP could be said to have direct effect. He was of the view that the principle could not be appealed to directly owing to the provision in the 1995 Environmental Code which states that the principles set out in the Law 'inspire' environmental policies 'in those laws which define its range'. In its judgment of 25 September 1998, that expressly invoked the PP for the first time, the CC departed from the conclusions of its Commissaire du Gouvernement; the ruling stated that the grounds put forward by the plaintiffs, who claimed the procedure leading to the decision was irregular owing to insufficient information on the one hand and to a violation of the PP on the other hand, appeared sufficiently serious to suspend the contested decision.⁶¹⁴ Thus, violation of the PP must be considered an infringement of a legal obligation; the fact that specific laws do not give concrete form to the principle does not prevent a court from applying it directly.

In a preliminary ruling of 20 March 2000 the CJEU declared that the French State was bound by the preliminary decision taken by the European Commission to consent to the commercialization of GMOs unless new scientific evidence of risk had become available.⁶¹⁵ Required to conform to the CJEU's interpretation in its decision of 21 March 2000, the French CE stated in a ruling of 22 November 2000 that, given the absence of new elements relating to potential environmental risks arising from Bt maize, the French Government was required to consent to Novartis' application. The procedural complaints put forward by the plaintiff regarding the French procedure preceding transmission of the application to the

⁶¹² Corte cost, 17 March 2006, No. 116/2006, §6.

⁶¹³ *Ibid.*

⁶¹⁴ CE fr., 19 February 1998, *Association Greenpeace France*.

⁶¹⁵ Case C-6/99 *Greenpeace France* (n 22). See the discussion in Subsection 3.6.3 above.

European Commission had no effect on the legality of the decision being challenged.⁶¹⁶ In 2001, in a later ruling in this case, the CE confirmed that the principle was directly applicable. However, it rejected the arguments in favour of annulment filed by the appellant NGOs on the grounds that the maize seeds concerned only contained a tiny proportion of genetically modified seeds.⁶¹⁷

It is also settled administrative case law that mayors cannot invoke their general police powers in order to place restrictions on GM cultivation that is covered by a specific regulations (*'police spéciale'*).⁶¹⁸ In effect, Article 5 of the Constitution requires that the PP may only be applied by the authorities within the ambit of their existing powers (*'domaines d'attribution'*).

As regards French criminal law, in a case involving the destruction of crops, criminal immunity could not be established by the risks associated with the cultivation of GM plants.⁶¹⁹ The state of necessity invoked by the defendants in order to justify the destruction of rice paddies was also rejected as a valid defence.⁶²⁰ Criminal courts have also concluded in some rulings that the principle had been complied with by operators thanks to the implementation of preventive measures.⁶²¹

3.6.5 Concluding remarks

Since biotechnology harbours both known and unknown risks, the most proactive regulations on GMOs have been a preferred field for the implementation of the PP. At both international and EU level, the regulatory approach to GMOs has been fraught with controversy since its inception. For instance, the regulation of GMOs and GM products in the EU has proved to be a daunting task. The complexity of EU regulatory schemes is further increased by the federal structure of risk governance inherent within the EU legal order. Tensions between the Member States and the EU institutions are likely to persist given that 'different regulatory approaches about risk also reflect different national priorities about the economic importance of modern biotechnology'.⁶²² Moreover, as discussed above, the dichotomy between risk assessment and risk management is not clear-cut; it is more of a chicken-and-egg situation. On the one hand, RAs appear to be permeated by value judgements, whilst on the other hand, political judgments appear to be constrained by scientific advice, in particular under EU law.⁶²³ A question arises as to

⁶¹⁶ CE fr., 19 November 2000, *Association Greenpeace France et autres*.

⁶¹⁷ CE fr., 1 October 2001, nos 22508, 225820, *Association Greenpeace France, Société coordination rurale*.

⁶¹⁸ CE fr., 24 September 2012, no. 342990, *Commune de Valence*.

⁶¹⁹ Cass. Crim., No. 10-81.529, 3 May 2011.

⁶²⁰ CA Montpellier, 3 ch corr, 20 December 2001, No. 1977. See also 616/17 *Blaise* (n 19), para 28.

⁶²¹ TGI Agen, 18 February 1998.

⁶²² T Christoforou, 'The Regulation of GMOs in the EU: The Interplay of Science, Law and Politics' 41 (2004) CMLR 709.

⁶²³ Lee, *GMOs* (n 556) 42.

the speed at which authorizations must be reviewed in the light of new scientific findings.⁶²⁴ However, in practice the European Commission appears to have failed to apply the PP in a balanced manner,⁶²⁵ falling between the extremes of either genuine science-based decision-making or politicized rhetoric.⁶²⁶

Various EU Member States have endorsed a rather protective approach by banning the cultivation of GMOs. A number of measures banning the use of GM plants have been challenged before domestic courts, some of which have referred questions for preliminary ruling to the CJEU.

Finally, the PP will continue to be embroiled in controversy. In fact, due to the novelty of the technology, uncertainty (ambiguity, ignorance, and indeterminacy) cannot always be resolved by more and better science.⁶²⁷

3.7 Nuclear energy

3.7.1 Introductory comments

Neither the international agreements⁶²⁸ nor the domestic legal instruments, with the exception of the German one, refer expressly to the PP. The fact that nuclear law does not incorporate the PP does not mean that it is not applicable in relation to environmental aspects. Accordingly, precaution has been invoked before several international courts, such as ITLOS, the ECtHR, and the CJEU.⁶²⁹ Moreover, German case law provides perhaps the most interesting picture of the implementation of the PP within nuclear law. However, it is not an easy task to draw dividing lines between the precautionary principle, the precautionary approach, the ALARA principle, nuclear safety, and radiation protection given that they are often intertwined.

3.7.2 The ALARA principle

The rationale of the ALARA (as low as reasonably achievable) principle is that any dose could cause a risk⁶³⁰ given that there is no scientific threshold under which

⁶²⁴ The authorities authorising the placing GMOs on the market are called upon to update their findings in the light of the latest scientific research to be provided by independent scientific advice (Directive 2001/18/EC, Appendix II, B, indent 4).

⁶²⁵ Generally, no reference is made as to how the PP has been considered in the course of the risk analysis.

⁶²⁶ M Weimer, 'Applying Precaution in EU Authorisation of Genetically Modified Products-Challenges and Suggestions for Reform' 16:5 (2010) ELJ 624–57.

⁶²⁷ Umweltbundesamt, *Considerations for a Precautionary Approach in GMO policy* (2010) 23.

⁶²⁸ 1990 Code of Practice on the International Transboundary Movement of Radioactive Waste by the International Atomic Energy Agency.

⁶²⁹ Case C-411/17 *Inter-Environnement Wallonie et Bond Beter Leefmilieu Vlaanderen* [2019] C:2019:622.

⁶³⁰ Opinion of AG FG Jacobs, paras 21–8 in Case C-376/90 *Commission v Belgium* [1992] I-6153.

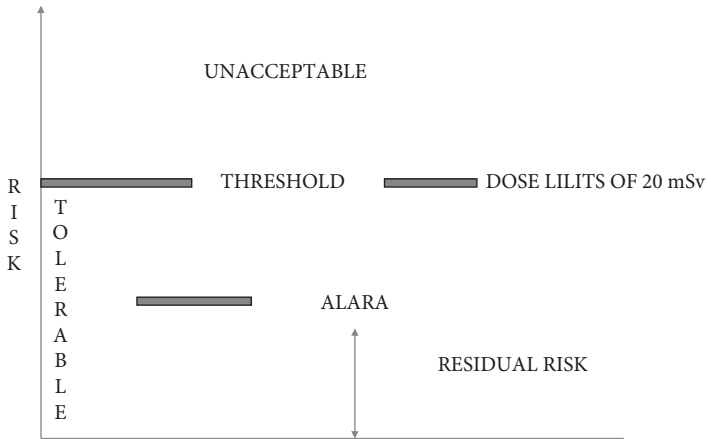


Figure 3.3 ALARA principle

exposure is absolutely safe.⁶³¹ Consequently, as there is lingering uncertainty as to the appropriateness of the dose limits established in order to protect workers and the general public, this principle requires the operators of nuclear installations to minimize ionizing radiation exposure to a level that is as low as can be reasonably achievable. This therefore mirrors the fact that no radiation threshold can guarantee absolute safety. Considered as the gold standard within radiation protection, ALARA may be considered a risk management principle.⁶³² As far as European Atomic Energy Community (EURATOM law) is concerned, the ALARA principle allows Member States to seek a higher level of protection than that provided for by the relevant directive. In effect, nothing precludes a Member State from applying stricter dose limits than the ones recommended by the International Commission on Radiological Protection (ICRP).⁶³³ The dose limits fixed by the ICRP are not absolute values but are published merely for guidance.⁶³⁴ However, ALARA cannot be considered as an early application of the PP, let alone of a PA. This is because it covers exclusively internal safety measures and not global safety assessments (e.g. of the licensing of new nuclear installations, or end-of-life decommissioning). In effect, the bottom line for the PP is to improve the quality of political decision-making when faced with uncertainty, given that law-makers must determine the risk level that is 'acceptable' for the society on which the risk is imposed.⁶³⁵ Figure 3.3 presents a diagram of the ALARA principle.

⁶³¹ S Lierman and L Veuchelen, "The Optimisation Approach of ALARA in Nuclear Practice: An Early Application of the Precautionary Principle?" (2006) EELR 98–107.

⁶³² *Ibid.*, 99.

⁶³³ Case C-376/90 *Commission v Belgium* [1992] I-6153.

⁶³⁴ *Ibid.*, para 25.

⁶³⁵ EC Communication on the PP (n 23), 15.

3.7.3 ITLOS

In the *Mox Plant* case, Ireland requested provisional measures to immediately suspend the authorization of the Mox plant at the Sellafield nuclear power station. Ireland argued, among other things, that the United Kingdom had breached its obligations under various Articles of the UNCLOS, including failing to take the necessary measures to prevent, reduce, and control pollution of the marine environment of the Irish Sea from intended or unintentional releases of radioactive materials and wastes from the plant. According to Ireland, the PP required the United Kingdom to demonstrate that no harm would arise from discharges of these Mox operations.

ITLOS did not find that the urgency of the situation required prescribing the provisional measures requested by Ireland. Nevertheless, the Tribunal considered that ‘prudence and caution require that Ireland and the United Kingdom cooperate in exchanging information concerning risks or effects of the operation of the Mox plant and in devising ways to deal with them, as appropriate.’⁶³⁶

3.7.4 ECHR

Requiring that petitioners demonstrate a significant degree of probability that the rights recognized in the Convention will be violated, the case law of the ECtHR indicates its reluctance to take the PP seriously into account.

In the French nuclear testing case in French Polynesia, the European Commission of Human Rights granted that the risk of a future violation of Articles 2(3) and 8 of the ECHR and of Article 1 of Protocol No. 1 could, in exceptional circumstances, qualify the applicant as a victim. In that case, however, the victim would have to produce ‘reasonable and convincing indications of the probability of the occurrence of a violation that personally concerned him; mere suspicions or conjectures are in this respect insufficient.’⁶³⁷ Although the applicants had produced several scientific reports to support their fear of a violation of these provisions, the Commission considered that it could not take a position, especially as there was disagreement between the parties and the experts. The Commission added that:

Merely to invoke the risks inherent in the use of nuclear energy, for both civil and military uses, is not sufficient grounds to claim to be a victim of a violation of the Convention, since many activities give rise to risks. A claim must demonstrate in a defensible and detailed manner that owing to failure by the authorities to take

⁶³⁶ *Mox Plant (Ireland v UK)* [2001] ITLOS Rep 10, Provisional Measures, Order no. 10, para 84. As Judge Wolfrum stated in his Separate Opinion, ‘Ireland could not, for several reasons, rely on the precautionary principle or approach in this case even if it were to be accepted that it is part of international customary international law’. If ITLOS had followed Ireland’s argument it would have had to decide on the merits, thus going beyond the scope of provisional measures.

⁶³⁷ Report of 4 December 1995, re. No. 28204–95.

sufficient precautions, the probability that damage will occur is high enough that it constitutes a violation, provided that the repercussions of the act in question are not too remote.

In *LCB v United Kingdom*, the ECtHR stated that in going ahead with nuclear tests the United Kingdom had not violated Article 2 of the ECHR since the applicant, who was suffering from leukaemia, had not demonstrated a causal link between the exposure of her father to radiation and her subsequent illness. The alleged link of causation was 'unsubstantiated'. The British authorities could only have been required to inform a serviceman about the risks of nuclear radiation if 'it had appeared likely at that time that any such exposure . . . to radiation might have endangered a real risk' to the health of the father of the applicant. In other words, it was not reasonable to expect the national authorities to provide health advice during the testing period unless, at that time, it had appeared likely that radiation could entail real risks.⁶³⁸ In *McGinley and Egan v UK*, the ECtHR judged that the British authorities had fulfilled their positive obligation according to Article 8 of the ECHR to inform the persons engaged in hazardous activities about radiation risks.⁶³⁹ Even when involved in activities that could give rise to long-term health effects, the applicants must demonstrate that, at the time of the occurrence in question, the national authorities withheld relevant documents concerning the risks of ionizing radiation. In the absence of such proof, they cannot claim a violation of their right to respect for their private lives based on a past failure to provide them with access to relevant information.

The ECtHR ruled in *Balmer-Schafroth v Switzerland* that the connection between the decision by the Swiss Federal Council to continue operating an outdated nuclear power plant and the right to protection of physical integrity invoked by the petitioners was 'too tenuous and remote' for the latter to invoke the right to a fair hearing by a tribunal within the meaning of Article 6(1) of the ECHR.⁶⁴⁰ Even if the victims had successfully challenged the technical defects of the nuclear plant, they had not convincingly demonstrated a causal relationship between the alleged risk and the right to protection of their physical integrity. The applicants failed to show that the operation of the power plant 'exposed them personally to a danger that was not only serious but also specific and, above all, imminent.'⁶⁴¹ Accordingly, the risk

⁶³⁸ *LCB v UK Case*, 14/1997/798/1001, 9 June 1998, Reports 1998–III, para 38.

⁶³⁹ *McGinley and Egan v UK*, 10/1997/794/995–996, 9 June 1998, Reports 1998–III, para 98.

⁶⁴⁰ *Balmer-Schafroth and Others v Switzerland*, 67/1996/686/876, 26 August 1997, Reports 1997–IV. In a dissenting opinion, Judge Pettiti expressed the view that such reasoning 'appeared to have ignored the whole trend of international institutions and public international law towards protecting persons and heritage', particularly as seen in 'the development of the PP and the principle of conservation of the common heritage'. In his view, in virtue of the PP, the applicants should not prove that there was an imminent danger: 'Does the local population first have to be irradiated before being entitled to exercise a remedy?'

⁶⁴¹ *Ibid*, para 40.

alleged ‘remained hypothetical’.⁶⁴² This case law was confirmed in *Athanassoglou v Switzerland*.⁶⁴³ As in the *Balmer-Schafroth* case, the ECtHR had to decide whether the link between an administrative decision to operate a nuclear plant and the applicants’ rights to adequate protection of their life, physical integrity, and property was sufficiently close to bring Article 6(1) of the ECHR into play and was not too tenuous or remote. The Court did not perceive any material difference between this second case and that of *Balmer-Schafroth*. The applicants considered that only a court could possess the independence to assess whether the authorities had taken proper account of a ‘high residual risk of unforeseen scenarios and of an unforeseen sequence of events leading to serious damage’. The Court judged, however, that how best to regulate the use of nuclear power was a policy decision for each Contracting State to take according to its democratic processes and that Article 6(1) cannot be read as dictating one scheme rather than another.⁶⁴⁴ Along the same lines, in *Folkman*, the Court ruled that the claimants did not bring evidence that the operating standards of the nuclear plant were running counter to the PP or that the probability of the occurrence of a damage was such that it constitute a breach of Article 6(1).⁶⁴⁵

The conditions laid down by the ECtHR do not do justice to precaution: in addition to the demonstration of the seriousness of the risk, the claimants must show that the risk is imminent. The case law mostly mirrors the principle of prevention rather than precaution and represents a missed opportunity from the perspective of the PP.

3.7.5 German law

As stressed earlier, German legal literature distinguishes between prevention (*Prävention*), which refers to foreseeing known dangers (*Gefahr*), and precaution (*Vorsorge*), which does not require certainty of the occurrence of the risk to be averted (*Risiko*). As we shall see, this distinction plays a role in the case law regarding nuclear plants. In light of Article 2(2) of the German constitution (*Grundgesetz*) which guarantees the right of life and physical integrity, both the Constitutional Court (Bundesgerichtshof, hereinafter BGH) and the Federal Administrative Court (*Bundesverwaltungsgericht*, hereinafter BVerwG) differentiate residual risk from other risks that have to be regulated on a stringent precautionary basis. The BGH has stated that the right to life and physical integrity embodied in Article 2 of the German Constitution does not require the authorities, or Parliament, to prohibit a technology in the name of a ‘zero-risk’ precautionary standard.

⁶⁴² Ibid, paras 39–40.

⁶⁴³ *Athanassoglou v Switzerland*, 27644/95, 6 April 2000.

⁶⁴⁴ *Balmer-Schafroth and Others v Switzerland* (n 640), para 54.

⁶⁴⁵ *Flokman v Tchechia*, 23673/03, 10 July 2006. See also *Sruzeni Jihoceska Matky v Tchechia*, 19101/03, 10 July 2006.

The PP is enshrined in Section 7 of Germany's Atomic Energy Act (*Atomgesetz*, hereafter AtG), which provides that authorization may only be granted if 'precautions demanded by the current level of scientific and technical knowledge are taken against possible damage caused by the establishment or operation of the installation.'

The BVerwG ruled, in a judgment of 8 August 1978 relating to the operation of the Kalkar nuclear reactor, that Section 7 of the AtG was consistent with the Constitution and aimed to ensure the optimal defence against dangers and the greatest precaution against risks, based on the protection afforded by fundamental constitutional rights, including the right to health protection.⁶⁴⁶ The BVerwG also ruled, in the same case, that indeterminate concepts such as 'precaution' and 'the current level of scientific and technical knowledge' should be made more precise by administrative authorities rather than by courts and that it was therefore legitimate to confer upon the executive the task of implementing the principles laid down by the law:

Evaluation of the probability of future damage due to the construction and operation of a nuclear installation must take account of similar situations in the past. In the absence of specific past situations, the evaluation must be based on simulations. To the extent that in this field only approximations, rather than certainties, exist, any new event as well as any new development in knowledge should be taken into account as it arises. Thus, to require legislation definitively to exclude any impairment (*Gefährdung*) of a fundamental right would make it impossible for the administrative authorities to grant an authorization. It is therefore proper to undertake a reasonable assessment of the risks. As concerns injurious effects on life, health and goods, the federal legislator has established an assessment scale based on optimal prevention of potential dangers and risks as set out in §§1 and 7 of the Atomic Energy Act: authorizations may not be granted unless, based on the current level of scientific and technical knowledge, the occurrence of damage may be practically excluded.

The contribution of the judgment is fundamental on this latter point. Precautionary measures must be adopted with reference to the latest scientific knowledge. If they cannot be carried out because of technical difficulties, operating license must simply be refused, based on the fact that, as the BVerwG stressed, 'precaution is not limited by what is technically achievable.' That said, the Court held that it was not the function of courts to substitute their judgment for that of political bodies, particularly in the absence of legal criteria. Moreover, if the legislator had to exclude all danger in order to secure fundamental rights, they would disregard the potential

⁶⁴⁶ BVerwGE 49, 89 (143) and 53, 30 (58/58).

of human intelligence and would forbid practically any State authorization of technical operations.

Risks should therefore be submitted to criteria of practical reason (*Abschätzungen anhand praktischer Vernunft*): that is, a reasonable assessment. Beyond the threshold of practical reason, uncertainties are inevitable; these are the residual risks (*Restrisiko*) that every citizen must tolerate as a socially fair distribution of burdens (*sozialadäquate Lasten*).⁶⁴⁷ The basic argument is thus: if a residual risk must be tolerated by everyone, no one has a subjective right to contest exposure to such risk.

Despite the BVerwG's judgment, the majority of German legal opinion in the early 1980s continued to consider that Section 7 of the Atomic Energy Act only covered protection from or prevention of hazards (*Gefahrenabwehr*): that is, the adoption of policy measures needed to avert known dangers. This provision could not cover the anticipation of risks (*Risikovorsorge*) or the prevention of minimal residual risks (*Restrisiko*).⁶⁴⁸ In other words, the elimination of all risks would condemn any technological progress.

In a judgment related to the operation of the nuclear power station in Wyhl, the Federal Administrative Tribunal rejected this overly narrow interpretation. In this case, the complaint concerned the legality of the operating licence for the nuclear plant, in that it did not envisage protection in the case of reactor accident. Failure to set conditions that would trigger a strong protection mechanism to protect the population against the risk of nuclear radiation led the Administrative Tribunal of Freiburg to rescind the contentious authorization in March 1978. The administrative authority that had granted the authorization had relied on the opinion of a number of experts who considered that protection against a nuclear reactor accident was not required as a necessary precaution, based on the current level of science and technology (*Stand von Wissenschaft und Technik*) as set out in Section 7 of the AtG.

This first decision was nevertheless reversed on 30 March 1982 by the Mannheim Administrative Appeals Court, which judged that 'one aspect of the natural sciences is to choose which facts should be taken into account when investigating risks' and that the analyses which had been ordered by the public authorities prior to authorizing the nuclear power station respected the requirements set out in Section 7 of the AtG.

On 19 December 1985 the BVerwG ruling in a second-stage appeal, granted the administrative authority a relatively significant discretion in assessing risks that did not fall under judicial control.⁶⁴⁹ This ruling produced particularly interesting

⁶⁴⁷ The *Restrisiko* amounts to the remaining risk every citizen has to accept.

⁶⁴⁸ E Rehbinder, 'Prinzipien des Umweltrechts in der Rechtsprechung des Bundesverwaltungsgerichts: Das Vorsorgeprinzip als Beispiel', in *Bürger-Richter-Staat, Festschrift für Horst Sandler* (Hg. Frannsen/Redeker/Schlichter/Wilke, 1991) 272; G Roller, *Genehmigungsaufhebung und entschädigung im Atomrecht* (Redeker, 1991) 54.

⁶⁴⁹ (1986) NVwZ 208.

clarifications regarding the obligation for precaution set out in Section 7 of the AtG, which had a considerable impact on the evolution of German administrative case law:

Section 7, indent 2, no. 3 should be interpreted not in terms of the predetermined notion of ‘danger’ of classical administrative law, but with regard to the specific protection which appears in Section 1, no. 2 of the AtG. Consequently, precaution in the sense of the standard in question does not mean that measures of protection may only be taken if ‘certain situations or facts can, by the law of causation, give rise to other, prejudicial, situations or facts’ (definition given by the Superior Administrative Court of Prussia, judgment of 15 October 1894). On the contrary, it is necessary to take account of the possibilities for damages that do not yet represent ‘dangers’ in this sense, since science in its present state is not capable of predicting with certainty the consequences of certain acts and can therefore not say whether or not these effects represent a danger. ‘It is thus necessary to take into consideration suspicion of danger or of “reasons for concern” (*Besorgnispotential*). Precaution also means that in assessing the probability of damage, reference to practical technical knowledge is not sufficient; security measures should also be considered according to “purely theoretical” thinking and calculations, so as to adequately exclude risks arising from uncertainties and lacunae in scientific understanding.’ In order to take the precautions required according to §7, indent 2, no. 3 of the Atomic Energy Act, dangers and risks must be practically excluded. The evaluation needed for this task should refer to ‘the current level of science and technology’. Uncertainties relating to research and risk assessment must be considered according to the reasons for concern associated with them under sufficiently conservative hypotheses. In this process, the administrative authority charged with granting the authorization should not just rely on dominant theory but should take account of all tenable scientific knowledge.

Following from these considerations, the BVerwG defined the notion of residual risk in the strictest possible manner. It imposed an obligation to act, because ‘dangers and risks must be practically excluded’. Since science is no longer omniscient, precaution must apply to ‘possibilities for damage which do not yet represent a danger’. By attaching greater importance to probabilities than to certainties, the BVerwG correctly distinguished risks whose causation is uncertain from the classical concept of danger. By not allowing the public authorities to take refuge behind a ‘dominant theory’, since ‘science in its present state is not capable of predicting with certainty the consequences of certain acts and can therefore not say whether or not these effects represent a danger’, the Court also recognized the plurality of truth.

The BVerwG thus applied a greatly widened concept of precaution, which goes much further than that originally envisaged by the drafters of the AtG and allowed at the time by most legal analysis.⁶⁵⁰ This case law demonstrated that courts are

⁶⁵⁰ E Rehbinder, ‘Vorsorgeprinzip im Umweltrecht und Präventive Umweltpolitik’ (n 65) 269; Roller, *Atomrecht* (n 64) 54 *et seq.*

likely to draw from the PP those criteria that permit them to ensure a hard look judicial review of administrative decisions without, however, taking the opportunity to weaken the separation of powers. While judicial review is thereby increased, it nonetheless remains marginal in verifying respect for the current state of science and technology. Based on the case law related to the Kalkar fast breeder reactor, the BVerwG expressed the opinion that it was not up to administrative tribunals to substitute their assessment of scientific controversies for the evaluation carried out by administrative authorities. In addition, the law-maker is not required to enact laws precluding all risks in as much as they may be reduced on the basis of common sense and are accepted as socially acceptable social burdens.⁶⁵¹ The Court rejected the appeal on the ground that the competent authority had studied differing scientific opinions in the case of the Whyl power plant.

When assessing risks, the authorities are required to rely on conservative assumptions. The assessment of worst-case scenarios required under the PP must include an aircraft crashing into the nuclear plant as well as a terrorist attack. These events are not deemed to be residual risks.⁶⁵²

Finally, local residents have standing to seek judicial review as to whether all measures necessary in order to comply with the PP have been taken into consideration within licensing procedures involving high risk technologies, such as nuclear energy. The difference from the previous case law is that, in the area of precaution, a larger body of measures are considered to give rise to standing.⁶⁵³

3.8 Electromagnetic fields

3.8.1 Introductory note

The impact of electromagnetic radiation (from mobile phones, power lines, and many other sources of exposure within everyday life) on human health is still a highly controversial issue.⁶⁵⁴ The rapid rise of new technologies compounds these uncertainties. The difficulty lies in the fact that there is some degree of uncertainty amongst scientists as to whether exposure to weak doses below regulatory limits gives rise to some risk, or to no risk at all. It is in fact difficult to establish a linear relationship between exposure and damage to health. In addition, the aspect of scientific uncertainty is different here to its operation in the field of nature conservation

⁶⁵¹ BVerwG 72, 300, at 315.

⁶⁵² BVerfGE 10 April 2008, 7 C39/077, 131, 129 *et seq.*

OBV für das Land Schleswig-Holstein, 19 June 2013, 4 KS 3/08 DE:OVGSH:2013:0619.4KS3.08.0A. See U Wollenteit, 'Nuclear Safety in the Aftermath of 9/11: The Legal Experience in Germany' 12 (2015) JEEPL 327–42.

⁶⁵³ BVerwG of 10 April 2008, NVwZ 2008, 1012.

⁶⁵⁴ In 2002 and 2011, IARC classified the radiation from overhead electric power lines and mobile phones as a Group 2B 'possible' human carcinogen.

or fisheries, where scientific knowledge is far less advanced. Moreover, chronic exposure to low-level radiation from mobile phone towers generates public concerns. It comes thus as no surprise that litigants are increasingly invoking the PP in cases involving planning authorization for installations such as telecommunication masts and power lines. Far from being exhaustive, our analysis in the following subsections highlights the aversion of courts to striking down administrative decisions for levels below regulatory exposure thresholds on the grounds that those thresholds already incorporate the PP.

3.8.2 ECHR

In examining various cases concerning the effects of antennae, the ECtHR found that there is ‘no agreement amongst the scientific community as to the possible harmful effects of electromagnetic radiation on human health.’⁶⁵⁵ Whenever the level of electromagnetic radiation is within the limits prescribed by the relevant domestic legislation, the right to privacy is not breached.⁶⁵⁶

3.8.3 Common law countries

As the PP has not been embodied within UK statutes and regulations, the British courts have been reluctant to apply the PP in cases involving mobile phone stations. The High Court, followed by the Court of Appeal on appeal, held that the uncertainty surrounding the effects of the radiation was insufficient to justify a PA.⁶⁵⁷ In *Duddridge*, the applicants asked that the Secretary of State be required to follow a PA to the risk of leukaemia from an underground high-voltage electrical cable, even though the RA was inconclusive. The High Court declined to rule that any precautionary obligation was applicable either due to the UK White paper ‘This Common Inheritance’ or as a matter of common sense.⁶⁵⁸

In *Telstra*, the NSWLEC rationalized its case law on the application of the PP in land planning consent decisions. This mandatory principle results in a number of tests, which must be complied with in order to shift the burden of proof within the decision-making process. According to the Australian legislation, in invoking the PP litigants must demonstrate a threat of serious or irreversible damage as well as scientific uncertainty concerning the damage.⁶⁵⁹ When these conditions are fulfilled, the precautionary measure may be taken in order to avert the anticipated threat stemming from the development. Although these two tests are generally laid

⁶⁵⁵ *Ruano Morcuende v Spain* (dec.), 75287/01, 6 September 2005; *Luginbühl v Switzerland*, 42756/02, 17 January 2006; *Tudor v Romania*, 42820/09, 3 June 2014, paras 30–1.

⁶⁵⁶ *Tudor v Romania* (n 655), para 31.

⁶⁵⁷ *R v Tandrige District Council, ex p Al-Fayed* (2000) 79 P.

⁶⁵⁸ *R v Secretary of State for Trade and Industry, ex p Duddridge and Others* (1995) Env L Rev 151 JEL 7.

⁶⁵⁹ *Telstra* (2006) 1456 LGERA 10, 38. See J Peel, ‘When (Scientific) Rationality Rules: (Mis) Application of the Precautionary Principle in Australian Mobile Phone Tower Cases’ (2007) 19:1 JEL 103–20; Scotford, *Environmental Principles* (n 47) 233–8.

down within most legislative instruments proclaiming the PP, Preston CJ interpreted them rather narrowly. In his view, the first test requires that there be adequate scientific demonstration for the purported threat. It was not fulfilled on the grounds that safety factors were incorporated into radio-frequency radiation (RFR) standards and into other preventive measures (design and operation of the mast). The fact that the operator complied with ‘authoritative and scientifically credible’ RFR standards as well as the existence of preventive measures removed any threat of serious or irreversible damage.⁶⁶⁰ With respect to the second test—scientific uncertainty⁶⁶¹—Preston CJ held that this condition was fulfilled ‘where a threat or risk of environmental damage is considered scientifically likely.’⁶⁶² It follows that this test cannot be met by hypothetical harm lacking in scientific credibility as this would ‘open the door wide to irrationality.’⁶⁶³ To conclude, there is thus no basis upon which the PP can operate when either of these two cumulative tests has not been satisfied. This reasoning has been criticized on the grounds that it replicates many of the shortfalls of conventional, science-based regulation of risks that have thus far failed to anticipate unknown harmful effects; accordingly, it downplays the core issue of uncertainty, which lies at the heart of the PP.⁶⁶⁴

3.8.4 Countries from the civil law family

The French *Conseil d’État* (CE) initially refused to review with reference to the PP permits issued under urban planning law to erect mobile telephone masts, invoking the principle of legislative independence (*principe de l’indépendance des législations*). Since the PP is a principle of environmental law, it cannot be relied on in relation to urban planning law.⁶⁶⁵ It was necessary to await the constitutionalization of the principle and the judgment of 12 April 2013, in which the CE reviewed the establishment of relay masts with reference to Article 5 of the Constitutional Charter for the Environment. The administrative principle of legislative independence thus receded in the face of a principle of constitutional law. However, the PP as a constitutional principle only applies in cases involving a risk of serious and irreversible damage to the environment ‘or damage to the environment that is liable to cause serious harm to health.’ This latter eventuality no longer involves serious damage but rather a risk of serious damage to human health. In addition, given the uncertainty surrounding the risk, it was considered to be sufficiently plausible.⁶⁶⁶

⁶⁶⁰ *Telstra* (n 659), 98, 186.

⁶⁶¹ *Ibid*, 128.

⁶⁶² *Ibid*, 148.

⁶⁶³ *Ibid*, 158.

⁶⁶⁴ Peel, ‘(Mis)Application of the Precautionary Principle’ (n 659) 104, 113.

⁶⁶⁵ CE fr., 20 April 2005, no. 248233, *Société Bouygues Telecom*; CE fr., 23 November 2005, nos 248233, 262105, *Commune de Nice*.

⁶⁶⁶ CE fr., 26 February 2014, no. 351514, *Association Ban Asbestos*, para 11.

In *THT*, a case involving a declaration of public utility for power lines followed by the application of an expropriation procedure, the CE examined the legality of such a declaration with reference to the requirements resulting from the PP.⁶⁶⁷ It is now settled case law that:⁶⁶⁸

An operation that violates the requirements of the PP cannot as a matter of rule be declared to be of public utility. It is thus for the competent State authority, when considering an application for a project to be declared to be of public utility, to seek to establish whether there are any detailed indications that are of such a nature as to support the hypothesis that there is a risk of serious and irreversible damage to the environment or of damage to the environment liable to cause serious harm to health that, based on available scientific knowledge, would justify the application of the PP in spite of the scientific uncertainty as to its existence and scope. If this precondition is met, it falls to that authority to ensure that the procedures for assessing risk identified be followed by the public authorities, or under their direction, and to satisfy itself, having regard to the plausibility and severity of the risk on the one hand and the interest in the operation on the other hand that the precautionary measures imposed in relation to the operation in order to avoid the occurrence of damage are neither insufficient nor excessive. It is for the courts ... to verify that the application of the PP is justified, and thereafter to ensure that risk assessment procedures are actually carried out and no manifest errors of assessment are made when choosing precautionary measures.

As regards the plausibility of the risk, the French CE ruled that the existence of a heightened risk of the occurrence of child leukaemia due to 'residential exposure to electromagnetic fields' must be regarded as 'a sufficiently plausible hypothesis considering the current state of scientific knowledge in order to justify the application of the PP'.⁶⁶⁹ In *THT*, various concordant studies had highlighted a significant statistical correlation between the risk factor invoked by the applicants and the incidence of leukaemia at a rate higher than the statistical average. In the *Association MBE Environnement*, the CE held that the studies presented by the company did not refute the plausible nature of the risk of leukaemia.⁶⁷⁰ Moreover, mitigating preventive measures 'cannot be considered to be manifestly insufficient in order to stop the risk alleged from manifesting itself'.⁶⁷¹ As a result, the PP was not held to have been breached.

⁶⁶⁷ CE fr., 12 April 2013, nos. 342409, 342569, 342689, 342740, 342748, 342821, *Association Stop THT*, para 38.

⁶⁶⁸ CE fr., 8 April 2019, no. 411862, *Communes d'Erquy et autres*, para 11.

⁶⁶⁹ *Association Stop THT* (n 667) para 38; *Communes d'Erquy et autres* (n 668), para 11.

⁶⁷⁰ CE fr., 11 May 2016, no. 384608, *Association MBE Environnement*.

⁶⁷¹ CE fr., 8 April 2019, *Communes d'Erquy et autres* (n 668), para 12.

In the Netherlands, the *Afdeling Bestuursrechtspraak van de Raad van State* (ABRvS) has dismissed claims brought against the installation of telecommunication masts on the grounds that, according to official health reports, there were no indications that electromagnetic fields from these installations could cause unacceptable health issues.⁶⁷²

Before considering the constitutionality of legislation enacted in Brussels, which severely limited electromagnetic radiation, the Belgian Constitutional Court (hereafter CC) rejected the argument relied on by the applicants concerning the violation of the freedom of trade and industry. The Court held that the burden of proving that it was technically or financially impossible to comply with the strict rules laid down by the Brussels legislation lay with the telephone operators.⁶⁷³ When Brussels law-makers decided several years later to relax the rule (from 3 V/m to 6 V/m) in order to enable the development of 5G technology, the applicant associations argued before the CC that this relaxation entailed a significant lowering of environmental protection compared to the previous legal regime and that this reduction was not justified by any overriding reasons of general interest or by any new scientific studies that concluded in a convincing manner that electromagnetic radiation at the levels authorized was harmless. The CC held that the PP had been complied with. Moreover, it observed that there was no legal obligation under Brussels law to adopt precautionary measures, and that the PP implied only the possibility of adopting such measures, in accordance with the case law of the CJEU.⁶⁷⁴

On another note, the Belgian *Conseil d'État* (CE) held that when there are serious indications that electromagnetic fields can cause negative health effects, this consideration—the presence of houses underneath the high-voltage lines—cannot be overlooked in the licensing procedure. Moreover, while risks from electromagnetic radiation to health cannot be proved, they cannot be excluded either. For the CE to suspend the license, ‘the detriment need not to be certain ... it suffices for the risk of detriment to be plausible’. Where they threaten basic constitutional rights to health and environmental protection, risks from electric cables could be considered to be sufficiently serious to warrant the suspension of construction licences.⁶⁷⁵

Finally, the Italian Constitutional Court has favoured national thresholds over regional ones on the grounds that the regions are not empowered to set higher precautionary standards.⁶⁷⁶ The civil courts have been as reluctant as the administrative courts to rule on such cases. Generally speaking, the uncertainty that triggers the PP operated against the plaintiffs as they were unable to demonstrate any

⁶⁷² RvS, 5 December 2018, *UMTS-mast Wassenaar*, NL:RVS:2018:3979.

⁶⁷³ Bg CCt, 15 January, 2009, no. 2/2009, para B.22.1

⁶⁷⁴ Bg CCt, 27 January 2016, no. 12/2016, para B.4.1.

⁶⁷⁵ CE Bg, no. 82.130, 20 August 1999, Venter.

⁶⁷⁶ Corte cost, 7 October 2003, no. 307; Corte cost, 7 November 2003, No. 331.

causal link between the exposure to electromagnetic fields and the potential harm. Administrative courts, on the other hand, held that national measures prevent municipalities from enacting more stringent precautionary thresholds.⁶⁷⁷

3.8.5 Concluding remarks

This brief overview of domestic case law reflects the reluctance of courts to apply a strong version of the PP when reviewing the constitutionality or legality of measures allowing installations. The risk is deemed to be acceptable whenever the installations comply with regulatory thresholds. Where this is the case, there is no need for additional precautionary measures. In other words, whenever regulatory standards flesh out the PP, and the administrative authorization complies with these standards, the principle has been held to be inapplicable within litigation.

A precautionary approach is followed upstream (so to speak) when regulatory thresholds for radiation are set, and not downstream when administrative authorizations are issued. This form of legal reasoning is open to criticism as it has the effect of excluding from legal debate any scientific uncertainty relating to exposure to low doses below regulatory limits. Finally, even if there were presumed to be a risk of exposure to radiation, that radiation would be deemed to be beneficial for society, with the result that it would in some sense be up to local residents to deal with the consequences.

3.9 Climate change

3.9.1 Introductory comments

Although experts have been arguing since 1979 that a doubling of the concentration of CO₂ will result in average heating of between 1.5 and 4.5 degrees, nothing has been done in order to invert the tendency. Indeed, in almost all cases new information results in more pessimistic forecasts. Whilst in 2020 the average temperature has only increased by around 1°C above pre-industrial levels, the situation has already become critical within the regions that are most exposed to risks of drought, heat waves, and flooding. Moreover, rising temperatures do not represent the only problem; the oceans are also acidifying at an alarming rate; whilst some animals seem to be adapting to changing conditions, the vast majority of species are unable to cope with the rise of temperatures and the change of precipitation patterns and the weather becoming less predictable and more extreme. These impacts also mask other even more troubling surprises. Primary production, ecosystemic service stability, and resource availability are all affected by this phenomenon.

⁶⁷⁷ R Caranta, 'Italian Law', in M Pâques (ed), *Precautionary Principle and Administrative Law* (Bruylant, 2007) 220–1.

After highlighting the specific features of climate change (CC) risks, this section will attempt to shed light on the UNFCCC definition of precautionary measures. In particular, it will review the various thresholds that are liable to limit the scope of such measures: the minimum level of knowledge, the significance of the damage, and the cost-effectiveness of the measures.

3.9.2 Anticipatory approach versus business as usual

In the context of incomplete knowledge regarding CC speed and impacts in the course of the 1980s, the international community was confronted by the following dilemma.⁶⁷⁸ In situations involving uncertainty, should the public authorities have been acting at that time in order to counter a CC threat that was merely suspected? Or must they have first reduced the margin of uncertainty (avoiding thus false positive errors), even if this means delaying action? At the end of last century, a number of Western States have pushed for the adoption of a precautionary strategy, limiting GHG emissions in response to the threat they pose to climate stability.⁶⁷⁹ In their view, the stakes were simply too high to put off key international decisions. Any failure to act in good time would result in false negative errors. Moreover, 'it may be less costly to spread the costs of averting climate change by beginning mitigation efforts early, rather than to wait several decades and take actions after the problem has already advanced much further'.⁶⁸⁰ On the other hand, by delaying the adoption of a regulatory approach until the CC hypothesis had been validated, other States endorsed a business-as-usual strategy. In their view, a pre-emptive approach would sacrifice economic welfare for the sake of avoiding an event that was not likely to occur (false positive errors).⁶⁸¹ They gave priority to further research in order to assess, first, whether there is any cause-and-effect relationship between GHG emissions since the industrial revolution and CC, and, secondly, the probability of adverse effects and the extent of the ensuing damage ('let's wait and see what the experts propose').

Needless to say, CC law is characterized by the engagement between these two schools of thought. However, these controversies did not prevent a majority of states from concluding the UNFCCC in 1992 followed by the Paris Agreement in 2015. Whilst the former Convention defines the conditions under which precautionary measures can be implemented, the latter does not refer to precaution at all. The fact that, thanks to the reports of the Intergovernmental Panel on Climate

⁶⁷⁸ T Iverson and C Perrings, 'The Precautionary Principle and Global Environmental Change, Ecosystem Services Economics', Working Paper Series (2011) 11.

⁶⁷⁹ H Grassl and B Metz, 'Climate Change: Science and the PP' in EEA Report 1/2013 (n 300) 320–1.

⁶⁸⁰ IPCC, *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects, Contribution of Working Group III on Mitigation*, 1.2.4 The Role of Uncertainty.

⁶⁸¹ Many critics were contending in 1992 that too bold an interpretation of the PP generates false positive errors leading to over-regulation at the expense of welfare considerations.

Change (IPCC), a global consensus has been achieved regarding the anthropogenic cause of CC perhaps explains the absence of any reference to precaution.

3.9.3 The specificity of CC risks

The risks stemming from CC are fundamentally different from earlier industrial types of risks for four reasons.

First of all, CC has much broader and diffuse impacts than any other type of human activity. The regulatory response in order to prevent temperature rises is much more complex than within the traditional environmental field. In fact, the issue is more a question of the accumulation of GHG in the atmosphere due to mass production, globalization and free trade, intensive agriculture, along with increased transportation by road and air, than of emissions from a limited number of industrial plants whose pollution can be easily controlled and reduced.

Secondly, the changes are unprecedented, at least since the end of the last ice age. The pace of change is swift compared with ordinary historic rates of CC, and is also outpacing the ability of ecosystems to adjust.⁶⁸² In contrast to industrial risks, we cannot learn from past experience. Given the novel nature of the threat, it would appear appropriate for decision-makers to act in accordance with the PP, which applies precisely where clear experience is lacking.

Thirdly, the anticipated winners and losers from CC are distributed unevenly throughout time and space,⁶⁸³ an issue which gives rise to difficult questions of equity.

Fourthly, given its scope and novelty—and this is undoubtedly the crucial difference—CC is permeated by uncertainty. Scientists are thus unable to determine with precision the regularity, frequency, and magnitude of impacts, regardless of the quality of their models.

The impacts CC may provoke is likely to vary in terms of

- time of latency between the increase of temperatures and the actual impact of damage (gradual or abrupt);
- speed (acceleration or deceleration);
- frequency of natural events (storms, floods, droughts, wildfires, erosion);
- duration (persistent, reversible, slowly reversible, irreversible, multi-generational);
- magnitude (cumulative or synergistic, serious or insignificant);
- localization (e.g. change in the regional distribution of precipitation, acidification of oceans, Arctic region warming more rapidly than the normal mean,

⁶⁸² JP Holdren, 'Introduction', in S Schneider et al, *Climate Change Science and Policy* (Island Press, 2009) 5.

⁶⁸³ Grassl and Metz, 'Climate Change' (n 679) 309.

warming over land larger than over the ocean, increased concentration of ozone);

- effects (human health, vulnerable countries, biodiversity loss, agricultural yields, tourism); and
- scale (global, continental, or regional).

Uncertainty permeates all of these factors. In particular, it affects the calculation of the speed of the phenomenon as well as the nature and scope of the impacts it may entail. Against a backdrop of uncertainty, experts propose scenarios rather than assertions. As stressed in the IPCC 5th Assessment Report (AR), when the overwhelming evidence is so compelling and the costs are mounting, ‘substantial and sustained reductions of GHGs emissions’ are required to limit further climate change.⁶⁸⁴

However, many uncertainties have decreased over time. For instance, the 2019 IPCC special report on the ocean and cryosphere describes with ‘a very high confidence’ or ‘a high confidence’ a number of impacts of CC (reduction in snow cover, increased permafrost temperature, shrinking of Arctic ice extent, etc.) and assess forthcoming scenarios (ocean warming, sea-level rise, etc.) as within a ‘likely’ or ‘very likely’ range. The fact is that temperatures are rising. Against this background, it was easier to reach a global agreement in Paris in 2015 than in Copenhagen in 2009.

That being said, other uncertainties are still lingering due to irreducible ignorance or disagreement between what is known and unknowable. In particular, large-scale singular events that are components of the global Earth system (slowdown of the Atlantic meridional overturning circulation (AMOC), the El Niño–Southern Oscillation, and the role of the Southern Ocean in the global carbon cycle) ‘are thought to hold the risk of reaching critical tipping points under climate change, and that can result in or be associated with major shifts in the climate system.’⁶⁸⁵ How close are we to these tipping points?⁶⁸⁶ What will happen if they are reached? The risks associated with these major events become ‘moderate’ or ‘disproportionately high’ depending on the increase in temperatures above pre-industrial levels.⁶⁸⁷ The prospect of reaching a potential tipping point enhances precaution in this field. Decision-makers must therefore take account of considerably extended timescales, as uncertainty prevails mainly during the period between a cause and the subsequent manifestation of a harmful effect.

⁶⁸⁴ IPCC, 2014: Summary for Policymakers, in *Climate Change 2014* (n 680), 19.

⁶⁸⁵ IPCC, *Special Report Global Warming of 1,5°C*, Chapter 3 (2018) 83.

⁶⁸⁶ According to the IPCC 2018 report, tipping points ‘refer to critical thresholds in a system that, when exceeded, can lead to a significant change in the state of the system, often with an understanding that the change is irreversible’. Ibid, 262.

⁶⁸⁷ Ibid, 83.

On the one hand, the remaining uncertainties are likely to be compounded by natural factors (resilience of ecosystems,⁶⁸⁸ reversibility or irreversibility of the damages). On the other, though observed warming is unequivocal, for long-term damages scientists are still facing a high level of uncertainty compounded by anthropogenic factors (consumption and energy policy choices, demographic trends, increase in trade and GDP growth, land use changes, technological innovation, abatement policies, etc.). A third aspect of the uncertainty is the positive and negative impacts of new negative-emission technologies (carbon storage, ocean fertilization). Given that these mitigating measures have not been tested on a large scale, it is difficult to assess their potential side effects, and they may entail risk trade-offs. It is important in this context to stress that according to the IPCC:

aspects of uncertainty are associated with each link of the causal chain of climate change, beginning with GHG emissions, covering damage caused by climate change, followed by a set of mitigation and adaptation measures. In particular, damage-function estimates are prone to low confidence as they involve uncertainty in both natural and socioeconomic systems.⁶⁸⁹

In a nutshell, the interacting of these natural and socio-political factors prevents clear-cut answers from being arrived at in relation to many questions of particular importance for decision-makers.⁶⁹⁰ The PP thus has real implications for risk-managers when confronted with tipping points. They should therefore incorporate non-linear, unpredictable, and extreme events, worst-case scenarios as well as impacts beyond 2100 into their CC abatement and mitigation strategies.

Last but not least, CC risks may give rise to damage outside the realm of commerce, and may thus be impossible to evaluate.⁶⁹¹ Some degree of consensus may be achievable as regards the relative likelihood of different global outcomes. Nonetheless, such outcomes may be highly ambiguous given that global temperature increases can be interpreted differently from an ecological, epidemiological, economic, or social perspective.⁶⁹²

⁶⁸⁸ Despite the efforts of the scientific community, there is still no hope of fully understanding the complexities of the interactions of the atmosphere, the oceans, and GHG in stabilizing the climate.

⁶⁸⁹ IPCC, *Climate Change 2014* (n 680), 10.4.2.2 Precautionary Considerations.

⁶⁹⁰ Grassl and Metz, 'Climate change' (n 209) 309.

⁶⁹¹ C Voigt, 'Climate Change and Damages', in C Carlarne et al (eds), *Oxford Handbook of International Climate Change Law* (OUP, 2015) 469–93.

⁶⁹² A Stirling, 'Risk, Uncertainty and Precaution: Some Instrumental Implications from the Social Sciences', in F Berkhout et al (eds), *Negotiating Change: New Perspectives from the Social Sciences* (E Elgar, 2003).

Table 3.5 Recognition of the PP in climate change agreements

MEAs	1992 UNFCC	1997 Kyoto Protocol	2015 Paris Agreement
Level of uncertainty	High	Moderate	Increased confidence

3.9.4 Recognition of the right to enact precautionary measures under the UNFCCC

Given the lingering uncertainties in 1992, the proclamation of the PP in the UNFCCC was a touchstone issue.⁶⁹³ The Convention provides for the following obligation:

the Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.⁶⁹⁴

Moreover, the Preamble of the Convention calls upon Parties to prevent damages even if there are ‘many uncertainties in predictions of climate change, particularly with regard to the timing, magnitude and regional patterns thereof’. Though the 1997 Kyoto Protocol does not mention the PP, political precautionary action was nonetheless strengthened at a time when scientific knowledge was still giving rise to conflicting opinions.⁶⁹⁵ Lastly, the Paris Agreement does not mention precaution at all. Table 3.5 highlights the manner in which uncertainties have permeated the different MEAs dealing with CC.

Article 3(3) of the UNFCCC acknowledges, therefore, the right of States to enact measures deemed to be precautionary in order ‘to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects’, and these measures either ‘anticipate’ or ‘mitigate’ CC risks. The recourse to mitigation measures amounts to a *posteriori* and not an *a priori* approach, which characterizes the PP.

The preventive and mitigation measures which are not predetermined can take the form of, *inter alia*, bans, restrictions, authorizations, emissions abatement, notifications, surveillance, requirements of BAT, cap and trade, carbon taxes, fees, and removing fuel subsidies. The activities likely to be subject to precautionary CC measures may range from listed installations to aviation.⁶⁹⁶ Given that the PP does

⁶⁹³ Grassl and Metz, ‘Climate Change’ (n 679) 338.

⁶⁹⁴ Art 3(3).

⁶⁹⁵ Grassl and Metz, ‘Climate Change’ (n 679) 326.

⁶⁹⁶ See Case C-366/10 ATAA [2011] C:2011:864.

not command a specific measure, each measure has to be determined on a case-by-case basis taking into consideration the different ‘socio-economic’ contexts.

Regarding their personal scope, Article 3(3) applies to State Parties, though operators of undertakings emitting GHGs are likely to be subject to precautionary measures as well. With respect to their temporal scope, Article 3(3) does not provide for any temporal limit and could accordingly apply to damages which occur generations after the release of GHGs.

In addition, Article 3(3) requires that precautionary measures must ‘be cost-effective so as to ensure global benefits at the lowest possible cost’. Such a requirement raises more questions than answers.⁶⁹⁷ Given that many damages won’t be easily translated into monetary terms, the benefits of CC policies are difficult to estimate accurately.

To conclude, Article 3(3) is worded in such a way that its statutory language is less forceful than in other MEAs. First, precaution is coined here neither as a *principle* nor as an *approach*. In order to avoid such a debate—while an approach is rather vague from a legal point of view, a principle entails legal effects—the authors of the Convention refer to ‘precautionary measures’. Secondly, given that the parties ‘should’ and not ‘shall’ enact these measures, Article 3(3) is far less prescriptive than other treaty obligations. Thirdly, that provision encapsulates a right to take preventive measures and not an obligation to act. Fourthly, unlike other MEAs, the precautionary measures don’t co-exist with other environmental principles. Fifthly, the scope of application of the precautionary measures as stated in the UNFCCC had to be rendered limited by a number of thresholds, such as the irreversibility and the seriousness of the damages, and the cost-effectiveness of the measures. It follows that the recourse to precautionary measures under the UNFCCC is subject to excessive precaution. By and large, given the sheer extent and the speed of CC all these thresholds are exceeded.

What matters is that precautionary measures are put in place with a view to achieving the level of protection stipulated by the Parties. The issue of how to determine an acceptable risk level has been fraught with controversy as the UNFCCC aims to stabilize GHG concentrations in the atmosphere ‘at a level that would prevent dangerous anthropogenic interference with the climate system’. This objective was further clarified in 2015. The Paris Agreement aims to prevent ‘the increase in the global average temperature to well below 2°C above pre-industrial levels’ and is ‘pursuing efforts to limit the temperature increase to 1.5°C’.⁶⁹⁸ Although such an objective strengthens the global response to the threat of CC, these safe levels

⁶⁹⁷ C Voigt, *Sustainable Development as a Principle of International Law* (Martinus Nijhoff, 2008). With respect to this requirement, the Hague District Court concluded that ‘in view of the latest scientific and technical knowledge it is the most efficient to mitigate and it is more cost-effective to take adequate action than to postpone measures in order to prevent hazardous climate change’ (*Urgenda Foundation v The Netherlands* [2015] HAZA C/09/00456689, para 4.73).

⁶⁹⁸ Art 2 (a).

are nonetheless problematic due to lingering uncertainties. Any threshold is thus questionable.

3.9.5 Concluding remarks

Regardless of the mitigation measures, the build-up of GHG in the atmosphere is causing temperatures to rise. Whilst the scientific research community has been gathering more accurate and reliable evidence regarding the actual and potential impacts of CC, it is much more difficult to calculate the risk of reaching or passing critical tipping points that entail possible large-scale and irreversible impacts. Accordingly, a full integration of the quantitative and qualitative dimensions to uncertainty should help them think the unthinkable.

Whilst the PP makes it difficult to delay adopting measures to prevent environmental degradation on the grounds that scientific certainty has not been established, scientific certainty or 'sound science' can no longer, *a contrario*, be considered as the absolute benchmark for long-term decision-making. Indeed, as has been acknowledged by the IPCC, uncertainty is not an argument for delaying action.

Despite the increasingly overwhelming evidence regarding the impacts of CC, action is still sluggish. As a result, the international community is still falling short of adapting a robust GHG abatement strategy. Political decisions are inconsistent with the emissions ceilings proposed to achieve the UNFCCC and the Paris Agreement objectives, and perhaps will remain so in the near future too.⁶⁹⁹ Therein lies the paradox.

On another note, it should be pointed out that the PP does not play any role in deciding how to allocate the costs of the preventive and mitigation measures. This issue must be resolved with reference to the PPP and the principle of common but differentiated responsibility.⁷⁰⁰

Finally, as stressed by Haritz,⁷⁰¹ preventive action is needed given that liability claims are likely to be confronted by major hurdles (causal connection, diffuse damages, retroactivity, etc.). For a risk to be insurable, it must be as objective as possible. Given the dearth of statistical data concerning the frequency or intensity of heavy precipitation events, droughts, floods, and their average costs, it is difficult to insure the risks stemming from CC.

3.10 Concluding remarks

From a formal point of view, the different formulations of the PP or the PA not only vary from one legal order to another, but also from regulatory setting to

⁶⁹⁹ Grass and Metz, 'Climate change' (n 679), 336.

⁷⁰⁰ UNFCCC, Art 3.

⁷⁰¹ M Haritz, *An Inconvenient Deliberation* (Wolters Kluwer, 2011) 15.

another. Moreover, each statute tends to enounce specific criteria for determining what triggers the adoption of precautionary measures. This variety of formulation makes sense given that each formulation reflects the types or risk and the level of uncertainty.

The above case studies do confirm that ‘unpredictability is part of the very essence of science.’⁷⁰² They also indicate that a genuine precautionary approach favours pre-emption rather than reaction, and aims to secure a greater level of protection, rather than an intermediate level of protection. CBA does not appear to have played a key role in determining the salient precautionary measures. A risk of severe damage—and not irreversible or catastrophic—to health or the environment appears sufficient to trigger precaution. The challenge of priority-settings does not seem to be insurmountable in sectors like chemicals, water management, or nature conservation. In addition, the statutory provisions commented on above leave the authorities with a broad margin of appreciation. For that reason, the courts tend to review whether the procedural requirements have been correctly applied rather than the merits of the decision. The scope of the PP also depends on trends in case law which to some degrees’ are influenced by prevailing social and political values.⁷⁰³

The greatest difficulty lies in the fact that the PP is not by any means *a priori* intended to apply solely in the area of environmental law. This principle can apply within a number of areas of the law, whether they entail financial risks or risks to human health. Of course, the principle is not applied in the same way throughout the various areas of environmental law, health law, and urban planning law. The PP is paradoxical in view of the fact that it has been invoked more in the areas of public health and food safety than for the purpose of environmental protection, for which it was initially envisaged.

There are evident differences rooted in logic between one area of the law and another. Moreover, some legal cultures are more receptive to precaution than others.⁷⁰⁴ Whilst the PP has been treated with particular caution within WTO law, it is regularly applied as a principle of good administration by administrative courts throughout Europe, which allow the administrative authorities broad room for manoeuvre. It is now necessary to consider the following question. Is this principle today a single cohesive principle? Its degree of cohesiveness must be assessed having regard to the formal name given to the precautionary standard (is it an actual principle or a bundle of rules?), although also with reference to the prerequisites for its application and any arrangements for judicial review. The case studies set out earlier enable us to discern a general trend towards harmonization, mainly within a regional European perspective.

⁷⁰² F Jacob, *La souris, la mouche et l’homme* (O Jacob, 1997) 189.

⁷⁰³ EC Communication on the PP, 10.

⁷⁰⁴ E Fisher, *Regulations and Administrative Constitutionalism* (Hart, 2010).

As far as the manner of application is concerned, various questions remain unanswered. Must one aver a serious, significant, irreversible or collective risk? Does the adoption of a measure require a minimum set of indications showing that the suspected risk is well founded, or are public authorities relieved of all requirements to furnish proof when confronted with an important risk? As for its implementation, should action be limited exclusively to moratoria, or are control and surveillance measures sufficient? And if this is possible, for how long should these measures apply? Praised by some, disparaged by others, the principle is indeed no stranger to controversy. Which risk deserves priority? How early should precautionary measures must be taken? We shall address these questions in the following sections.

Subject to the limited number of exceptions set out above, the efficacy of the PP in the area of environmental law still remains to be demonstrated. Whilst the metaphorical seed may have been planted, the green shoots have still to sprout.

4. Systematic analysis

The analysis of the PP requires a clarification of the concept of risk, and particularly post-industrial risk. In carrying out this examination, we identify the essential elements of the three threshold levels to which precautionary measures appear to be subject: risk (Subsection 4.1), damage (Subsection 4.2), and proportion (Subsection 4.3).

4.1. The concept of risk centrality of post-industrial risk

4.1.1 The ambiguity of the concept of risk

The PP is so intimately linked to risk that we must examine the scope of the concept before systematically considering the subject as a whole. The success of the concept of risk in legal systems should not obscure the fact that its multiple meanings continue to give rise to controversy. In current usage, risk is generally understood as a synonym for danger, peril, an unfortunate event. Risk is inherently uncertain. It is by nature erratic, unforeseen, unexpected. Where the slightest doubt exists as to whether an event will occur, risk is present. Insurance policies, whose purpose is to cover risk, exclude intentional misconduct by the policy holder.⁷⁰⁵ Insurance only covers the *probability* of loss of a good: that is, uncertainty. However, the concept of risk is ambiguous in that it covers both loss and the event causing the loss.

⁷⁰⁵ The principle that insurance cannot be provided for intentional fault does not, however, exclude that simple fault or negligence may be insured against.

It is thus necessary to distinguish clearly between risk in its strict sense and in its wider sense.

Sensu stricto, risk refers to the possibility of an unfortunate event occurring. The ensuing damage is consequential.

Sensu lato, risk is a two-sided concept: on one hand, chance, accident, the possible occurrence of an event; on the other hand, the resultant loss or damage. It embraces both probability of occurrence and damage. This twofold approach is made necessary by the fact that risk has no meaning in and of itself. The concept is usually associated with adverse effects that occur as the result of human activity (e.g. cancer caused by smoking or drinking, AIDs due to unsafe sex, driving accidents) or natural phenomena (e.g. floods, earthquakes). The notion of risk thus only becomes fully effective when it affects values or interests. Environmental risk, for instance, did not exist so long as nature could be casually destroyed; the concept only took shape once such destruction came to be seen as affecting collective interests.

Against this background, the risk has been defined as an expression of the likelihood of harm from a particular hazard.⁷⁰⁶ As a result, it is the function of two variables:⁷⁰⁷

- the probability that an adverse event (hazard) will occur: for instance, a substance or situation will produce environmental harm under specified conditions; and
- the consequences of the adverse event, such as impacts of the substance on public health and the environment.

The need to distinguish clearly between risk and damage has led us to adopt the first meaning of the term. With only a few exceptions, 'risk' is used here *sensu stricto* to designate the probability of an event or process with injurious consequences.

Traditionally, risk applies to a situation in which there is confidence in both hazard and probabilities.⁷⁰⁸ It follows that the hazards are known and are calculable from previous experience.⁷⁰⁹ Such probabilities may be taken to reflect established frequencies of occurrence of similar past events under comparable circumstances

⁷⁰⁶ Hazard is determined by whether a particular substance or situation has the potential to cause harmful effects.

⁷⁰⁷ The US Presidential and Congressional Commission on risk assessment and risk management, *Final Report*, 2 (Washington, 1997) 7. See, in this connection, the definition of risk set out in Directive 2012/18/EU, Art 3(15) on the control of major-accident hazards involving dangerous substances: 'the likelihood of a specific effect occurring within a specified period or in specified circumstances'. Along the same lines, the EU GFL defines 'risk' as the 'function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard' (Art 3(9)). See also Case T-13/99 *Pfizer* (n 17) para 147; Case T-70/99 *Alpharma* (n 351) para 160.

⁷⁰⁸ By way of illustration, the ECtHR requires the applicants to demonstrate a 'serious and substantial risk' to their health 'with a degree of probability'. See *Tatar* (n 15) para 107; *Balmer-Schafroth* (n 640) § 40

⁷⁰⁹ M van Asselt, E Vos, and B Rooijackers, 'Science, Knowledge and Uncertainty in EU Risk Regulation', in M Everson and E Vos (eds), *Uncertain Risks Regulated* (Routledge-Cavendish, 2009) 360.

(or in a hypothetical series of trials). By way of illustration, the probability of car accidents can be derived from statistic historical records. In particular, the language of ‘percentage certainty thresholds’ is itself deeply conditioned by the probabilistic paradigm.

However, the likelihood of the occurrence of the event can be difficult or even impossible to determine given the lingering uncertainties, let alone ignorance. In decision theory, it is customary to oppose ‘risk’ to ‘uncertainty’.⁷¹⁰

Uncertainty refers to situations where the outcomes of a particular event are known (‘known’) but no theoretical or empirical basis exists for the assigning of the probabilities of these outcomes (‘unknown’). With respect to new chemicals and GMOs, for instance, whose impacts are imperfectly understood, the probabilistic paradigm can be called into question given that ‘serious doubts emerge over the crucial assumption of comparability between past and future circumstances and outcomes’.⁷¹¹ Accordingly, it is difficult to assign probability to each of the possible outcomes. To be more precise, it is not the mere assigning of probabilities that is at issue, but (i) that there are questions over the confidence that can be placed in this, such that (ii) no single aggregated distribution is easy to justify over some other alternative. Therefore, one has to differentiate science at the frontier of knowledge from textbook science that is known with a great level of confidence.⁷¹²

These two categories have to be distinguished from ignorance that applies to situations with unknown outcomes as well as unknown probabilities of these outcomes. Both uncertainty and ignorance trigger the PP. Table 3.6 highlights the level of knowledge and related principles.

4.1.2 The centrality of risk

The appearance of the PP is linked to the emergence of a new type of risk, which we qualify as post-industrial risk. In this section we examine what distinguishes this from other forms of risk from a historical perspective.

The concept of risk has undergone lightning progress. Put forward by French legal authors such as Salleilles and Josserand at the end of the nineteenth century, the theory of risk seemed to provide a new basis for civil liability, which would progressively allow worker—and subsequently consumer—related damages to be compensated without the fault of the installation owner/operator or producer having to be proved.

Risk theory rapidly shaped the welfare state, a model that thoroughly permeated the majority of political systems in the course of the twentieth century. In that

⁷¹⁰ The most common usage of the term uncertainty in decision theory is to refer to situations in which probability distributions are still held to be definable.

⁷¹¹ A Stirling, ‘Risk, Uncertainty and Precaution: Some Instrumental Implications from the Social Sciences’, in F Berkhout et al (eds), *Negotiating Change* (n 692).

⁷¹² S Goodstein, ‘How Science Works’, in Federal Judicial Center (ed), *Reference Manual on Scientific Evidence*, 2nd ed (Federal Judicial Center, 2000).

Table 3.6 Level of knowledge and related principles

	Knowledge about the possible outcomes	Knowledge about likelihood	Illustrations	Environmental principles
Risk	Known known	Known known	Activities that are known to impair natural habitats or ecosystems	Prevention: measures aiming at reducing known hazards
Uncertainty	Known known	Known unknown	Antibiotic growth promoters or endocrine disruptors	Precaution: measures aiming at reducing plausible hazards
Ignorance	Unknown unknown	Unknown unknown	Discovery in 1974 of the depletion of the ozone hole that was caused by an apparently harmless class of chemicals, CFCs	Precaution: measures taken to anticipate the impact potential occurrence of 'surprises'

context, social risk (illness, old age, unemployment) gave rise to a 'right' to compensation within the framework of mechanisms that ally solidarity with insurance. Whether through private or public compensation mechanisms (unemployment insurance, workplace accident funds, etc.) insurance guaranteed optimal indemnification for victims. In order to be covered by the welfare state, or if necessary by private insurers, risks had to be regular, foreseeable, and calculable.⁷¹³ This model of 'insurability' is thus based entirely on knowledge.

Particular to industrialized society, the concept of 'environmental risk' first appeared in the mid-1960s with the sudden awareness of environmental degradation. Environmental risks rapidly became a major concern, in that they affected all socio-economic sectors: industry (risk of accidental release of pollutants, hazardous wastes, etc.), energy (risk of air pollution resulting from the combustion of fossil fuels, nuclear wastes), transport (potential impacts of photochemical oxydants, introduction of non-indigenous species), exploitation of natural resources (precipitous depletion of fish stocks), intensive farming (eutrophication of surface and ground waters, acidification or salinization of soils). At that stage it was believed that potential adverse impacts could be reduced to tolerable levels thanks to science, which made it possible to ascertain the probability of adverse effects and

⁷¹³ F Ewald, *L'Etat Providence* (Grasset, 1980).

the extent of the ensuing damage. A preventive approach (land use planning, emission controls, quality standards, BAT, IPPC, emergency planning) was expected to prevent further degradation.⁷¹⁴

The end of the twentieth century has taken us fully into a 'risk civilization' or 'risk society'.⁷¹⁵ Scientific development gives rise to so many new risks that it has become difficult to know which are real and which hypothetical. In this context the abstract concept of risk has become a dominant ordering principle, helping to structure and condition social and institutional relations and, to some extent, replacing monetary wealth and cultural privilege as the focus of distributional tensions and political conflict.⁷¹⁶ In his book *Risikogesellschaft*, the German sociologist Ulrich Beck characterizes risk as the central concept of the twentieth century.⁷¹⁷ Although contemporary societies are undoubtedly less exposed to danger than earlier societies, they nevertheless have a much keener perception of risk. According to Beck, the notion of risk encapsulates the readiness of the modern spirit to confront the multiple hazards of a rapidly changing socio-economic culture, just as earlier societies braved the perils of the sea. Risk is inherent in all aspects of our civilization. Life is replete with risks, including sickness, unemployment, scholastic failure, criminality, etc. Consequently, risk is becoming a tool for objectifying social problems.

4.1.3 The character of post-industrial risk

While our understanding of environmental risks has advanced greatly, the globalization of the economy and the rise of new technologies characteristic of post-industrialized society have caused a new generation of risks to emerge (BSE, CFCs, GHGs, GMOs, ODS, POPs, hormone-disrupting chemicals, electromagnetic fields, etc.). Presenting unique challenges to the ability of science to anticipate and prevent harm, these 'post-industrial risks' are fundamentally different from earlier types of risks for three reasons. First, while the risks assumed by the welfare state primarily concerned either individuals (consumers, workers) or specific groups (neighbourhood, local communities), post-industrial risks have much wider and diffuse impacts. In fact, it is more a question of accumulation of ecological impacts (e.g. the tremendous increase of transportation by road and by air) due to mass production, globalization, and free trade than of radical technological change (e.g. genetic engineering which is revolutionary in comparison to traditional industrial

⁷¹⁴ While it is rarely defined in normative texts, risk has now become a familiar word in environmental law. The legal regimes that apply to nuclear risks, risk of major accidents involving dangerous substances, or natural risks are legion.

⁷¹⁵ P Lagadec, *La civilisation du risque* (Seuil, 1981); A Giddens, *Modernity and Self-Identity: Self and Society in the Late Modern Age* (Polity, 1990); N Luhmann, *Risk: A Sociological Theory* (de Gruyter, 1991).

⁷¹⁶ A Stirling, *On Precautionary and Science Based Approaches to Risk Assessment and Environmental Appraisal: Field Study* (Institute for Prospective Technological Studies, 2001) 3.

⁷¹⁷ U Beck, *Risiko Gesellschaft: Auf dem Weg in eine andere Moderne* (Suhrkamp, 1986); Eng. translation: *Risk Society: Towards a New Modernity* (Sage, 1992).

processes). Therefore, the impacts of post-industrial risks are more global (ozone depletion, climate change⁷¹⁸) than local (pollution of the Great Lakes or the North Sea). Secondly, post-industrial risks may give rise to damage outside the realm of commerce (e.g. to human health) and thus be impossible to evaluate. Finally, and this is undoubtedly the crucial difference, post-industrial risks are permeated with unquantifiable uncertainty.⁷¹⁹

The level of awareness of the authorities is likely to vary according to the scientific evidence and the lingering uncertainties. Given that the post-industrial risks bear the marks of systematic or structural uncertainty, the main question has shifted from one of what happened in the past (probability) to one of 'what may happen' under uncertain conditions.⁷²⁰ Although science cannot provide definitive evidence on uncertain risks, policy-makers are called on pursuant to the PP to resort to science to warrant their protective measures. Therein lies the paradox.

Each new concept of risk (social risk, environmental risk characteristic of industrial societies) has disturbed existing legal regimes, in some cases 'subverting' and in all cases at least destabilizing the established order; we can expect that the concept of 'post-industrial risk' will also give rise to major legal transformations.

4.1.4 Uncertainty permeating the post-industrial risk

4.1.4.1 *Introductory comments*

It comes as no surprise that the PP came to centre stage in the field of environment policy in response to the limitations of science in assessing complex and uncertain health and environmental risks. Absolute scientific proof can never be achieved. As a result, given that science is tolerant of some level of error, uncertainty is embedded in scientific research. This explains why scientific evidence can always be open to question, no matter how long-standing it has been.⁷²¹ That being said, the new generation of post-industrial risks confront assessors with more significant serious difficulties: uncertainty is a persistent feature both of understanding the chain of causation as well as predicting the outcomes.

First, scientific knowledge is relativistic, and uncertainty weighs heaviest on those factors determining causation for post-industrial risk. In cases where causation cannot be fully established, it is replaced by a relationship of level of confidence, eventuality, or plausibility between a cause and its effect. As a result, the lack of full scientific certainty is likely to be the norm rather than the exception.⁷²²

⁷¹⁸ The third IPCC assessment report guidance on uncertainties noted that uncertainties are compounded by factors such as global scale and low frequency variability.

⁷¹⁹ By way of illustration, the IPCC distinguishes statistical or probabilistic uncertainty (referred to as quantifiable risk) and systemic or structural uncertainty (referred to as unquantifiable risk).

⁷²⁰ van Asselt, Vos, and Rooijackers, 'Science, Knowledge and Uncertainty' (n 709) 362.

⁷²¹ Peel, *The Precautionary Principle in Practice* (n 9) 35.

⁷²² G Bates, *Environmental Law in Australia*, 7th ed (LexisNexis, 2010) 221.

Second, it is difficult to determine the damages post-industrial risks may provoke, in terms of:

- localization (e.g. the impacts of acid rain or radioactivity vary with thermal currents);
- time of latency between the first exposure and the actual impact of damage (e.g. mutations due to thalidomide);
- frequency (repetitive or single);
- duration (persistent, reversible, slowly reversible, irreversible, multi-generational);
- extent (cumulative or synergistic, serious or insignificant);
- nature (human health, biodiversity); and
- scale (global, regional).

Uncertainty may touch all these factors (e.g. in the case of climate change).⁷²³ In other situations, it may be restricted to specific aspects of the problem (e.g. aquifer pollution by pesticide dispersion). In addition, insufficient experience makes it impossible to determine the regularity and probability of such risks.⁷²⁴

For example, although evidence that CC's origin is man-made has strengthened continuously since the 1995 IPCC report (with 'very high confidence' in the IPCC Assessment Report AR4 to 'extremely likely' in AR5), 'the connections between emissions of GHGs and climate change are not yet fully understood'.⁷²⁵ The speed with which oceans and land ecosystems will continue to act as 'sinks' or will become saturated cannot be well-established. The cooling and warming effects of aerosols is dogged by uncertainty. Uncertainty in aerosol radiative forcing complicates the assessment of climate sensitivity.⁷²⁶ Despite the efforts of the scientific community there is still no hope of fully understanding the complexities of the interactions of the atmosphere, the oceans, and GHGs.⁷²⁷ This type of complexity is the rule, rather than the exception, in ecosystems. In approaching such questions, scientists therefore put forward scenarios rather than assertions. The uncertainty that attaches to causation of post-industrial risks affects the calculation of their probability as well as the nature and scope of the damages they may entail.

Given that the term 'uncertainty' is subject to different interpretations, it is not an easy task to grapple with it. Scientific uncertainty exists whenever there is no adequate theoretical or empirical basis for assigning probabilities to the occurrence

⁷²³ See Subsection 3.9 above.

⁷²⁴ Before one of the nuclear reactors at Chernobyl exploded on 26 April 1986 no expert could have stated with certainty the probability of an explosion for the simple reason that verification would not have been possible. Simulations had not predicted its occurrence.

⁷²⁵ IPCC, *Climate Change 2014* (n 680), 1.2.4 The Role of Uncertainty.

⁷²⁶ M Mastrandrea and S Schneider, 'Climate Change Science Overview', in S. Schneider et al, *Climate Change Science and Policy* (Island Press, 2009) 17–19.

⁷²⁷ IPCC, *The Ocean and Cryosphere in a Changing Climate. Summary for Policymakers* (2019).

or the extent of a risk. As far as environmental risks are concerned, there is indeed a strong deficit in predictive capability. With that said, it ought to be remembered that uncertainty is neither an absolute, static or clear-cut concept. In fact, multi-layers of uncertainty inhibit policy choices. In other words, a whole range of different types of uncertainty exists, ranging from lack of full evidence, lack of causal mechanisms, incorrect assumptions, extrapolation uncertainty, inconclusiveness, indeterminacy, and ambiguity, all the way to complete ignorance.

The concept of uncertainty, which is both cross-sectoral (it applies throughout the legal system) and inter-disciplinary (it is relevant over and beyond positive law), has only been subjected to legal analysis on a limited number of occasions. Since it is a precondition that must be met in order for a precautionary measure to be implemented, it is therefore essential to define its scope.

Although uncertainty might exist in several forms, one could frame uncertainties either narrowly or broadly: uncertainties arising within science (Subsection 4.1.4.2) differ from uncertainties arising at its frontiers (Subsection 4.1.4.3). The former relate to errors under current scientific models whilst the later relate to the epistemological limits of science. In order to grapple with the PP, the understanding of both perspectives is needed. In addition, these uncertainties are likely to be compounded by a number of societal factors (Subsection 4.1.4.4).

4.1.4.2 *Uncertainty within the scientific realm*

The empirical basis of science is both a strength and a weakness. Whilst reliance on empirical data compounds the objectivity of the assessment, the experts cannot guarantee ‘the absolute accuracy of any hypothesis generated on the basis of empirical data.’⁷²⁸ The following categories are illustrative of the ways in which uncertainty within the scientific realm pervades the risk assessment process:

- *measurement errors*: imprecision, miscalculation, or inaccuracy could be caused by the fact that the data used in the analysis of risks is not available or is out of date, or that assessors are facing measurement errors, inappropriate experimental design incorporating unrepresentative samplings,⁷²⁹ uncertainties of modelling, lack of long-term data sets,⁷³⁰ potential bias in the data, etc;
- *variability*: observed or predicted variation of individual responses to an identical stimulus among the individual targets within a relevant population; and

⁷²⁸ Peel, *The Precautionary Principle in Practice* (n 9) 35.

⁷²⁹ Regarding climate change projections, the IPCC stresses the inherent limitations and assumptions of the models used for projecting future impacts. See IPCC, *Special Report Global Warming 2018* (n 685) 69.

⁷³⁰ The time available to conduct further research as well as the level of financial resources available has an impact on the degree of uncertainty.

- *insufficiency*: for instance, the various scientific disciplines involved in assessing the risk are not sufficiently developed to explain the cause-and-effect relationship.⁷³¹

The conventional probabilistic techniques are applicable; however, there remain questions over the depth and breadth of research that is warranted. That being said, these uncertainties represent only one of a whole spectrum of uncertainties that may affect scientific knowledge.

4.1.4.3 *Uncertainty at the frontiers of the scientific realm*

In addition to uncertainties pertaining to the scientific process, other types of uncertainties arise at the frontier of the scientific realm. Because they are often intractable, they are likely to linger in spite of the improvement of the techniques employed to reduce them.⁷³²

First, given the complexity of ecosystems and their processes, epistemological uncertainty arises as a result of gaps in scientific knowledge. In other words, scientists know the effects of a situation, but are unable to ascertain the likelihood of their occurrence. In particular, several factors might compound epistemological uncertainty:

- *indeterminacy*: the causal relations are understood but the intensity of the relationship between cause and effect cannot be estimated because the experts do not know all the factors influencing the causal chains;⁷³³
- *ambiguity*: can be defined as ‘a condition under which the risks in question are acknowledged to be multidimensional in nature and where there are a number of different perspectives concerning the scope, characterisation and prioritisation of the various magnitudes involved’⁷³⁴—as a result contradictory certainties can give rise to ambiguity;⁷³⁵
- *inconclusiveness*: the realities of science dictate that scientists, whatever the quality of their investigations, will never be able to eliminate some

⁷³¹ By way of illustration, the accidental discovery of the Antarctic ozone hole highlighted the lack of knowledge regarding the basic cause-and-effect relationships among physical phenomena. Only in the early 1970s was the connection between CFC emissions and depletion of the stratospheric ozone layer understood. According to the Communication from the Commission on the PP, ‘insufficiency’ is deemed to be a triggering factor for implementing precautionary measures. Typical in this respect is Recital 32 of Regulation 1829/2003 on GM food and feed which recognizes that, in some cases, scientific risk assessments cannot provide all of the information on which a risk management decision should be based.

⁷³² Peel, *The Precautionary Principle in Practice* (n 9) 42–7.

⁷³³ Climate change experts are unable to determine with precision the release of GHGs contributing to the change in global temperature of the atmosphere.

⁷³⁴ Stirling, *On Precautionary and Science Based Approaches* (n 716) 11.

⁷³⁵ The extent of any uncertainty is influenced by the way in which experts interpret the available scientific data. When considering the same data, two different experts may arrive at different conclusions

uncertainties—for instance, there may be too many unpredictable variables to enable the identification of the relative influences of each factor;⁷³⁶

- *incommensurability*: given that activities give rise to more than one impact, a multitude of hazards give rise to a problem of incommensurability.⁷³⁷

These subcategories are often highly correlated. Moreover, methodological uncertainties may not only result from the gaps in knowledge but also from the lack of appropriate methods for collecting, processing, and assessing data. They may also be exacerbated by the inaccuracy of the scientific techniques to describe the complexity and the variability of the natural world (positive and negative feedback loops, long delay periods between cause and effect, inter-individual variations, etc.).⁷³⁸ No matter how sophisticated the models are, they will never fully capture the reality.⁷³⁹ In fact, the distance in time and space between sources and effects, the cumulative and synergistic effects, the unpredictable reactions of some ecosystems (potential resilience), and the large scale of impacts, compound the methodological difficulties in assessing environmental risks.⁷⁴⁰ Therefore, the absence of proper techniques precludes the experts to draw firm conclusions from the data or to achieve consensus on these conclusions.⁷⁴¹ These difficulties impinge on the accuracy and reliability of scientific knowledge. On the whole, all these uncertainties undermine the confidence in the estimated cause and effect chain.

By way of illustration, the IPCC working group on mitigation has been stressing that ‘evaluation of uncertainty and the necessary precaution is plagued with complex pitfalls.’ These include ‘the global scale, long time lags between forcing and response, the impossibility to test experimentally before the facts arise, and the low frequency variability with the periods involved being longer than the length

as to whether or not there is any uncertainty. By way of illustration, a quantitative risk assessment performed by eleven different teams in the EC came up with eleven different results that differed by a millionfold. See S Contini, A Amendola, and I Ziomas, *Benchmark Exercise on Major Hazard Analysis* (Ispra, European Commission Joint Research Center, 1991). By the same token, different models for assessing carcinogenicity can result in cancer predictions that differ by a factor of 100 or more when extrapolated to low doses. For example, M Shapiro, ‘Toxic Substances Policy’, in O Portney (ed), *Public Policies for Environmental Protection* (Resources for the Futures, 1990) 218. Given ‘the uncertainty inherent in assessing the public health risks posed by the use of food additives’, the CJEU acknowledges the possibility of conducting legitimately different risk assessments yielding to different scientific evidence. See Case C-3/00 *Denmark v Commission* [2003] ECR I-2643, para 63).

⁷³⁶ For instance, the French food safety Agency (AFSSA) claimed that there exists more than forty possible causes that might explain the observed trends in the decline of honeybees. See AFSSA, *Weakening, Collapse and Mortality of Bee Colonies* (Paris, 2008).

⁷³⁷ H Somsen, ‘Some Reflections on EU Biotechnology Regulation’, in R Macrory (ed) *Reflections on 30 Years of EU Environmental Law* (Europa Law Pub, 2006) 329–30.

⁷³⁸ Peel, *The Precautionary Principle in Practice* (n 9) 34.

⁷³⁹ Lee, *EU Environmental Law* (n 556) 33.

⁷⁴⁰ J Kasperson, ‘Introduction: Global Environmental Risk and Society’, in J Kasperson and R Kasperson (eds), *Global Environmental Risk* (Earthscan, 2001) 4.

⁷⁴¹ Peel, *The Precautionary Principle in Practice* (n 9) 45.

of most records.⁷⁴² Moreover, imprecise, unreliable, and inconclusive evidence, as well as irreducible ignorance, are additional hurdles. The interaction between natural and anthropogenic factors is impossible to assess with accuracy. By way of illustration, although oceans and forests can undoubtedly reabsorb some portion of GHG emissions, increased evaporation of water from the ocean into the atmosphere is likely to result in more warming.⁷⁴³ To make matters worse, natural catastrophes such as fires, which are likely to become more frequent, in turn are giving rise to further emissions, which have not been hitherto adequately accounted for in climate models. If warming accelerates evaporation, resulting in the formation of clouds, the latter could in turn strongly amplify the warming phenomenon (by trapping infrared radiation) rather than serving to stabilize it (by reflecting solar rays).

Secondly, *ignorance* can be differentiated from both risk and uncertainty. Uncertainty and ignorance occupy different positions along the spectrum of knowledge. First, whereas uncertainty presupposes some minimum level of information, ignorance involves a complete lack of any scientific data. Secondly, facing uncertainty, experts cannot confidently derive probabilities of outcomes, whilst under a scenario of ignorance some outcomes may be entirely unexpected. Ignorance arises from many familiar sources, including ‘incomplete knowledge, contradictory information, conceptual imprecision, divergent frames of reference and the intrinsic complexity and systemic indeterminacy of many natural and social processes.’⁷⁴⁴ The experts do not know what they do not know (i.e. no data at all);⁷⁴⁵ however, further research can reduce an ignorance situation. That said, in many areas, such as climate change, risk, ignorance, and uncertainty are interwoven to a great extent.⁷⁴⁶

4.1.4.4 *Uncertainty out with the scientific realm*

Thirdly, uncertainties can stem from more than a simple lack of data or inadequate model of RA. In effect, further sources of uncertainty may arise from various external variables, such as social factors. For instance, the level of threat faced by endangered species can be compounded by poaching or

⁷⁴² IPCC, *Climate Change 2014* (n 680), 10.4.2.2 Precautionary Considerations.

⁷⁴³ Mastrandrea and Schneider, ‘Climate Change’ (n 726) 21.

⁷⁴⁴ B Wynne, ‘Uncertainty and Environmental Learning: Reconceiving Science and Policy in the Preventive Paradigm’ (1992) *Global Environmental Change* 111–27.

⁷⁴⁵ The concept of ignorance is no less scientific than the probabilistic notion of risk is. This concept can be defined as ‘a state under which there exist neither grounds for the assignment of probabilities, nor even a basis for the definition of a comprehensive set of outcomes.’ Stirling, *On Precautionary and Science Based Approaches* (n 716) 17; EEA, *Late Lessons* (n 209) 169–70; EC, *Science for Environment Policy, The Precautionary Principle: Decision-making under Uncertainty* (Future Brief, 2017). The consequences of ignorance can be dramatic, as shown by the late discovery of the impacts of asbestos mesothelioma cancer (unknown prior to 1974), of CFCs (unknown prior to 1977), and of TBT antifoulants (grossly underestimated until the middle of the 1980s).

⁷⁴⁶ M Haritz, *An Inconvenient Deliberation* (Kluwer, 2011) 54.

unsustainable harvest,⁷⁴⁷ which cannot be assessed from a genuine scientific point of view. By the same token, the potential effects of mitigating measures (investment in renewables, decarbonization of the economy) and other factors (demographic and consumption patterns) compound the uncertainties related to the non-linearity of climate change. Some of these factors may be hardly known at all. They are much more difficult to be taken into consideration in traditional RAs.

4.1.4.5 *Concluding remarks*

This systematization of the concept of uncertainty of course reaches its own limitations. Environmental law in every legal system does not distinguish subcategories of uncertainty. Accordingly, one can wonder what the implications are of such notionally distinguished subcategories. Moreover, these different aspects of incertitude can lead to confusion. In fact, risk, uncertainty, ambiguity, and ignorance are not objective categories of situation out there in the real world; they are distinguishable ways in which incertitude can be subjectively experienced, irrespective of specific causes or contexts.

That being said, these types of uncertainties make risks less predictable, less calculable. As a result, they represent a 'fundamental challenge' to experts claiming that they can provide definitive and objective knowledge.⁷⁴⁸ Whilst some of these uncertainties can be resolved by further scientific research, others have to be overcome with policy choices (to err on the safe side) because of the current limitations of scientific knowledge.⁷⁴⁹ Furthermore, both epistemological uncertainty and ignorance are routinely treated in the regulatory appraisal of technologies by using the probabilistic techniques of RA.⁷⁵⁰ In the same vein, given that uncertain risks compound the anxiety of the layperson, risk assessors tend not to exhibit uncertainty.⁷⁵¹ Table 3.7 highlights the uncertainties within and out with the scientific realm.

4.1.5 The dilemma of post-industrial risk

In the 1980s, on the basis of almost identical scientific hypotheses about ozone layer depletion, public authorities in the United Kingdom and the United States set in motion diametrically opposed policies concerning possible limitations on the production of chlorofluorocarbons (CFCs). The Americans adopted a precautionary strategy, limiting CFCs in response to the threat they posed to stratospheric ozone. The representatives of UK Government, on the other hand, delayed

⁷⁴⁷ See Subsection 3.3 on fisheries.

⁷⁴⁸ Peel, *The Precautionary Principle in Practice* (n 9) 54.

⁷⁴⁹ W Wagner, 'The Science Charade in Toxic Risk Regulation' 95 (1995) Columbia LR 1687.

⁷⁵⁰ IPTS-ESTO, *On Science and Precaution in the Management of Technological Risks*, vol. I (2001) 27; Stirling, *On Precautionary and Science Based Approaches* (n 716) 27.

⁷⁵¹ van Asselt, Vos, and Rooijackers, 'Science, Knowledge and Uncertainty' (n 709) 381.

Table 3.7 Uncertainty within and out with the scientific realm

Level of knowledge	Features
Uncertainty intrinsic to the risk assessment	Inexactness, imprecision, lack of observation
Uncertainty within science	Indeterminacy, ambiguity, inconclusiveness,
Ignorance	Reducible or irreducible
Uncertainty due to external variables	

the adoption of regulations until the hypothesis had been validated. This example illustrates the dilemma confronting public authorities when action is required to protect against risks posed by chemicals.⁷⁵² Should they act under conditions of uncertainty to parry a threat that is merely suspected? Or should they first reduce the margin of uncertainty, even if it means delaying action?

Uncertainty affects both the likelihood of an event and when—and to what extent—it will produce damage. In response, public authorities will opt for either a delayed or an immediate preventive approach. However, two types of erroneous outcomes are likely to result from each approach.

The former approach aims to delay action until the authorities have determined the exact nature of the risk. This strategy gives priority to research, even if it means delaying decisions until investigations have been completed. The accumulation of scientific knowledge resulting from this delay offers decision-makers some hope of reaching a suitable and carefully planned decision. By avoiding hasty and precipitate measures, this stance appears to favour a more efficient allocation of economic resources; however, the uncertainties inherent in scientific investigation could delay the adoption of essential measures in the absence of incontrovertible proof. It follows that the experts may conclude that there is no impact when actually there is one (false negative). Over the long term, this approach could therefore prove to be as expensive as, or even more expensive than, an immediate strategy.

The latter approach does not condone any hesitation by public authorities. Although they may be torn between waiting and acting, the authorities may not vacillate even if conclusive evidence to support their suspicions is not yet available. Serious risks must immediately be prevented. Although it may allow the authorities to avert potentially expensive damages at low cost, this tactic presents certain drawbacks. Thus, if an anticipatory measure turns out not to have been necessary because the perception of risk was exaggerated (false positives), its proponents will

⁷⁵² S Rowland, 'EU Policy for Ozone Layer Protection', in J Golub (ed), *Global Competition and EU Environmental Law* (Routledge, 1998) 39.

Table 3.8 False negative and false positive

Types of errors	Description	Consequences	Illustrations
False positive	The substance is wrongly thought to cause harm but it does not	Overregulation and overcompensation of plaintiffs	Saccharin as a food irradiant
False negative	The substance is wrongly believed to be safe. No preventive or anticipatory actions are taken	Underregulation and undercompensation of plaintiffs	TTB antifoulant, asbestos, lead in petroleum, CFCs, biphenol A, neonicotinoids, DBCP pesticide

be reproached for having acted irresponsibly, sacrificing innovation for the sake of security. This approach can prove onerous in cases where preventive measures cost more than damages.⁷⁵³

Table 3.8 highlights the two types of mistakes that can be made at the level of hazard identification: false negative and false positive.

This paradox illustrates the dilemma confronting public authorities when they need to act in a context of incomplete knowledge. Should they await the results of full scientific investigations before acting, thereby risking irreversible damage in the future? Or should they act in an anticipatory fashion, even if the real nature of the threat remains less than certain?

Taken to the extreme, neither strategy is defensible: the risk of false positives would forbid action in the present for fear of uncertain eventual effects, while false negatives would allow pressure for short-term gain to the detriment of long-term conservation goals. The approach of delayed preventive action for the fear of false positives may allow irreversible ecological damage to occur; its rival can paralyse technological development.

Whether a risk is merely suspected or has been clearly demonstrated, the authorities will not intervene unless they have taken into consideration the various interests at stake.⁷⁵⁴ At this point choice of action is still largely determined by the importance accorded to environmental protection as opposed to competing socio-economic interests. Authorities with a high level of environmental awareness will do everything in their power to avoid a disaster, even if it means wasting money, since they value the environment beyond price. On the other hand, authorities that consider problems from a purely economic perspective will refuse to sacrifice

⁷⁵³ D Pearce, 'The Precautionary Principle and Economic Analysis,' in O'Riordan and Cameron, *Interpreting the Precautionary Principle* (n 65) 145.

⁷⁵⁴ Case T-31/07 *Du Pont de Nemours* (n 299) para 145.

progress for the sake of hypothetical stakes and will refrain from intervening until it has been clearly demonstrated that a catastrophe is taking place.

In this way, the notion of objective evaluation of ecological risk depends by turn on what information is available and what values the public authorities are upholding. Intervention receives further justification when uncertainty decreases and it has been admitted that a risk may affect a recognized value. Inversely, inaction tends to triumph when uncertainty remains strong and the consequences of triggering the risk in question are not considered significant. One further point may be worth making here. When the harm is irreversible (e.g. persistent organic pollutants (POPs), species loss), there is a fundamental asymmetry between avoiding false negatives and avoiding false positives.⁷⁵⁵

In the debates surrounding the PP, critics have often claimed that the widespread application of the PP would lead to a swath of false positives. However, recent analyses show that uncertainty has often been mistaken as evidence of safety. In effect, scientists give less attention to false negatives than to false positives.⁷⁵⁶ Admittedly, authorities tend to wait until sufficient evidence of harm is established beyond any reasonable doubt and to react only to crisis events. In so doing, they characteristically err towards belated and costly measures.⁷⁵⁷ As a result, ‘paralysis by analysis’ is not uncommon. Accordingly, the fears of false positives have led to the avoidance of regulatory measures that were warranted.⁷⁵⁸

4.2 Risk thresholds

Although various legal definitions of the PP share common elements, the thresholds intended to limit their scope are strongly nuanced. These restrict the application of the principle by defining the risk to be averted (with proof based on ‘technical knowledge’ required in some instances) or specifying the damage likely to occur (which, according to some definitions, should be ‘serious or irreversible’); moreover, these two thresholds may apply cumulatively. Once these thresholds have been crossed, a precautionary measure may be taken to avert the anticipated risk, but it should be proportionate. This last condition also gives rise to divergent interpretations (some definitions require that risk reduction measures not ‘entail excessive costs’).

This is not the place to examine the varying thresholds set out by different definitions, as this would entail retracing the principle’s history. Instead, we attempt

⁷⁵⁵ EEA Report 1/2013 (n 300), 673.

⁷⁵⁶ Cranor, *Toxic Torts* (n 298) 209.

⁷⁵⁷ EEA, *Late Lessons* (n 209) 168, in EEA Report 1/2013 (n 300) 674.

⁷⁵⁸ S Foss Hansen and J Tickner, ‘The Precautionary Principle and False Alarms—Lessons Learned’ in EEA Report 1/2013 (n 300) 17–45.

to elaborate a systematic theory of the application thresholds governing the use of the PP.

These thresholds are critical because of the context of uncertainty that justifies the use of precaution. We will examine the difficulties of interpretation raised by *stricto sensu* risk, damage, and proportionality and link these to the concept of post-industrial risk. Each subsection that follows presents a brief summary of the question before setting out solutions which should be encouraged in view of the objectives of the PP. International, national, and regional definitions of the PP provide the empirical basis for these reflections.

4.2.1 The effect of uncertainty on establishing *stricto sensu* risk

4.2.1.1 *Introductory note*

Lawyers do not recoil from considering risk, even if their concept of science is still grounded much more firmly in certainties than in plausibilities. As evidenced by the evolution of liability and insurance law, the legal systems no longer ignore the concept of risk. Nonetheless, the risks that set the PP in motion give rise to certain difficulties.

When an event characteristic of *stricto sensu* risk tends to recur, risk can be calculated on the basis of probability. It is possible, for instance, to calculate a driver's risk of accident by reference to elevated alcohol levels, exceeding the speed limit, or failing to exercise particular care in bad weather. However, when an event is merely anticipated and normal experience provides no basis for forecasting its likelihood, risk cannot be ascertained by calculating probability. Therefore, standard prerequisites for calculating probabilities cannot be satisfied for this class of risks, since any given problem is bound to remain controversial until the relevant scientific knowledge has stabilized. The question then arises: in which category of foreseeability should we place risks anticipated on the basis of the PP? Should the principle apply to any suspected risk, or only to known risks?

4.2.1.2 *Recommended solutions*

4.2.1.2.1 A hierarchy of risks corresponding to degree of knowledge Risk can be categorized as a function of knowledge, using the German theory⁷⁵⁹ that distinguishes three types of risk.⁷⁶⁰ The highest category is that of 'dangers' (*Gefahren*), unacceptable risks to which the principle of prevention (*Schutzprinzip*) corresponds. Dangers must be prohibited. 'Residual risks' (*Restrisiko*) form the lowest category. Purely hypothetical, such risks must be tolerated by society and therefore

⁷⁵⁹ This is only one of a number of approaches used to determine the concept of risk; see the synthesis of various possible classifications by R Baldwin, 'Introduction—Risk: The Legal Contribution', in R Baldwin (ed), *Law and Uncertainty: Risks and Legal Processes* (Kluwer Law Int'l, 1997) 2.

⁷⁶⁰ As regards this distinction, see among others A Reich, *Gefahr-Risiko-Restrisiko* (Werner, 1989).

escape regulatory measures. As a result neither the principle of prevention nor the PP (*Vorsorgeanlaß*) applies to them. Only the final category, that of 'risks' (*Risiko*), which are located between unacceptable risks and residual risks, falls within the scope of the PP.⁷⁶¹ In order to minimize such risks in situations of recognized uncertainty (*Minimierungsgebot*) the authorities are obliged to act under the PP.⁷⁶²

By slightly modifying this hierarchy of risks, we may distinguish:

- *residual risks*, which do not require regulatory measures;
- *certain risks*, which fall within the scope of the principle of prevention; and
- *uncertain risks*, which come under the PP.

4.2.1.2.1.1 *Residual risks* If the PP imposes upon the decision-maker a mode of thinking that seeks to limit risks, must it therefore necessarily reduce them to inaction as soon as a risk is suspected? Does it apply in the same way to purely speculative risks? Must all Cassandras be taken seriously?

Such strictness would be an exaggeration. Most authors believe that it would be excessive to try to avert all risks.⁷⁶³ In any case, many of the consequences of our activities are unforeseeable because they arise in a context that is itself unpredictable. Risks are everywhere. We accept some of them while rejecting others. Driving a car, travelling by aeroplane, using electricity, having sexual relations: all of these involve some risk or another. To avert all risks we would have to forbid gas cookers because electric cookers are less likely to give rise to accidents: clearly an absurd suggestion. Hanging a Damoclean sword over any technical activity suspected of entailing environmental risk would put an end to innovation, discourage the spirit of enterprise, and compromise technological progress.

For instance, in the 1980 *Benzene* decision⁷⁶⁴ the US Supreme Court stated that:

Some risks are plainly acceptable and others are plainly unacceptable. If, for example, the odds are one in a billion that a person will die from cancer by taking a drink of chlorinated water, the risk clearly could not be considered significant. On the other hand, if the odds are one in a thousand that regular inhalation of gasoline vapors that are 2% benzene will be fatal, a reasonable person might well consider the risk significant and take appropriate steps to decrease or eliminate it.

⁷⁶¹ E Rehbinder, 'Precaution and Sustainability: Two Sides of the Same Coin?', in *A Law for the Environment* (IUCN, 1994) 93.

⁷⁶² M Kloepfer, *Umweltrecht* (CH Beck, 1989) 167.

⁷⁶³ Some characterize such an approach as 'absolutist': e.g. A Nollkaemper, 'What You Risk Reveals What You Value and Other Dilemmas Encountered in the Legal Assaults on Risks' in D Freestone and E Hey (eds), *The Precautionary Principle* (Kluwer Law Int'l, 1995), 73.

⁷⁶⁴ *Industrial Union Department. AFL-CIO v American Petroleum Institute* (n 510).

Similarly, the German Constitutional Court has stated that the right to life and physical integrity embodied in Article 2 of the German Constitution does not require the authorities, or Parliament, to prohibit a technology in the name of a ‘zero-risk’ precautionary standard.⁷⁶⁵ By the same token, the CJEU and the EFTA Court held that ‘a purely hypothetical or academic consideration will not suffice to base a precautionary measure in order to protect the health and life of humans.’⁷⁶⁶

Adherence to the adage ‘when in doubt, do nothing’ should not overshadow the complementary wisdom that ‘there’s such a thing as being too careful’. To avoid having the best become the enemy of the good, the principle’s field of application must exclude those risks characterized as residual, that is, hypothetical risks resting on purely speculative considerations without any scientific foundation. Speculation, conjecture, intuition, warnings, or denunciations should not suffice in and of themselves to justify an attitude of precaution.

4.2.1.2.1.2 Certain risks Risks for which causation between an event, and damage is demonstrated by irrefutable scientific proof do not in any case come under the PP.⁷⁶⁷ Such risks can be qualified as *certain*, since it is possible to establish the causal link between the initial event and its adverse effects, to calculate the probability of their occurrence, and on that basis to insure against them. This characterization may be surprising, since risk is by nature a question of chance and its occurrence is always uncertain. Yet what is ‘certain’ here is precisely the link of cause and effect between an event that might occur and the damage anticipated as a result. Only the length of time that will elapse before the risk occurs is unpredictable.

For example, since we know that global warming due to increased GHG emissions will cause sea levels to rise,⁷⁶⁸ this is a certain risk to the extent that we know it will happen, if not the exact rate at which it will happen.⁷⁶⁹ In the same way, the risk of flooding caused by intensified use of agricultural land or of eutrophication caused by discharges of urban wastewater or slurry are certain risks, since we can establish causation—the risk of flooding is derived from records on past floods—between these human activities and the resultant ecological phenomena.⁷⁷⁰ That knowledge justifies adopting preventive measures. In the context of the German theory referred to above, these risks are *unacceptable*, because they are known.

⁷⁶⁵ *BVerfG*, Beschl. v. 20 December 1979, 1 BvR 385/77 (*Nuclear Power Plant Mulheim-Karlich*), vol. 53, 30.

⁷⁶⁶ Case C-282/15 *Queisser Pharma* (n 340) para 60; *EFTA Surveillance Authority v. Norway* (n 332) para 20.

⁷⁶⁷ The *Trail Smelter* case illustrates the importance afforded to certainty. According to the Arbitral Tribunal the no harm principle applies where an ‘injury is established by clear and convincing evidence’ (*Trail Smelter*, 716). In the same vein, see the concept of known risk in *Corfu Channel* (UK v Albania) [1949] Judgment ICJ Rep 18–22.

⁷⁶⁸ IPPC, *Special Report Global Warming 2018* (n 685) 207–10.

⁷⁶⁹ *Ibid.*, 201, 219, 221, 240.

⁷⁷⁰ M van Asselt, E Vos and B Rooijackers, ‘Science, knowledge and uncertainty’ (n 709) 361.

4.2.1.2.1.3 *Uncertain risk* If ‘certain’ and ‘residual’ risks elude the PP for the reasons set out above, the principle should nevertheless apply to risks situated between these two extremes. The occurrence of such risks remains heavily encumbered with uncertainty, but it is not unreasonable to anticipate their occurrence on the basis of certain data or hypotheses, even if those data have not yet been fully validated. In other words, strong presumption should be sufficient basis for an appeal to precaution, whereas simple intuition excludes its use. The application of the principle should depend on minimal evidence of the probability of a risk;⁷⁷¹ failing this, scientific uncertainty—which serves to advance knowledge—would be transformed into a sterile debate and would eventually serve to discredit research. The precautionary measure must therefore be linked to a minimum of knowledge: that is to say, to scientific grounds with a demonstrated degree of consistency.

On the one hand, the wording of several definitions confirms this desire to maintain the principle within the limits of the reasonable. For example, the 1992 OSPAR Convention calls for ‘reasonable grounds for concern’, while the preparatory text for the French Environmental Code stresses that a precautionary measure may only be taken ‘when there are serious grounds for concern about the state of the environment’. On the other hand, other definitions of the PP go so far as to exclude the scientific demonstration of causation.⁷⁷²

That being said, precaution demands by definition that knowledge of the more or less predictable nature of a danger need not be entirely validated. Indeed, consideration of numerous definitions makes it clear that the principle is to apply even if certainty about the occurrence of an event is not ‘absolute’ or ‘total’,⁷⁷³ in the ‘absence of adequate scientific information’,⁷⁷⁴ in the case of ‘insufficient relevant scientific information and knowledge’,⁷⁷⁵ ‘if there is no conclusive proof of a causal link between causes and effects’,⁷⁷⁶ or if ‘scientific research has not fully demonstrated the existence of a causal link’.⁷⁷⁷ In some instances, the Parties

⁷⁷¹ See the requirements set out by the CJEU with respect to hazardous substances, Subsection 3.2 above. According to Italian case law, preventive and precautionary measures restricting the exercise of free enterprise have to be enacted on the basis of ‘scientific knowledge and experimental evidence acquired normally through national or supranational institutions, that have been delegated this task’ (Cass. it., No. 282, 26 June 2002; No. 116, 17 March 2006). See Butti, *The Precautionary Principle* (n 103) 100, 126.

⁷⁷² See, for example, the formulation of the Declarations of the Parties at the Second Conference on the North Sea and of the Nordic Council at the International Conference on Pollution of the Seas in October 1989. In particular, see HELCOM Recommendation 12/3, 20 February 1991, according to which, the PP applies ‘even where there is no scientific evidence to prove a causal link between discharges and effects caused by substances’.

⁷⁷³ See, among others, the formulations set out in the Ministerial Declaration of the Second International Conference on the Protection of the North Sea, the ninth recital of the CDB, Art 3(3) of the 1992 UNFCCC, and Principle 15 of the 1992 Rio Declaration on Environment and Development.

⁷⁷⁴ 1995 UNFSA, Art 6(2).

⁷⁷⁵ 2000 CPB, Art 10(6) and 11(8).

⁷⁷⁶ E.g. the definition of the PP in the 1992 OSPAR Convention.

⁷⁷⁷ E.g. the definitions of the PP in the 1994 Scheldt-Meuse Agreements and in the 1992 UNECE Watercourses Convention.

to the MEA don't have to wait for scientific proof regarding the environmental harm.⁷⁷⁸

Lastly, given that absolute scientific proof is impossible, the expression 'lack of full certainty' widely used in a handful of definitions of the PP⁷⁷⁹ is misleading.⁷⁸⁰

The PP may henceforth be applied if there are 'reasonable grounds' for concern even when irrefutable proof is lacking. That is to say, the threshold should be set neither too high nor too low. If it is too high, the principle would be devoid of substance;⁷⁸¹ if too low, the principle would become inoperable. A middle course should thus require public authorities to demonstrate that a risk is considered scientifically likely ('reasonable scientific plausibility').⁷⁸² That condition would be fulfilled when empirical scientific data (as opposed to simple hypothesis, speculation, or intuition) make it reasonable to envisage a scenario, even if it does not enjoy unanimous scientific support.

When is there 'reasonable scientific plausibility'? When risk begins to represent a minimum degree of certainty. But a purely theoretical risk may also satisfy this condition, as soon as it becomes scientifically credible: that is, it arises from a hypothesis formulated with methodological rigour and wins the support of part of the scientific community, albeit a minority.

The principle may consequently apply to all post-industrial risks for which a cause-and-effect relationship is not clearly established but where there is a 'reasonable scientific plausibility' that this relationship exists. This would be particularly appropriate for delayed pollution, which does not become apparent for some time and for which full scientific proof is difficult to assemble. In the case of delayed pollution, analytical results do not provide a sufficient basis for evaluating the efficacy of actions already taken or measuring the extent of damages avoided. Since feedback from experience is too slow, the expert must extrapolate what is known beyond normally permitted limits and assign a greater or lesser degree of probability to possible future developments.⁷⁸³ In this way they will find themselves led

⁷⁷⁸ Pursuant to the 1991 Bamako Convention on the Prohibition of International Trade in Waste with Africa, the PA entails, *inter alia*, preventing 'the release into the environment of substances which may cause harm to humans or the environment without waiting for scientific proof regarding such harm' (Art 4(3)(f)).

⁷⁷⁹ Principle 15 Rio Declaration on Environment and Development; Preamble, Oslo Protocol on Further Reduction of Sulphur Emissions to LRTAP Convention;

⁷⁸⁰ *A contrario*, one could conclude that 'full certainty' exists.

⁷⁸¹ According to Italian administrative case law, the enactment of more stringent precautionary licensing requirements is conditioned by a situation of 'insuperable uncertainty' about the environmental risk (TAR Veneto, Section III, No. 4242, 14 December 2005).

⁷⁸² VR Walker, 'Keeping the WTO from Becoming the World Trans-Science Organisation' (1998) Cornell ILJ 251, 262 and 279–85; D. Wirth, 'The Role of Science in the Uruguay Round and NAFTA Trade Disciplines' (1994) Cornell ILJ 855–6. By way of illustration, Italian courts require that the assessment of such risks must be serious and prudent ('*seria e prudentziale*'), and conducted in accordance with the current state of available scientific knowledge (TAR Piemonte, Section I, No. 99, 22 January 2018).

⁷⁸³ OECD Environment Committee, Group of Economic Experts, ENV/EC/ECO (92) 12, 31.

by circumstances to predict the unpredictable. As a result, a new understanding of duration in causality is urgently needed. The PP invites the decision-maker to take account of considerably extended timescales, as uncertainty largely resides in the period between a cause and the subsequent manifestation of a harmful effect.⁷⁸⁴ Therefore it should be possible to counter delayed pollution in the name of the PP, without having to use weak evidence to try to demonstrate the likelihood of ecological damage.

The principle also applies to biotechnologies, even if the damage that these techniques may cause is very poorly understood. The risk posed by GMOs is beginning to constitute a minimum supported by repeated experience.

Decision-makers should also be aware that in some cases the very possibility of an adverse impact may be unknown. Even more than uncertainty, ignorance underscores the need to accept the limits of scientific assessment. Therefore regulatory appraisal in complex situations should tackle not only uncertainty but also ignorance.⁷⁸⁵

The degree of uncertainty peculiar to post-industrial risk marks a break with the character of certain risk and residual risk. It is thus possible to conclude that if the PP *a priori* excludes purely residual risk and does not concern certain risk, it nonetheless requires a highly sophisticated understanding of the probability of the risks situated between these two extremes. In this way it strongly resembles the strategy of delayed preventive action, although the two should not be confused.⁷⁸⁶ We will see in the following subsection that the need to avert uncertain risk is even more essential when damage may prove to be significant or irreversible.

4.2.2 The effect of uncertainty on damage

4.2.2.1 Introductory note

Having weighed the probability of a suspected risk, the decision-maker will naturally wonder how to protect against it. Should they reduce, if not eliminate, the risk in question, whatever the importance or severity of the damages it may entail? Or should they intervene only if the stakes are high enough? Their attitude is likely to vary depending on the probability that a hazard will materialize and, above all, the importance of the anticipated damage. Risks that are likely to give rise to serious damage will have to be averted, even if they are of low probability.⁷⁸⁷ On the other hand, the decision-maker could not reasonably be expected to act to avert a weak risk or a high risk of negligible damage. Thus, the scope of possible damage gives meaning to *sensu lato* risk.

⁷⁸⁴ F Ewald, 'The Return of the Crafty Genius: An Outline of a Philosophy of Precaution' 6: 1 (1999/2000) Conn Ins LJ 12.

⁷⁸⁵ See the discussion in Subsection 3.1.4.3.

⁷⁸⁶ See the discussion in Chapter 2, Subsection 3.2.2.

⁷⁸⁷ Commentary (2) of Principle 1, ILC's Draft principles of loss in the case of transboundary harm arising out of hazardous activities, 69.

The disappearance of natural habitats and their species as a result of human land-use patterns, and diseases and fatalities due to atmospheric pollution are all damages whose precise form is not easily defined. CC is one of the clearest illustrations of this. On the one hand, the scientific community is now convinced that CC entails significant damages. 'Limited understanding of the physical mechanisms involved as well as the lack of observational data implies large uncertainty about the likelihood' of CC events that have potentially very damaging consequence for the world.⁷⁸⁸ For instance, sea levels will continue to rise, droughts and floods are likely to become more severe, etc. if nothing is done to reduce emissions of GHG into the atmosphere. No one seriously doubts that the CC issue is one where humankind confronts a threat of serious damage. The fundamental importance of climatic conditions to maintaining life on earth leads people to take the prospect of global warming seriously.

On the other hand, despite the consensus among scientists regarding the man-made origin of CC, they have not yet reached full agreement on the scope, the rapidity of the phenomenon, and the ensuing damages. In particular, a time element comes into play. A number of ecological damages may show up belatedly. It is still impossible to accurately determine the extent of the ensuing disturbances and the speed with which they will occur (melting of the ice sheet, dwindling of estuarine environments, flooding of coastal plains, droughts, etc.). By way of illustration, most recent estimates indicate that sea-level rise due to a 1.5 to 2°C degrees' increase in the average temperature relative to 1986–2005 at the Earth's surface by the end of the century could vary between 20 centimetres and 1 metre.⁷⁸⁹ It is still impossible to accurately determine the frequency and the magnitude of the ensuing effects: melting of the ice sheet, dwindling of estuarine environments, heavy precipitation events, extreme floods and droughts, ocean acidification, impact on biodiversity, etc. Will these phenomena occur suddenly or progressively? The uncertainty surrounding this swath of phenomena is still likely to evolve in a completely unforeseen manner (large-scale discontinuities). Even greater uncertainties affect the regional impact of climate change. Some regions of the world will experience unusually heavy rainfall; others will be affected by drought. Such changes will be exacerbated by the continuing severity of extreme weather events such as droughts, floods, and heat waves that characterize the phenomenon of CC.⁷⁹⁰ From a global perspective, poor nations and communities are more at risk as they have a low capacity to adapt.⁷⁹¹ It is not possible to determine with accuracy the probability and the magnitude of each impact at regional or local level.⁷⁹² Some damages, such as the loss of ecosystems, will appear somewhat insignificant in

⁷⁸⁸ EEA Report 12/2012, *Climate Change, impacts and vulnerability in Europe 2012*, 22.

⁷⁸⁹ IPCC, *Special Report Global Warming* (n 685) 207, 219.

⁷⁹⁰ IPCC, *The Ocean and Cryosphere in a Changing Climate* (n 727).

⁷⁹¹ EEA (2012) 5, 22.

⁷⁹² J van der Sluijs and W Turkenburg, 'Climate Change and the Precautionary Principle', in E Fisher, J Jones, and R von Schomberg (eds) *Implementing the Precautionary Principle* (E Elgar, 2006) 245.

some countries whilst taken seriously in other countries (desertification and reduced yields from agriculture in Africa; inland flash floods and increased erosion, glacial retreat in mountainous areas in Europe).

Our only certainty at present is precisely the *uncertainty* surrounding the speed with which these phenomena will take place, which could evolve in a completely unforeseen manner (tipping points). Oceans and forests can undoubtedly reabsorb some portion of CO₂ emissions; however, natural catastrophes such as the ones caused by fires will become more frequent,⁷⁹³ in turn giving rise to further emissions. If warming accelerates evaporation, resulting in the formation of clouds, the latter could in turn strongly amplify the warming phenomenon (by trapping infrared radiation) rather than serving to stabilize it (by reflecting solar rays). As temperatures might rise from 2°C to 4°C by the end of the twenty-first century the level of risks and impacts is obviously non-linear.⁷⁹⁴

Even greater uncertainties affect the regional impact of CC. Some regions of the world will experience unusually heavy rainfall; others will be affected by drought.⁷⁹⁵ Alterations in animal and insect migration and breeding patterns have already been observed in northern Europe, affecting the predictability of traditional ecosystem patterns. Will lemon trees eventually flourish on the banks of Scandinavian fjords, or almond trees in northern Europe? Unable to respond to such questions with any precision, experts can only provide forecasts heavily encumbered with uncertainty.

4.2.2.2 Possible solutions

4.2.2.2.1 Determination of a threshold Although inter-ministerial declarations relating to the protection of the North Sea note the existence of potential damage without specifying its precise nature, most authors believe that a threshold must be set in order to avoid the PP being watered down through over-use. They consider that it should only apply to risks entailing non-negligible damage.⁷⁹⁶ Several definitions lend support to this theoretical interpretation. Thus, the 1992 UNFCCC, the 1976 Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (as amended in 1995), the CETA, the Australian Intergovernmental Agreement on the Environment (IGAE), the Canadian Environmental Protection Act,⁷⁹⁷ as well as the 1990 Bergen and 1992 Rio Declarations only recognize

⁷⁹³ IPCC, *Special Report Global Warming 2018* (n 685) 201, 219, 221, 240.

⁷⁹⁴ *Ibid*, Chapter 1, 69.

⁷⁹⁵ Large robust and widespread regional differences are expected in relation to temperature extremes. *Ibid*, 177, 189–208.

⁷⁹⁶ Nollkaemper, 'What You Risk Reveals What You Value ...' (n 763) 83; J Cameron and J Abouchar, 'The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment' (1991) Boston CILR 1–27, 100.

⁷⁹⁷ SC 1999, c. 33, Preamble. In Canada, each environmental statute tends to set out its own criteria for determining what triggers precautionary action and the procedures to be applied. In spite of those differences, the threat of serious or irreversible harm is generally the key triggering factor. See

recourse to precaution in order to avert ‘threats of serious *or* irreversible damage’, while in France the Environmental Code and the Environmental Constitutional Charter authorize the principle (and this is an important nuance) only to ‘avert a threat of serious *and* irreversible damage’ (emphases added). Under Australian case law the pre-conditions of seriousness and irreversibility exclude the application of the PP if there is no scientifically defensible threat or if the threat is of moderate or reversible harm, although decision-makers may still choose to act cautiously to minimize risks.⁷⁹⁸ These requirements mirror the willingness to narrow the scope of the PP.

For other issues damage is specified in slightly less abstract terms. In the 1992 CBD, the principle should counter a ‘threat of significant reduction or loss of biological diversity’. The 1992 OSPAR Convention and Helsinki Convention on the Baltic Sea turn to the principle when pollution ‘may bring about hazards to human health, harm living resources and marine ecosystems’, while the 1994 Scheldt-Meuse Agreements require that dangerous substances have ‘a significant transfrontier impact’ in order for the principle to come into play. In the 2000 CPB precautionary measures are limited to cases where scientific uncertainty relates to a lack of evidence regarding the ‘extent’ of the potential adverse effects on the conservation and the sustainable use of biodiversity.⁷⁹⁹

Such requirements can also be found in national case law. In the *Benzene* case, the US Supreme Court required the OSHA to carry out a threshold determination of ‘significant risk’ of cancer before the Agency could promulgate standards for air-borne benzene intended to counter that risk:

‘Safe’ is not the equivalent of ‘risk-free’. There are many activities that we engage in every day—such as driving a car or even breathing city air—that entail some risk of accident or material health impairment; nevertheless, few people would consider these activities ‘unsafe’. Similarly, a workplace can hardly be considered ‘unsafe’ unless it threatens the workers with a *significant* risk of harm (emphasis added).⁸⁰⁰

The decision-maker is thus obliged to restrict the application of the PP to certain categories of damage; however, agreement has not yet been reached on how

S Comptois, ‘On the Idea of Precaution in Canadian Administrative Law’, in Pâques, *Precautionary Principle* (n 677), 64.

⁷⁹⁸ *Wiseowl Investments Pty Ltd v Shire of Busselton* [2010] WASAT 150; *Xstrata Coal Queensland Pty Ltd v Friends of the Earth, Brisbane Co-op Ltd* [2012] QLC 13; *My Environment Inc v Vic Forests* [2012] VSC 91, affirmed in *My Environment Inc v Vic Forests* (2013) 42 VR 456; *Australian Conservation Foundation Inc v Minister for Environment* [2016] FCA 1042.

⁷⁹⁹ The term ‘extent’ embodies a notion of quantity that is not appropriate for the type of risk in question.

⁸⁰⁰ *Industrial Union Department. AFL-CIO v American Petroleum Inst.* (n 510).

to define those categories. How to define ‘serious’—or ‘significant’⁸⁰¹— damage? These are highly subjective concepts, which are perceived quite differently depending on location, period in time, and persons affected. The fundamental importance of climatic conditions to maintaining life on earth leads people to take the prospect of global warming seriously. The wide range of disturbances that will result from this process obliges States to demonstrate their duty of care. No one doubts that the issue is one where humankind confronts a threat of serious damage. But what about other types of risks that might arise? In the eyes of the layperson, the loss of an endemic species of flower from a tropical forest may appear insignificant. After all, such forests contain thousands of other similar species. However, if the species that is threatened with extinction conceals as yet undiscovered medicinal potential, firms that might engage in its commercialization and the sick whom it might cure will sustain a real loss.

Gauging the serious or significant character of the consequences of a risk is even more difficult when interaction with other risks is likely. As long as it remains isolated, a blow to the environment will not necessarily give rise to serious damage. However, it need only be repeated or interact with other assaults on the environment to suddenly take on unexpected dimensions.⁸⁰² Economists call this phenomenon the ‘tyranny of small decisions’ because of the perverse effects that may result from a large number of micro-decisions that individually have no importance for environmental protection but which, taken together, give rise to considerable damage.⁸⁰³ Should such risks be disregarded? Or should they be countered with a view to their cumulative effects? *A priori*, the latter. In the framework of the North Sea Conference, at any rate, the PP is formulated to ensure that low-level threats whose accumulation could pose a serious danger are taken into account. The CJEU, for its part, has adopted a very broad definition of the types of damage to human health that the principle should address.⁸⁰⁴

The degree of severity needed to trigger the implementation of the PP could certainly be made more objective by the use of economic criteria. For instance, the principle might apply only when the cost of repairing damage exceeds a specified sum of money. However, this would be to forget that the principle fits into a logic of decision-making rather than one of indemnization. In contrast to the PPP, it seeks to prevent, delay, regulate, or even forbid an activity rather than to indemnify its victims. Precaution is above all conceived as a means of avoiding damage that might give rise to extremely high levels of compensation. The principle therefore

⁸⁰¹ Preamble of the 1995 Protocol concerning specially protected areas and biological diversity in the Mediterranean.

⁸⁰² Regarding the cumulative impact of open-cast mining operations on protected species, see Case C-404/09 *Commission v Spain* [2011] ECR I-11835, para 80.

⁸⁰³ J Van Dunné (ed), *Non-Point Source River Pollution: The Case of the River Meuse* (Kluwer Law Int’l, 1996).

⁸⁰⁴ See the case law on the cumulative effect of chemical substances in Subsection 3.5.3.3.5.

does not really fit into the concept of risk coverage that characterizes the welfare state, where everything is considered ultimately repairable. Rather, it reminds us that we cannot always attribute an economic value to things; some damages are irreparable, beyond the power of money to fix. In such cases precaution provides a boldly innovative approach which recognizes the importance of the individual elements that make up the environment. Determining the seriousness of environmental damage on the basis of purely monetary criteria makes no sense in this framework.

4.2.2.2.2 Serious or irreversible damage The risk of irreversible damage might appear easier to determine than the risk of serious damage, since irreversibility may be scientifically, objectively determined. An irreversible situation is irrevocable: it is impossible to return to the point of departure. Neither corpses nor extinct species can be brought back to life.

But does all irreversible damage necessarily fall within the scope of the PP? Is not any serious bodily injury, not to speak of death, a form of irreversible damage for its victim, which no amount of money can truly compensate?⁸⁰⁵ If we follow that logic the majority of damage could be considered irreversible, and the principle would thus have to apply to a multitude of risks, undoubtedly reducing its effectiveness. Accordingly, we should ask ourselves if it is correct to equate the concepts of seriousness and irreversibility: for while irreversible damage is always serious, the opposite is not necessarily the case. Whereas the risk of irreversible climate change impacts (also called tipping elements) were considered to be low in the early 2000, they are nowadays considered with ever decreasing uncertainty to be moderate for the same increases in temperatures. By way of illustration, forest die-off provoked by climate change will increase wildfires and would lead to more warming. As a result, the shrinkage of carbon sinks will form a positive feedback compounding the impacts of CC. Small shifts in the climate system can thus trigger large-scale and often irreversible damage.⁸⁰⁶

For that reason the criterion of irreversibility does not necessarily constitute a satisfactory approach to the question. We should also note that in its 1999 Order, ITLOS required a risk of 'serious harm', not of irreversible damage, to southern bluefin tuna stocks in order to take provisional measures to avert their further deterioration.⁸⁰⁷

4.2.2.2.3 Serious and irreversible damage The French definitions of the PP combines the criteria of seriousness and irreversibility.⁸⁰⁸ This may at first glance

⁸⁰⁵ Ewald, 'The Return of the Crafty Genius' (n 784) 62.

⁸⁰⁶ EEA (2010) 23.

⁸⁰⁷ *Southern Bluefin* (n 221) (case nos 3 and 4), paras 77 and 80.

⁸⁰⁸ Constitutional Charter on the Environment, Art 5; Environmental Code, Art L 110-1, II, 1°. However, these requirements have been softened by the *Conseil d'État* in health protection cases. That

appear obvious, since irreversible damage is by definition serious.⁸⁰⁹ We should ask ourselves, however, if it is correct to equate the concepts of seriousness and irreversibility: while irreversible damage is always serious, the opposite is not necessarily the case. For example, experience has taught us that the often spectacular marine pollution caused by oil spills is largely reversible. Yet marine spills certainly fall within the scope of the PP owing to their seriousness.

4.2.2.2.4 Collective damage Given the difficulty of interpreting the terms ‘significant’, ‘serious or irreversible’, and ‘serious and irreversible’, the PP should probably apply only to collective damage which is catastrophic in nature. The effect of this, however, would be to exclude individual damage. Moreover, no criterion for collective damage appears in either the explanatory memoranda or commentaries of the various national and international instruments establishing the PP.

Injury to a worker resulting from a technological risk may well be serious and irreversible. In such a case, would the operator not be blamed for failing to take proper precautions? Following this logic, we may seek the equivalent of this criterion for cases of damage to the *res communes*. The fact that the environment is considered *res communes* tends to transform any type of ecological damage into collective damage. If a species of butterfly vanishes, strollers will be deprived of the pleasure of seeing it flit from flower to flower, photographers will no longer be able to capture its essence on film, entomologists will lose their subject of study, and so on. The damage in this case affects the collectivity, even if it concerns a very small element of the natural environment.

As a result, recourse to a criterion of collective damage is on one hand overly restrictive, since it excludes damages caused to individuals by technological risks; on the other hand it is superfluous in cases of damage to the *res communes*.

4.2.2.2.5 Damage under conditions of uncertainty We must ask ourselves whether the desire to determine damage on the basis of these criteria leads to a paradox since its occurrence remains subject to scientific uncertainty. How can one anticipate the seriousness, irreversibility, or collective character of damage that may never arise? The scope of the damage feared is in effect no more assessable than *sensu stricto* risk. Given the complexity of ecological processes and their reactions to possible assault, determining what damage may be anticipated is always a gamble.

jurisdiction requires that the environmental risk is likely to severely harm human health (CE Fr., 12 April 2013, *Association Stop THT*, para 37). See also Art D.3 (1) of the Walloon Environmental Code.

⁸⁰⁹ In *Confédération paysanne*, the CJEU held that the effects of the release of LMOs that may reproduce in the environment and cross national frontiers, thereby affecting other Member States may be irreversible. See Case C-528/16 *Confédération paysanne* (n 570) para 49.

The threshold models described above assume that the environment or the human body can assimilate a certain level of contaminants without being harmed. This assumption might, however, be incorrect in many cases. For example, for hazards such as harm to the immune systems of animals or human beings due to endocrine disrupting substances, thresholds may simply not exist.⁸¹⁰

A time element also comes into play. Ecological damage may show up belatedly, since chemical and biological effects do not necessarily become evident immediately; but when they do appear they tend to require major restoration works or be irreversible. Low levels of chemical contaminants exert impacts that are difficult to detect in short-term laboratory tests but show up later, often in the next generation. The principal tenet of toxicology—the ‘poison is in the dose’ should be supplemented by the observation that ‘duration reveals the poison.’⁸¹¹

We can of course learn from past experience when facing similar situations. However, that would be to overlook the fact that the PP applies precisely to hypotheses where clear experience is lacking.⁸¹² Any attempt to establish a hierarchy for damages that are serious or insignificant, irreversible or reversible, collective or individual would come up against the uncertainty inherent in the anticipated risk.

The PP is therefore not a comprehensive means by which to evaluate the scope of damage. In the long run, the political process rather than legal inference will have to determine which goods are most precious to us and then erect a firewall of precaution to protect them from external threats. For that reason perhaps, in contrast to the Rio Declaration which submitted the PP to ‘serious or irreversible damage’, the 1992 OSPAR Convention, the 1992 Helsinki Baltic Sea Convention, and the 2000 CPB do not apply any threshold requirements to threats of serious or irreversible damage: it is sufficient that a substance may give rise to a hazard to human health or harm living resources or marine ecosystems in order for the principle to be implemented.

4.2.3 The effect of uncertainty on the proportionality of precautionary measures

4.2.3.1 *Introductory note*

Even if we agree to recognize that suspected risk is real and may entail considerable damage, the decision-maker must still be convinced that the game is worth the candle. Risk reduction necessarily implies redistribution of resources, to the detriment of certain socio-economic sectors: a sacrifice that may be deeply resented

⁸¹⁰ A Gides and AM Soto, ‘Bisphenol A: Contested Science, Divergent Safety Evaluations’, in EEA Report No. 1/2013 (n 300) 217 and 219.

⁸¹¹ PL de Fur, ‘The Precautionary Principle: Application to Policies Regarding Endocrine Disrupting Chemicals’ in Raffensperger and Tickner, *Protecting Public Health & the Environment* (n 516) 342.

⁸¹² The third IPCC assessment report guidance on uncertainties noted that uncertainties are compounded by factors such as the impossibility of before-the-fact experimental controls and the time lags between climate effects and response.

during times of economic slowdown. The decision-maker will thus be forced to choose between reducing risks that have been only weakly demonstrated and meeting more immediate needs.

At this level, in contrast to the usual application of the PP, where the decision-maker balances the cost of a policy measure against the cost of inaction, a third parameter comes into play and complicates decision-making. The causal link between a hazardous activity and resultant environmental damage is suspected at this stage but cannot yet be demonstrated. Ignorance, indeterminacy, or incommensurability thus replaces full understanding of the risk involved, disturbing the decision-making process.

The decision-maker will undoubtedly be inclined to weigh the ecological cost of inaction against the socio-economic cost of the measure intended to avert the anticipated risk.⁸¹³ Yet such 'cost-benefit' analysis (CBA) is no longer valid, since the comparison between various parameters is unbalanced by the uncertainty surrounding the risk. Even if a decision-maker is convinced that the seriousness of possible environmental damage outweighs the economic advantage of not taking action, they will hesitate to intervene simply because they have reason to believe that the risk will not materialize. The cost of pollution avoidance measures will then be augmented by the cost of uncertainty, which will substitute for the internalization of externalities.⁸¹⁴ In this way, doubt leads to underestimating the cost of environmental damage in comparison to the cost of redistributing economic resources implicit in the adoption of a preventive measure. What price can we assign to damage that has not yet arisen? Once a risk is better understood, however, the decision-maker can more easily weigh the probable benefit of intervention against the cost of inaction.

4.2.3.2 Possible solutions

The principle of proportionality has been promoted in order to mitigate any excesses that might arise from an insufficiently nuanced application of the PP. If the risks must be weighed, the same should be true of precaution.

Although most of the definitions of the PP found in international law do not contain restrictions referring to 'economically acceptable' costs, this requirement is expressed in the 2001 POPs Convention,⁸¹⁵ the 2001 London IMO Convention on the Control of Harmful Anti-Fouling Systems on Ships,⁸¹⁶ and in the 1992 UNFCCC.⁸¹⁷

⁸¹³ C Gollier, 'Should we Beware of the Precautionary Principle' 33 (2001) *Economic Policy* 303–21.

⁸¹⁴ G Brüggermeier, 'The Control of Corporate Conduct and Reduction of Uncertainty by Tort Law' in Baldwin, *Law and Uncertainty: Risks and Legal Processes* (n 759) 65.

⁸¹⁵ Annex C.

⁸¹⁶ Art 6(4)(a)(iii).

⁸¹⁷ See also the 1998 Aarhus Protocols on heavy metals and POPs to the CLRTAP (Annexes III and V), the 1994 Energy Charter (Art 19(1)); and CETA (Art 24.8(2)).

Several provisions of EU law set out a similar requirement.⁸¹⁸ In particular, the EU courts as well as the EFTA Court review the precautionary measures in light of the general principle of proportionality, being aware that these measures may have been adopted when it was not clear that they were effective.⁸¹⁹ That being said, the CJEU takes into account the uncertainty, ‘which is inseparable from the concept of precaution’: it ‘influences the extent of the discretion of the Member State and thus has an impact on the means of applying the proportionality principle.’⁸²⁰ It follows that the impossibility of determining the toxicity thresholds does not amount to a breach of the principle.⁸²¹ In *Afton*, the CJEU held that the restriction placed on the MMT content of fuel was not disproportionate in relation to the economic interests of producers of that substance, in order to ensure a high level of protection of health and the environment.⁸²² Moreover, it must be accepted that a Member State can enact a precautionary measure that it deemed to be proportionate ‘without having to wait until the reality and seriousness of those risks are fully demonstrated.’⁸²³ Last but not least, under this principle the need to safeguard public health must be balanced against the principle of the free movement of goods.

Moreover, a number of domestic statutes require a proportionate approach. According to some definitions the proportionality of a precautionary measure should be assessed by means of a CBA based on economic criteria. The explanatory memorandum of the French legal provision enunciating the principle proposes that the cost of a precautionary measure should be ‘correlated with the seriousness of the risk and the economic capacity of the operators.’⁸²⁴ According to the 1998 Swedish Environmental Code, precautionary rules cannot be deemed unreasonable. In this respect, ‘Particular importance shall be attached . . . to the benefits of protective measures and other precautions in relation to their cost. The cost–benefit relationship shall also be taken into account in assessments relating to total defence activities or where a total defence measure is necessary.’⁸²⁵ By requiring that the ‘cost’ of the measure be ‘economically acceptable’, the legal definition of the principle confirms this interpretation.

⁸¹⁸ Communication on the PP, para 6.3.1. Regarding food safety precautionary measures, GFL, Art 7(2) provides that the precautionary measures ‘shall be proportionate’.

⁸¹⁹ Opinion of AG Kokott in Case C-343/09 *Afton* (n 17) para 62. Communication on the PP calls for the ‘least restrictive alternative. This means that controls and bans are only a means of last resort.’

⁸²⁰ Case C-282/15 *Queisser Pharma* (n 340) para 60.

⁸²¹ The regulation of polycyclic aromatic hydrocarbons in food is not disproportionate where the contested regulation is reckoning on an EFSA opinion ascertaining the carcinogenic and genotoxic effects of these substances, in spite of the impossibility to set out thresholds. Case T-14/16 *Apimab Laboratoires* (n 469) paras 167 and 168.

⁸²² Case C-343/09 *Afton* (n 17) para 68.

⁸²³ Case C-333/08 *Commission v France* (n 17), para 91.

⁸²⁴ G Cesar, *J.O.*, déb. Sénat, meeting of 12 October 1994, 4174, and P Herisson, *J.O.*, déb. Sénat, meeting of 9 November 1995, 2413.

⁸²⁵ 1998 Swedish Environmental Code Chapter 2, Section 7.

In the German debate about *Vorsorge* a central issue is the proportionality of administrative action (*Verhältnismässigkeit*). In its decision of 8 August 1978 on the operation of the Kalkar fast breeder reactor, Germany's Federal Constitutional Court recalled that 'it is appropriate to proceed to a reasonable evaluation of the risks.'⁸²⁶ Proportionality should in any case lead the decision-maker to evaluate the need for and usefulness of proposed measures by considering how they will affect the interests of the various parties influenced by a decision. A precautionary measure will be deemed disproportionate and should be abandoned if it brings into question in an inappropriate manner interests that are worthy of legal protection.⁸²⁷

However, some national laws go as far as to proscribe weighing ecological against economic interests, on the grounds that fundamental values should be protected at any price. For example, in the United States, even though the ESA does not recognize the PP as such, it gives absolute priority to the existence of species.⁸²⁸ Under this Act endangered species have an 'incalculable value'. In addition, the Federal Appeals Court of the District of Columbia has held that the US Clean Air Act (CAA) should be applied independent of economic considerations.⁸²⁹

The question then arises is whether the public authorities should carry out a classic CBA before taking any precautionary action or whether they could content themselves with a qualitative analysis of the pros and cons of the envisaged action. In our view, the requirement to carry out a CBA might be inappropriate for the following reasons.

First, a CBA does not address the issue of defining what 'costs' are 'economically acceptable', and for whom. In addition, it will never be accurate as long as economic analysis remains incapable of correctly internalizing all externalities in a context of uncertainty. From an economic point of view there are clearly no simple or comprehensive rules for integrating risk and uncertainty into decision-making.⁸³⁰ Indeed,

⁸²⁶ Cf. the comment on this decision in Subsection 3.7.5 above.

⁸²⁷ While precautionary measures to reduce emission loads need to be proportionate to the risks they are intended to address, a programme that seeks to reduce emission loads across the board and is tailored to provide for uniform and regular implementation has been upheld as complying with this requirement of 'global' or overall proportionality (*BVerwGE* 69, 37: Heidelberg Heizkraftwerk). See also S Rose-Ackerman, *Controlling Environmental Policy* (Yale UP, 1994) 77; G Roller, 'Environmental Law Principles', in Sheridan and Lavrysen, *Environmental Law Principles in Practice* (n 65) 165–7.

⁸²⁸ By way of illustration, the listing of endangered species under Section 4 of the US ESA must be conducted solely on scientific evidence. KA Saterson, 'Biodiversity Conservation', in Wiener et al, *The Reality of Precaution* (n 64) 204–5. By the same token, the classification of special birds protection areas in EU law abides solely on ornithological criteria. See Case C-355/90 *Commission v Spain* [1993] ECR I-6159, para 22; Case C-166/97 *Commission v France* [1999] ECR I-1719, para 38. What is more, State authorities have to show on the basis of the best available scientific evidence why they consider that a protected polder can be removed from the Natura 2000 network. C-281/16 *Vereniging Hoekschevaards Landschap* [2017] C:2017:774.

⁸²⁹ *Natural Resources Defense Council v US EPA*, 824 F.2d (D.C. Cir. 1987), 1163.

⁸³⁰ D Pearce, 'The Precautionary Principle and Economic Analysis' in O'Riordan and Cameron (n 65) 194.

the uncertainty inherent in precaution increases the possibility that ecological interests could be systematically compromised compared to competing interests since, as recalled above, the gravity of suspected damage can only be known in an approximate manner.⁸³¹ The fact that causation may not be entirely clear (and there is continuing theoretical conflict as to how this question should be handled) also serves to complicate the decision-maker's task. In any event, such a calculation can never be as precise as might be the case for a measure adopted in a hypothetical stable universe where risks could be completely mastered. As with risk assessment, value judgements and assumptions are likely to influence the whole process.⁸³²

Secondly, in addition to the irreversible, we must acknowledge the problem of the irreparable. Increasingly, victims are no longer satisfied with receiving compensation, no matter how high. The PP contradicts the postulations of an insurance-based society, which presupposes that one can assign a price to everything.⁸³³ For these reasons balancing the disadvantages of a precautionary measure against the advantages it is meant to secure cannot be limited to carrying out a classical CBA. Not everything can always be considered from an economic perspective. For instance, the benefits of avoiding CC are notoriously difficult to estimate, since many impacts cannot easily be translated into monetary terms.⁸³⁴ Likewise, traditional CBA is often inappropriate to use in deciding whether the PP is suitable for biodiversity conservation. Indeed, the negative impacts of biodiversity loss as well as the positive impacts of conservation are difficult to quantify. Environmental goods such as endangered species or landscapes are not commodities; their value can only be appreciated collectively. Our duties to future generations or to the global commons must be understood as incommensurable with classical economic valuation in the sense that such values cannot be ranked in a scale of relative worth; in other words, they cannot be represented by CBA techniques. Therefore precaution must reintroduce common sense into decision-making: where risks are deemed unacceptable, they must be prevented absolutely and not subject to a CBA.

Thirdly, decisions must thus also take into account other non-quantifiable values (aesthetic, spiritual) at the economic level. Calculating these non-monetary values also compound the uncertainties of a CBA.⁸³⁵ Examining costs and benefits entails comparing the overall cost to the community of action and lack of action, in both the short and long term.⁸³⁶ Potential long-term effects must especially be taken into account in evaluating the proportionality of measures in the form of

⁸³¹ Lee, *EU Environmental Law* (n 556) 31, 34–8.

⁸³² L Heizerling, 'Regulatory Costs of Mythic Proportions' 107 (1990) Yale LJ 181.

⁸³³ Ewald, 'The Return of the Crafty Genius' (n 784) 62.

⁸³⁴ Grassl and Metz, 'Climate change' (n 679) 319.

⁸³⁵ Lee, *EU Environmental Law* (n 556) 34.

⁸³⁶ According to the Communication from the Commission on the PP, this is not simply an economic CBA: its scope is much broader, and includes non-economic considerations, such as the efficacy of possible options and their acceptability to the public.

rapid action to limit or eliminate a risk whose effects will surface in several decades or will affect future generations.⁸³⁷

Fourthly, it is reasonable to wonder to what extent the criterion of economic balance should continue to be allowed in cases where precautionary measures refer back to a constitutional right to environmental protection.

In the EU, strong support for this view is given by the CJEU. The obligation, set out in the Communication on the PP, to carry out an impact assessment is no more than a specific expression of the principle of proportionality. In virtue of that obligation, the European Commission is required to assess the advantages and disadvantages of its measure,⁸³⁸ in particular by taking 'all relevant information into account for that purpose'. That being said, the preliminary assessment must serve as an aid to political decision-making, not a substitute to it.⁸³⁹ In *Bayer CropScience*, the EU GCt has been stressing that such a requirement is justified 'a fortiori in the context of the application of the PP, where the administration adopts measures restricting the rights of individuals, not on the basis of scientific certainty, but on the basis of uncertainty'. On the one hand, the individual must accept that they may be barred from carrying on an economic activity even though it is not even certain that it entails an unacceptable risk. On the other, the administration must at least be required 'to assess fully, as far as possible, the consequences of its action, as against the possible consequences of its inaction, for the various interests at stake'.⁸⁴⁰ Nonetheless, nothing requires the EU institution to demonstrate that the monetized benefits of the measure shall outweigh its costs. In effect, the Commission enjoys a 'considerable discretion regarding the methods of analysis'.⁸⁴¹ Lastly, the impact assessment is not binding on either the Parliament or the Council.⁸⁴²

4.2.4 Risk trade-offs

In assessing the proportionality of a precautionary measure, one should also consider non-targeted risks that might arise: to refuse to run a risk is often to accept

⁸³⁷ According to the Communication on the PP, risk reduction measures should not be limited to immediate risks where the proportionality of the action is easy to assess. It is in situations in which adverse effects do not emerge until long after exposure that cause-and-effect relationships are more difficult to prove scientifically and where the precautionary principle must consequently often be invoked. In this case the potential long-term effects must be taken into account in evaluating the proportionality of measures in the form of rapid action to limit or eliminate a risk whose effects will not surface until ten or twenty years later or will affect future generations. This applies in particular to ecosystem effects (para 6.3.1).

⁸³⁸ In that connection, see the obligation to assess 'the potential benefits and costs of action or of lack of action' pursuant to TFEU, Art 192(3).

⁸³⁹ European Commission, *Impact Assessment Guidelines* SEC (2009) 4. That said, the performance of a CBA is not a technocratic exercise. When it relates to a legislation, the CBA should be the prerogative of the lawmaker. Case C-151/17 *Swedish Match* [2018] C:2018:938, paras 61–2.

⁸⁴⁰ Joined Cases T-429/13 and T-451/13 *Bayer CropScience* (n 37), para 170.

⁸⁴¹ *Ibid.*, para 459.

⁸⁴² Case C-343/09 *Afton* (n 17) para 57.

other, opposite risks.⁸⁴³ Even if a decision-maker is convinced of the need to intervene in order to eliminate a risk, they may have to abandon the planned measure if it is likely to give rise to a different hazard.⁸⁴⁴ They may find themselves confronting competing scenarios which, as the following examples illustrate, are difficult to prioritize.

Is it appropriate to combat famine worldwide by opening the way for the growth of biotechnology or, on the contrary, must we brake its development in the name of still uncertain risks? Should the construction of dams be encouraged on the grounds that they could produce clean energy, even at the cost of the irreplaceable ecosystems that will be submerged in the process? Or should we endeavour to conserve natural resources at any price? What about the construction of high-speed trains? Should this be encouraged because these trains compete with more polluting modes of transport without consideration for the natural areas that will be disturbed by the infrastructure they require?

The question of trade-offs became particularly relevant in Europe at the end of 2000, when some States, including France (followed by the European Commission) prohibited the use of animal-based feeds. While discontinuance of these feeds reduced the risk associated with eating beef, it also put an end to an important recycling activity for animal fats that would otherwise have to be eliminated through more polluting methods such as incineration, and increased the import of genetically modified maize from the United States, of which European consumers are wary.

However, there are limits to the trade-offs that can be considered in risk analysis. It would be excessive to oblige regulatory agencies to consider the environmental consequences resulting from the financial impact of risk-reduction decisions. Thus, for example, the District of Columbia Court of Appeals rejected the argument that the EPA 'erred in refusing to consider the health consequences of unemployment in determining the primary National Air Quality Standards for particulate matter' and held that 'it is only health effects relating to pollutants in the air that EPA may consider'.⁸⁴⁵

⁸⁴³ On risk trade-off analysis, see, e.g., J Graham and J Wiener, *Risk v Risk* (Harvard UP, 1995); JB Wiener, 'Managing the Iatrogenic Risks of Risk Management' (1998) 9 *Risk: Environment Health & Safety* 39–84; JB Wiener, 'Precaution in a Multi-Risk World', in D Paustenbach (ed), *The Risk Assessment of Environmental and Human Health Hazards*, 2nd ed (John Wiley, 2001).

⁸⁴⁴ Some US authors go so far as to defend the thesis that policies based on a precautionary approach act to generate risks whose scope exceeds those of the risks that have been avoided. See, e.g., F Cross, 'Paradoxical Perils of the Precautionary Principle' (1996) 53 *Wash & Lee LR* 851. This argument does not appear to be supported by recent case studies carried out in the EU by the EEA. In cases involving BSE, asbestos, and fisheries (collapse of Canadian cod stocks) regulatory inaction to prevent uncertain risks led to far greater costs than if precautionary measures had been taken. Better targeted research at an earlier stage would have helped to minimize future costs. See, e.g., EEA, *Late Lessons* (n 209) 17–27, 52–61, 157–67, and 181.

⁸⁴⁵ *NRDC*, 902 F.2d 972–3; *American Trucking Associations Inc v EPA*, 175 F.3d 94.

The concept of the general interest is inherent in the approach to environmental risk. In practice, however, that general interest will be defined in a variety of ways by different societal groups. Therefore it will again fall ultimately to the political establishment to arbitrate between the conservation of biodiversity and the production of less polluting energy, between modernizing agricultural production and genetic upheaval, etc., on the basis of the values it upholds. Yet the ramifications of these alternatives should, at the very least, be clarified in the light of the PP, with the aim of ensuring that final decisions conform to the general interest.

4.2.5 Critical assessment

The PP has been put forward as the best as well as the worst of principles. Applied strictly according to the letter it would condemn us to inaction. The principle would become inapplicable if taken to the extreme: it would lose its way, a substitute for good intentions. On the other hand, to place absolute faith in the competence of techno-science is sooner or later to court irreversible damage which could be averted by timely action. We no longer have a right to err. But at what price? That is the question. While a certain number of markers must be fixed to prevent the PP resulting in absurd decisions, it is nevertheless essential that these be set out intelligently in order to use precaution wisely.

Conscious of these problems, both legislators and courts are attempting to define the scope of the PP within the limits of what is reasonable, by gradually giving shape to *stricto sensu* risk, anticipated damage, and the scope of policy measures. Even the most progressive formulations of the principle are circumscribed in scope, allowing for regulatory actions under a host of conditions. Given the limitation of science, it is possible to lay down more technically precise requirements such as 'reason to assume' and 'significant harm'? However, careful consideration of several definitions makes it clear that the limits being set for the principle at times contradict its stated objective. Is it reasonable to require that a decision be based upon the existence of relevant scientific and technical data in the case of hypothetical damage which would be both significant and irreversible and where the decision will not even seriously affect socio-economic interests? Under multiple conditions of this sort, it appears that recourse to the PP is subject to excessive precaution. A balance must be struck between the two extremes: absolute certainty and the sheer absence of rational basis.

Throughout this section we have sought an equitable path that would preserve the useful effect of the PP without paralysing innovation. We have drawn several conclusions from this exercise. Even if the principle does not require that the probability of damage be fully demonstrated, it should nevertheless not take purely hypothetical risks into account. Entirely speculative considerations are thus excluded. Common sense also suggests that the principle should not apply in the case of an extremely low probability of very slight damage. Thus the injury to be averted should be reasonably specific, even if the much cited criteria of seriousness and

irreversibility are not always satisfactorily met. Finally, the proportionality of the measures should not be reviewed in the narrow framework of a CBA. Rather, proportionality should be broadened to take into account long-term non-economic advantages for society as a whole.

To conclude, we should ask ourselves if it is reasonable to expect such conditions to be reflected in normative texts. The nature of a legal principle is precisely *not* to be the subject of a complete and exhaustive definition in positive law; what is sought is a flexible norm able to adapt to the heterogeneous situations in which it will be used. Any attempt to define a legal principle by overly precise wording would definitively restrict its meaning, thereby rendering it useless. Moreover, although a legal principle may remain vague, its scope will gradually be clarified as it is applied in various situations. Legal analysis will carry out this beneficial work.

5. Science versus precaution: a false dichotomy

The PP runs up against the need for certainty that permeates the legal system as a whole.⁸⁴⁶ In order to derogate from the principle of the free movement of goods national measures must demonstrate the existence of risk; to obtain compensation for damage a victim must establish a clear causal link between that damage and an event; authorization to place a product on the market or to employ a new technology cannot be refused unless a suspected risk is firmly established. Positive law is thus partnered by scientific certainty. This presupposes continuous recourse to scientific expertise, with experts being able to provide flawless advice to both courts and supporting the decision-maker. Yet growing uncertainty has eroded this faith in science at the service of power. In addition, the perception of what constitutes risk is strongly influenced by psychological elements that cannot be quantified.

The emergence of the PP can be seen as a response to the limitations of science in the environmental realm. In effect, 'l'imprévisible est dans la nature même de l'entreprise scientifique (unpredictability is at the hearth of scientific investigation).'⁸⁴⁷ Given that the PP applies in the context of scientific uncertainty, it is considered by the proponents of 'sound science' to be antithetical to scientific knowledge. In other words, critics of the PP often set precaution and scientific knowledge against one another. The implication of this opposition is that the adoption of the principle might somehow be seen *a priori* as being antithetical to the principles of scientific rigour in the regulation of risk (systematic methodology,

⁸⁴⁶ Scientific certainty has been embedded in European culture since the Renaissance. For instance, the second rule for the direction of the mind proclaimed by René Descartes is that: 'We must occupy ourselves only with those objects that our intellectual powers appear competent to know certainly and indubitably.' R Descartes, *Rules for the Direction of the Mind* (Paris, 1628).

⁸⁴⁷ F Jacob, *La souris, la mouche et l'homme* (O Jacob, 1997) 189.

scepticism, transparency, emphasis on learning, etc.). Within such a perspective, implementation of the PP essentially becomes a politically determined compromise which has nothing to do with 'sound science'.

The purpose of this fourth section is precisely to demonstrate that the PP and the principles of scientific rigour are not antithetical, but rather mutually reinforcing. We base our analysis upon the following antimony:

- a *thesis* according to which precaution frees the decision-maker from the constraints of scientific expertise (Subsection 5.1), and
- an *antithesis* according to which precaution reinforces the position of experts to the detriment of decision-makers (Subsection 5.2), in order to derive
- a *synthesis* which shows, by focusing on the practical implications of the subtle relationship between science and precaution in risk analysis, that the PP could serve to reconcile the roles of scientists and decision-makers (Subsection 5.3).

Even though this section is firmly based on the empirical elements of Section 2 above (primarily case law relating to RA of GMOs and chemicals) we have tried to adopt a multidisciplinary approach by referring to recent research in the field of social sciences (political sciences, philosophy, sociology).

5.1 Thesis: returning decision-making to the political sphere

Environmental law has its source in a paradox that has not yet played itself out: the fact that the vulnerability of terrestrial ecosystems became apparent in the mid-1960s, at the very time when technology had most firmly established its mastery over nature. Since then the innovative powers of technology have consistently exceeded the capacity of science to anticipate potential adverse effects. Environment policy and science therefore stand in a paradoxical relationship to one another: while science (and its technological offspring) stand accused of being largely responsible for environmental damage, we rely upon science to identify the very ills to which it gives rise and to prescribe their necessary remedies.

Several factors explain why sciences are much more in evidence in environment law than in other branches of law. First, the sciences detect, identify, and set out the ecological problems to which the law must respond. Secondly, environmental crises are increasingly perceived through scientific descriptions of our physical world. Only scientists are capable of discerning the threats posed by nuclear power, biotechnology, synthetic chemistry, and other technologies. No one actually observed the hole in the ozone layer, and the lay gaze will never manage to scrutinize the stratosphere, animal tissues, or the oceans' shoals. Science may thus claim

to be both the problem and its solution.⁸⁴⁸ And given that environmental statutes empower administrations to define the adequate level of protection, sciences play a dominant role in setting protective standards in accordance with the legislative mandate. RAs performed by scientists provide the cornerstone for much environmental legislation. Thus, environmental regulations remain heavily dependent on sciences in the form of technical regulations, acoustic thresholds, chemical concentrations, fishing quotas, etc. Last but not least, sciences are often called upon to play a decisive role in judicial procedures. Sciences are thus the foundation for environmental regulations.⁸⁴⁹

It is hardly surprising, then, that environmental law should be deeply marked by a heavy reliance on science. In fact, no area of public policy is comparably dependent on science.

Scientists thus play a decisive role in the conception and implementation of this legal discipline; all the regulations adopted in this field, without exception, are based on their calculations, their computations, or their affirmations.⁸⁵⁰ Whether it is a question of setting a nuisance threshold, delimiting a protected area, or listing a species for legal protection, decisions are based on scientific considerations. By establishing their validity, science is linked to legal standards to such an extent that environment law would be crippled without its contribution. Science has become both the basis and the justification for political decision-making: political decisions are legitimate because they are based on RA performed by risk assessors who are legitimate because they apply sound science.⁸⁵¹

Yet this marriage of reason is not entirely free of strife: to the extent that science postulates what exists while law lays down what should be, their respective logics are mutually inconsistent. Science is descriptive whilst law is prescriptive. By way of illustration, where the jurist conceives environmental protection in terms of the number of persons to be protected or hectares to be conserved, the ecologist thinks in terms of ecosystems. The latter conform to the long rhythm of natural cycles, the former to the staccato tempo of human expectations. Legal rules are meant to provide predictability, yet nature is unpredictable. Scientists tend to acknowledge the complexity of their subject whilst lawyers tend to simplify their thinking in providing binary choices. While the jurist seeks certainty, the scientist points to the uncertainty inherent in environmental risk. Uncertainty is more easily embraced

⁸⁴⁸ J Theys and B Kalaora, 'Quand la science réinvente l'environnement' 1 (1992) *Sciences et société* 21.

⁸⁴⁹ E Fisher, 'Science, Environmental Laws, and Legal Cultures' in Lees and Viñuales, *Oxford Handbook of Comparative Environmental Law* (n 546) 751–3.

⁸⁵⁰ The reliance on science is reflected in regulatory instruments. See UNCLOS, Art 61(2); UNFSA, Art 5(b) and 6(3)(a); TFEU, Art 191(3). In fisheries, precautionary measures have to be based on the best scientific evidence available (Regulation (EU) No 1380/2013 on the Common Fisheries Policy, Art 2(2)). One of the principles of good governance of the CFP requires the establishment of measures adopted 'in accordance with the best available scientific advice' (Regulation (EU) 2013, Art 3(c)).

⁸⁵¹ V Heyvaert, *Coping With Uncertainty: The Regulation of Chemicals in the EU* (European University Institute, 1999) 186.

by scientists than lawyers, not least ‘because open-ended questions provide on-going opportunities for further research.’⁸⁵² Moreover, the fact that scientific research is relatively open-ended because of its complexity and that old theories might always be overturned by better ones can generate tensions with law.⁸⁵³ Each discipline adopts different methods and standards of proof. Environment law attempts to resolve these contradictions. While it relies heavily on scientific data, it nevertheless remains a legal system: that is, a means of managing a fictitious social order, able to regulate conflicts with its own set of conceptual tools. As a result, scientists involved in the legal processes may feel their expertise inappropriately used.

At the same time we are now seeing the appearance of post-industrial risks that could endanger the very conditions that sustain life on Earth.⁸⁵⁴ From the erosion of genetic resources to depletion of the ozone layer, from global warming to the spread of persistent and bioaccumulable pollutants throughout the world’s waters, all global ecological problems present specific characteristics relating to scientific uncertainty. It is precisely the impossibility of measuring and anticipating all their effects on the environment and human health that set them apart from anything we have known before. Faced with the growing complexity and globality of ecological phenomena, science has ceased to be omnipotent. Strictly speaking, it is no longer possible to have so-called technical standards that express the facts in a definitive manner. Complete scientific certainty is the exception rather than the norm. As pointed out in Hans Jonas’ *The Imperative of Responsibility*, a paradigm of uncertainty has taken the place of certainty: ‘Whereas Descartes recommended that we hold as false everything that can be questioned, faced with planetary risks it would on the contrary be advisable to treat doubt as a possible certainty and thus as a fundamentally positive element in any decision.’⁸⁵⁵

Classical science has tended to privilege ‘hard’ scientific fact. Moreover, science is deemed to be objective on the account that it can be neatly separated from values. This made it easy to determine what decisions could be considered well grounded. Henceforth, post-Cartesian science will call for hard fact to be replaced by flexibility. Such science seeks to apprehend the greatest uncertainty—that is, ignorance⁸⁵⁶—and assess its dialectical interaction with knowledge. No longer omniscient, science will not have the power categorically to express a single truth. Scientific and technical progress will from now on be ruled by laws very different from those in place at the time of its most rapid advances. Furthermore, science is not neutral and above the political fray as previously believed; the choice of apparently neutral scientific assumptions often reflects political power relations. Unexpressed value judgements, which are meant to be safely sequestered during

⁸⁵² L Godden et al, *Environmental Law*, 2nd ed (OUP, 2018) 334.

⁸⁵³ Cranor, *Toxic Torts* (n 298) 208–9.

⁸⁵⁴ See the discussion in Subsection 4.1 above.

⁸⁵⁵ H Jonas, *The Imperative of Responsibility* (University of Chicago Press, 1984).

⁸⁵⁶ See the discussion on ignorance in Subsection 4.1.4.3 above.

risk management, significantly influence the outcome of RAs. The vague regulatory standards requiring agencies to eschew significant or unreasonable risks leave the risk assessors to effectively decide in practical terms what is acceptable and how the different objectives should be balanced. However, the responsibility and accountability for decisions on protection goals and risk acceptability should lie with legislators and risk managers, not with scientists.⁸⁵⁷ In the field of chemical substances, what gets chosen for toxicity testing, by whom, and by what methods are crucial political issues.

The reversal of certainty and doubt seriously disturbs the relations with the political authorities that scientific circles have patiently built up over time. A decision-maker always seeks reassurance through certainty; they therefore expect scientists to provide simple and categorical answers from which they can deduce political decisions. Henceforth, however, when scientists are consulted they will inform the decision-maker that their knowledge is incomplete and express doubts and differences, even ignorance. For instance, as stated by the IPCC, 'some of these uncertainty aspects may be irreducible in principle, and hence decision makers will have to continue to take action under significant uncertainty, so the problem of climate change evolves as a subject of risk management in which strategies are formulated as new knowledge arises'.⁸⁵⁸

Hence, experts will have to work to overcome the aversion of the political elite to everything that is imprecise, improbable, or uncertain. The disappearance of the alliance between knowledge and power will shatter the Weberian myth of the expert providing indisputable knowledge to a politician who takes decisions that reflect the values they defend.⁸⁵⁹ This will in turn exacerbate the recurrent tensions between a public decision-making process dominated by pragmatism and a scientific approach which, to its credit, is characterized by uncertainty.

As we have seen, this context of uncertainty has given rise to the PP, which has its roots in an epistemology that posits the relativity of scientific knowledge. Precaution in fact gives evidence of a deeply disturbed relationship to science, which is consulted less for the knowledge that it offers than for the suspicions and doubts to which it gives rise. In the framework of prevention the search for safety was oriented towards a steady growth of the scientific and technological arsenal; from the perspective of precaution, security consists in strengthening the duty of care in the face of unforeseen risks. The PP involves going beyond the classic scientific–technological model for combatting risk. We would no longer reason in terms of thresholds; rather, we would have to take the trouble to assess what cannot

⁸⁵⁷ SAM Group of Chief Scientific Advisors, *EU Authorisation Processes of Plant Protection Products, Scientific Opinion 5/2018* (POUE, 2018) 26.

⁸⁵⁸ IPCC, *Climate Change 2014* (n 680), 10.4.2.2. Precautionary Considerations.

⁸⁵⁹ M Weber, *Le savant et le politique* (Union générale des éditions, 1963).

be assessed. The principle invites one to anticipate what one does not yet know, to take into account far-fetched forecasts as well as reasonable scientific plausibility.⁸⁶⁰

No longer dependent on the current level of scientific knowledge, decisions could—indeed, should—be taken in the presence of doubt, as well as ignorance. It will not be possible to avoid recourse to extra-scientific judgments. This amounts to a powerful return to political decision-making, for the decision-maker will no longer be able to take refuge behind a screen of scientific pseudo-certainties provided by the expert. More than ever before, the decision-maker will find themselves constrained to make choices: or more precisely, to choose among more or less acceptable hypotheses. In any case, they will have to explain their decisions and confront the consequences of their choices. The decision to act or to abstain from action will consequently be placed back in political hands. Only in this way can environmental law free itself from domination by science.

If the PP makes it difficult to delay adopting measures to prevent environmental degradation on the grounds that scientific certainty has not been established, scientific certainty or 'sound science' can no longer, *a contrario*, be considered as the absolute reference criterion for decision-making.

We may wonder about the legal implications of such a transformation of scientific knowledge. Does disengagement from the requirement to provide rational and objective grounds for binding norms mask an abrupt return to the arbitrary? Should public authorities be allowed to discriminate among those they administer without being able to justify their measures on the basis of reliable evidence? Does this not amount to implicit acceptance that authorities may regulate without justifying their acts: in other words, to granting them unlimited discretionary power?

5.2 Antithesis: reinforcing the role of experts

At first glance the PP appears to relativize the role played by scientists in the decision-making process. Should we then fear that they will be rendered superfluous? That would be an exaggeration. In this subsection we develop the antithesis according to which the operational contents of the PP are entirely consistent with and even reinforce the use of expertise in the decision-making process.

First of all, arguing that 'sound science' is the sole arbiter of policy action undermines trust in the concept of scientific analysis.⁸⁶¹ The PP is there to respond to intractable problems in RA, such as ignorance and incommensurability, and this is entirely consistent with sound scientific practice. Acknowledging uncertainty is

⁸⁶⁰ Ewald, 'The Return of the Crafty Genius' (n 784) 66.

⁸⁶¹ B Haerlin and D Parr, 'How to Restore Public Trust in Science' 400 (1999) Nature 499.

thus part of science; it clarifies what is known and not known and stimulates further research.⁸⁶²

Secondly, a minimal degree of scientific expertise is needed to set in motion a policy of precaution, which may take extremely varied forms according to the nature of the risk in question.⁸⁶³ Rather than exclude science, precaution thus legitimizes it.

Thirdly, the requirement that scientific uncertainty not delay the adoption of a measure intended to enhance environmental protection does not prevent immediate action being supplemented by scientific follow-up in order to reduce the margin of uncertainty about the scope of the problem confronting the decision-maker. Indeed, one of the central features associated with the PP is the continuous re-evaluation of scientific evidence: all decisions taken in a context of uncertainty should regularly be revised in the light of new information.⁸⁶⁴ In the field of food safety follow-up measures are widely used: they allow the authorities to control the health impacts of food products from the farm to the fork.⁸⁶⁵ The efforts of the international community to fight atmospheric pollution perfectly illustrate such a scientific review procedure. In this case a necessary transition was effected from a classical international law approach (the timely adoption of conventions setting out rather vague legal obligations) to a continuous normative process characterized by the adoption at regular intervals of protocols setting out more precise obligations than those contained in their framework conventions. Scientific progress in identifying the causes and effects of regulated phenomena makes it essential that legal obligations be adapted through additional protocols.

Science therefore needs to play a vital role in implementing the PP.⁸⁶⁶ Nevertheless, in all likelihood scientists will have to play a fundamentally different role in this new arrangement from the one reserved for them in the framework of the preventive model. As scientists learn more about the effects of various hazards they may come to realize that greater knowledge does not necessarily translate into greater understanding about the complexity of environmental disturbances. Rather than formulating solidly established truths, the scientist's task will in future be to transform the evaluation of scientific uncertainty into functional estimates of what data could be useful in implementing policies. Consequently, the scientist will provide the decision-maker with uncertain but evolving knowledge. This new discourse will also stimulate discussion about essential values. The PP will thus

⁸⁶² Stirling, *On Precautionary and Science Based Approaches* (n 716) 12.

⁸⁶³ For a discussion on the minimal degree of scientific expertise needed to set in motion a policy of precaution, see Subsection 3.5.3.3.3 above.

⁸⁶⁴ Cases T-429/13 et T-451/13 *Bayer CropScience* (n 13).

⁸⁶⁵ According to Art 5(7) of the SPS Agreement, a State taking a precautionary measure must seek to obtain 'additional information necessary for a more objective assessment of risk'.

⁸⁶⁶ K Barrett and C Raffensperger, 'Precautionary Science' in Raffensperger and Tickner, *Protecting Public Health & the Environment* (n 516) 107.

extend the autonomy of policy without constraining research; on the contrary, it will encourage it.

Likewise, the science of climate change is increasingly being drawn into political structures, to the point where ‘climate change science’ is not always separable from the political process that shapes it.⁸⁶⁷ Rather than constituting an obstacle to decision-making, scientific expertise makes possible the continuous adaptation of the decision-making process. Accordingly, uncertainty has been taking centre stage in the IPCC Reports. Explicit assignment of the author’s confidence in the underlying science is backing up each conclusion.⁸⁶⁸ Evidence is expressed either qualitatively or quantitatively. The type, the amount, the quality, and the consistency of the evidence determine the level of certainty. Hence, the degree of certainty is expressed as a qualitative level of confidence (from very low to very high),⁸⁶⁹ and, when possible, probabilistically with a quantified likelihood (from exceptionally unlikely to virtually certain).⁸⁷⁰

5.3 Synthesis: reconciling science (risk assessment) and politics (risk management)

There is growing international debate about the relationship between the PP and RA methodology, spurred by recent trade controversies concerning environmental issues (POPs) or food safety issues (beef hormones and GMOs).⁸⁷¹ By narrowly defining the scientific basis for health or environmental decision-making in terms of quantitative assessment, the classical RA methodology required by international organizations can limit the ability of national authorities to take precautionary measures. The question then arises as to how to reconcile the RA analysis typically used by regulatory agencies and the tendency of some political authorities to break free of these procedures in the name of the PP.

This discussion, which has significant implications for international trade, allows us to establish a synthesis between the thesis and antithesis described in the two preceding subsections. That synthesis is as follows: while the PP simultaneously reinforces the weight of expertise and political decision-making, it also

⁸⁶⁷ The IPCC displays a Janus-face as it is an intergovernmental body and a scientific body, which reports involve both peer review and review by governments.

⁸⁶⁸ IPCC Cross-Working Group Meeting on Consistent Treatment of Uncertainties, *Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties* (2010).

⁸⁶⁹ ECHA, *Guidance on information requirements and chemical safety assessment—Uncertainty analysis* (2012); EFSA, *Guidance on uncertainty analysis* (2018).

⁸⁷⁰ IPCC, 2014: Summary for Policymakers, in *Climate Change 2014* (n 680) 4.

⁸⁷¹ While the PP was initially applied to environmental issues, such as dumping of pollutants, which are characterized by sparse scientific data useful for setting policy, it has been expanded to protect against environmental health risks for which extensive toxicological and epidemiological data are available. For example, KR Foster, P Vecchia, and MH Repacholi, ‘Science and the Precautionary Principle’ 288:5468 (2000) *Science* 979–81.

requires these two areas to interact in order to master the challenges posed by the risks they must assess and manage.

After examining the advantages and shortcomings of a structured approach to risk analysis (Subsection 5.3.1) we explore how the PP could redefine both *risk assessment* (Subsection 5.3.2) and *risk management* (Subsection 5.3.3).

5.3.1 Advantages and shortcomings of a structured approach to risk analysis

Even though few standards for national risk regulation have emerged in a systematic and rationalist manner, international law as well as US and EU law have progressively emphasized a structured approach to risk analysis. The advantages and drawbacks of this approach are synthesized in this subsection.

5.3.1.1 *The attraction of a structured approach to risk analysis*

The traditional structured risk analysis approach comprises a two-step process. First, the probability of the occurrence of harm is determined using an RA, in which experts examine both hazard and exposure, generally by mathematical modelling, in order to calculate an acceptable or tolerable level of contamination or exposure.⁸⁷² RA is broadly similar to EIA, in the sense ‘that it is concerned with predicting risks and preventing, as far as practicable, future harm.’⁸⁷³ This systematic process involves a four-step approach: hazard identification (does a substance give rise to an adverse effect such as cancer, birth defects, etc.); dose-response assessment (how potent a carcinogen is it?); exposure assessment (which groups of people are exposed to the substance, what is the environmental vehicle of exposure—air, water, soil—for how long, and at what levels?); and risk characterization (what is the likelihood that any particular exposed person will get cancer?).⁸⁷⁴ Table 3.9 highlights the steps in the risk assessment process.

In brief, the risk characterization provides a numerical estimate of the probability that a harm will result from the exposure to the hazardous agent. Because RA rules are strongly procedural in nature, they structure the decision-making process. Imbued with the magic of numbers, RA offers the decision-maker a structured information set: namely, an estimation of the probability of adverse effects occurring as the result of use of a particular substance or product. When the RA procedure is completed, a *risk management* decision must be taken by politicians, taking into account both legislative requirements and economic, political, and normative dimensions of the problem. Risk management, in contrast to RA, is the public process of deciding how safe is safe. It necessarily requires ‘the use of value judgments on such issues as the acceptability of the risk and the reasonableness of the costs of control.’⁸⁷⁵

⁸⁷² NRC, *Risk Assessment in the Federal Government: Managing the Process* 3 (1983) 13.

⁸⁷³ Godden, *Environmental Law* (n 852) 349.

⁸⁷⁴ See GFL, Art 3(11); Case T-13/99 *Pfizer* (n 17), para 156.

⁸⁷⁵ NRC, *Risk Assessment* (n 872) 18.

Table 3.9 Steps in the risk assessment process

RA Stages	Objectives	Exposure
Hazard Identification	Identification of the intrinsic properties of the chemical and the adverse effects associated with those properties	Does not take exposure into account
Hazard Characterisation	Dose–response analysis determines the relationship between dose and the type of adverse response and/or probability or the incidence of effect	Does not take exposure into account
Risk Identification	Exposure assessment of the nature and the probability of human or environmental receptor to be exposed to the intrinsic hazard of the chemical	Takes into account the multiple routes of exposure over the lifecycle of the chemical, frequency, duration of those exposures
Risk Characterisation	The results of the three steps are combined to produce an estimate of the nature and magnitude of risk	Because of the different susceptibilities and exposures, this risk will vary within a population

These two stages are essential as they aim on the one hand to ensure as rigorous as possible a scientific basis for managing the risk (risk assessment) and, on the other hand to recognize a margin of autonomy for the body authorized in fine to determine the appropriate level of protection (risk management).⁸⁷⁶ This distinction thus satisfies a dual requirement: on the one hand, the need to base a political decision on a value-neutral expertise and, on the other hand, the need to maintain the autonomy of politics vis-à-vis the results of scientific assessments.⁸⁷⁷

⁸⁷⁶ This clear-cut distinction is found in different regulations. Following the example of the CPB (Arts 15 and 16), the GFL distinguishes in particular between assessment that ‘shall be based on the available scientific evidence and undertaken in an independent, objective and transparent manner’ (Art 6(2)), and management which must bear in mind the risk evaluation, ‘other factors legitimate to the matter under consideration’, and the PP (Art 6(3)). See also the Communication from the Commission on the PP (n 23). However, in the EC *Hormones* case the AB rejected the distinction made by the panel between risk assessment and risk management, considering that such distinction had no textual support either in Art 5 or the rest of the Agreement (See Chapter 7).

⁸⁷⁷ Opinion of AG MJ Mischo in Case C-192/01 *Commission v Denmark* (n 334), para 92. At the end of the 1990s, this separation had been institutionalized by the establishment of agencies (ECHA, EFSA) that perform RAs whilst the final decision is vested in the European Commission.

Although controversial,⁸⁷⁸ RA is widely applied in international law in the field of 'food-borne' or 'pest-or-disease-related' risks,⁸⁷⁹ technical barriers to trade,⁸⁸⁰ and GMOs.⁸⁸¹ In EU law, RA requirements are found in the areas of worker health and safety,⁸⁸² food safety,⁸⁸³ drugs,⁸⁸⁴ environmental protection,⁸⁸⁵ and authorization schemes for dangerous substances,⁸⁸⁶ GMOs,⁸⁸⁷ pesticides,⁸⁸⁸ and biocides.⁸⁸⁹ Its attraction is reflected in political statements such as the Communication of the Commission on the PP, which emphasizes that any approach based on the PP should start with as complete a scientific evaluation as possible.⁸⁹⁰ While there are few explicit requirements in US regulations for agencies to conduct quantitative RAs, regulatory agencies have adopted this requirement as the most methodical way to defend and isolate the decision-making process.⁸⁹¹

Judicial circles are also keen to favour decisions based on sound science. Even though the PP has been acknowledged in several important cases, the CJEU has recently tended to tighten the duty of the European Commission to refer and even defer to scientific expertise to justify its decisions.⁸⁹² On the other side of the Atlantic, the US SCt has progressively obliged regulatory agencies to base their decisions on scientific evidence.⁸⁹³ Finally, the requirement to ensure that SPS

⁸⁷⁸ NRC, *Understanding Risk: Informing Decisions in a Democratic Society* (National Academy Press, 1996).

⁸⁷⁹ SPS Agreement, Art 5(1) which imposes a specific obligation that SPS measures are 'based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk-assessment techniques developed by the relevant international organizations.' More detailed rules on the procedure of RA are set out in Arts 5(2) to 5(8).

⁸⁸⁰ TBT Agreement, Art 2(2). For pesticides, see the 1998 Rotterdam Convention.

⁸⁸¹ CPB Arts 10(1) and 15 require that a decision to prohibit or restrict the import of an LMO under the advance informed agreement procedure has to be based on a 'risk assessment carried out in a scientifically sound manner' taking into account recognized RA techniques. Annex III of the CPB further defines scope, general principles, and methodology of the RA.

⁸⁸² Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemicals, physical, and biological agents; Directive 89/391/EEC on the introduction of measures to encourage the improvements in the safety and health of workers at work; Directive 90/394/EEC on the protection of workers from the risks related to exposure to carcinogens at work.

⁸⁸³ GFL, Art 6(1) stresses that risk analysis, including RA, must form the foundation on which food safety is based.

⁸⁸⁴ Regulation 726/2004 on the supervision of medicinal products for human and veterinary use, Art 6(2)(c).

⁸⁸⁵ Water FD, Art 16(2). The hazardous substances included in the priority list have to be selected according to specific scientific methods.

⁸⁸⁶ See Section 3.5 above.

⁸⁸⁷ Directive 2001/18 on the deliberate release of GMOs, Art 4(1)–(2) and Annexes II and III.

⁸⁸⁸ Commission Regulation 546/2011 as regards uniform principles for evaluation and authorisation of plant protection product.

⁸⁸⁹ BPR, Art 8, and Annex VI.

⁸⁹⁰ According to the Commission, 'the reliance on the precautionary principle is no excuse for derogating from the general principles of risk management' (Communication on the PP, Section 6.3, para 2).

⁸⁹¹ Unlike EIAs, which originated from a statutory requirement, RAs are not generically required by statutes. However, specific statutes requiring risk-benefit analysis and the obligation to justify proposed regulation according to administrative procedure had a strong impact on the development of RA.

⁸⁹² See Subsection 3.5.3.4.1 above.

⁸⁹³ See the discussion in Subsection 3.5.6.1 above.

measures are based on RA has proved to be of central importance in the WTO AB case law concerning the enforcement of the SPS Agreement.⁸⁹⁴

5.3.1.2 *The failure of the current system to address health and environmental concerns*

Risk assessment is embedded in a 'sound science risk regulatory paradigm'.⁸⁹⁵ Firmly based on facts and verifiable test results, RA has been considered a purely and value-free scientific evaluation. As a technical, analytical, and objective exercise, RA does not require any public involvement.⁸⁹⁶ Moreover, subjective or ethical considerations must be excluded and relegated to the decision-making process.⁸⁹⁷ Inversely, risk management has been considered a political process involving risk evaluation, option assessment, option implementation, monitoring, and review in order to achieve an appropriate level of protection.⁸⁹⁸ This distinction between risk assessment and risk management is based on the assumption that experts are best suited to weigh uncertain scientific evidence and produce objective results that will lead to optimal political decisions. However, this clear-cut division between scientists, who discuss facts (objective approach), and politicians, who discuss values (subjective approach), has recently been thrown into question.⁸⁹⁹ Paradoxically, while reliance on sound science is increasing at international and regional levels, sharp criticism of risk regulation is growing, particularly in the United States; the limitations of the quantitative RA procedure have never been so clear.

First, when the RA procedure is overburdened by analytical requirements it becomes a resource-intensive and time-consuming process, too stringent to suit regulatory goals. It can be so slow that it may lead to a process of ossification or 'paralysis by analysis'.⁹⁰⁰

Secondly, RAs are falling short of providing clarity given that every step is permeated with uncertainties. Hazard identification, a process that is largely quantitative, involves significant uncertainties and value judgements. The dose-response assessment implies the extrapolation of the results of high-dose animal testing to humans exposed to low doses. In order to cope with the uncertainties entailed by these extrapolations, risk assessors have to apply safety margins. When they are not scientifically justified, these safety factors are likely to introduce greater uncertainty.⁹⁰¹ Exposure assessment is also a source of controversy because it is

⁸⁹⁴ D Robertson and A Kellow, *Globalisation and the Environment: Risk Assessment and the WTO* (Routledge, 2001).

⁸⁹⁵ J Peel, *Science and Risk Regulation in International Law* (CUP, 2010) 113.

⁸⁹⁶ V Heyvaert, 'Reconceptualizing Risk Assessment' 8 (1999) RECIEL 140.

⁸⁹⁷ Directive 2001/18/EC on the deliberate release into the environment of GMOs, Art 29.

⁸⁹⁸ The latter phase takes place without expert consultation.

⁸⁹⁹ The basis for the distinction between risk assessment and risk management has been criticized in Europe in the fields of health and environmental regulation, on both practical and theoretical grounds.

⁹⁰⁰ This ossification process has affected US risk regulation as well as the EU chemicals policy; see the discussion in Subsection 3.5.6.3 above.

⁹⁰¹ Godden, *Environmental Law* (n 852) 340.

permeated by uncertainties coming from various sources. It is difficult to determine the pathways (air, water, food, etc.) and the routes (ingestion, inhalation, etc.) that lead to exposure. Besides, some population groups may be more susceptible to exposure than others to certain hazards. Finally, all these uncertainties affect significantly the risk characterization.⁹⁰²

Thirdly, existing exposure models may underestimate risks, especially for new substances where no empirical real-world exposure data are available.⁹⁰³ Likewise, the linear dose response curves can be inappropriate when low doses are more harmful than high doses.⁹⁰⁴

Fourthly, the scope of assessment may be too narrow, excluding certain disciplines and failing to achieve a holistic understanding of complex ecosystems (e.g. analysis may focus only upon cancer, ignoring other potentially harmful effects). Given that RA addresses the risk posed by a single substance, the impact of multiple exposure paths and possible cumulative or synergistic effects is rarely captured. Assuming uncausality is too simplistic when multicausality is the reality.⁹⁰⁵

Fifthly, the experts cannot begin to assess something unless they have been instructed to do so. The current RA process has a negligible input from those dealing with risk management as regards practical options for change or the validity and effectiveness of control measures. On the other hand, all the steps in risk analysis are becoming increasingly dependent on the assumptions of risk assessors (about exposures, human behaviour, etc.)⁹⁰⁶ which may be explicit or implicit, with the attendant danger of bias caused by external factors (e.g. industrial or commercial interests).⁹⁰⁷ In reckoning upon different types of scientific evidence and different RA principles, risk assessors may reach conclusions that may differ significantly from one another. Estimates could vary millionfold depending on the models chosen by the assessors.⁹⁰⁸

Sixthly, RA also raises an issue of environmental justice given the difficulties to integrate the higher exposures faced by low-income communities.⁹⁰⁹ Moreover, it unduly restricts minorities from participating in any meaningful way in that process.

⁹⁰² Wagner, 'The Science Charade' (n 749) 1723.

⁹⁰³ SAM Group of Chief Scientific Advisors, Opinion 5/2018, 40.

⁹⁰⁴ EEA Report 1/2013 (n 300), 677; N Kuraj, 'Complexities and Conflicts in Controlling Dangerous Chemicals' in E Maitre-Kern et al (eds) *Preventing Environmental Damage from Products* (CUP, 2018) 287.

⁹⁰⁵ van der Sluijs and Turkenburg, 'Climate Change and the Precautionary Principle' (n 792) 391.

⁹⁰⁶ With respect to biocidal products, the RA process 'depends heavily on expert judgement in the interpretation of exposure and effects' (Guidance on the BPR: I Parts B+C (ECHA, 2017)).

⁹⁰⁷ M O'Brien, *Making Better Environmental Decisions* (MIT Press, 2000) 27.

⁹⁰⁸ By way of illustration, in assessing the significance of benzene-related hazards in the 1980s, the EPA and OSHA reached different estimates although they relied on the same epidemiological evidence. For other illustrations, see Latin, 'Good Science' (n 511) 91–2.

⁹⁰⁹ R Kuehn, 'The Environmental Justice Implications of Quantitative Risk Assessment' 1 (1996) University of Illinois LR 103–72.

Seventhly, it is relatively difficult to meet the requirements of RA at the international level in areas such as sanitary measures in the face of scientific uncertainty, despite the attempt by the WTO AB to allow some margin for scientific uncertainty.⁹¹⁰ The AB's case law seems ambiguous on this point.⁹¹¹

More fundamentally, RA focuses on quantifying threats rather than preventing them. It leads to a policy of pollution control (how much of a given contaminant are we able to assimilate? Is one death in a million an acceptable risk?) rather than a policy of prevention (what is the availability of less hazardous alternatives?).⁹¹²

Budgetary constraints and pressing deadlines call for faster, better, and more representative assessment techniques that are meaningful for regulatory decision-making and more suited to cope with the numerous uncertainties affecting the process. In the light of the PP, the expert and the political sphere must be mutually supportive. What is at stake here is not just a blurring of the boundaries between RA and risk management procedures, but rather creating an opening between these two areas.

The innovations we propose as regards both RA and risk management should boost the level of environmental and health protection. Our analyses are largely based on our comparative analysis of WTO AB, CJEU, and US case law regarding the validity of standards decided under conditions of scientific uncertainty.

5.3.2 Reviewing RA in the light of the PP

RA, unlike the PP, assumes that it is possible to quantify and compare risks. In contrast, the PP is not neutral towards uncertainty; it is biased in favour of safety. Due to this *prima facie* opposition, a number of public authorities assume that the principle will be contrary to a sound scientific basis for RA. Therefore they consider the PP merely a risk management tool that has nothing to do with RA.⁹¹³

However, we do not share the viewpoint that RA and risk management should be seen as opposites. Indeed, we are going to demonstrate that the PP may influence both assessment methodology (Subsection 5.3.2.1) and the proper role of scientific expertise (Subsection 5.3.2.2).

⁹¹⁰ See the discussion in Chapter 7, Subsection 3.2 below.

⁹¹¹ On one hand, a 'minimum magnitude of risk' is not required; a 'divergent opinion coming from qualified and respected sources' can be sufficient scientific evidence (*Australia—Measures Affecting Importation of Salmon* WTO Doc. WT/DS18/AB (20 October 1998), paras 120–30). On the other hand, the AB has set high conditions as regards the 'specificity' of such an RA and rejected studies that lend 'more weight to unknown and uncertain elements' (*EC—Hormones* (n 348), para 186 and *Japan—Varietals* (n 349), para 77). It also held that under the SPS Agreement, Arts 2(2) and 5(1) the risk must be 'ascertainable' as opposed to 'theoretical uncertainty' (*Australia—Salmon*, para 125).

⁹¹² CF Cranor, *Regulating Toxic Substances: A Philosophy of Science and Law* (OUP, 1993) 14.

⁹¹³ European Commission's Communication on the PP.

5.3.2.1 Reviewing RA methods

Given that RA obligations are likely to stay, and indeed to increase in the future, there is a need to endorse a systemic approach in order to overcome the regulatory failures. Lately some considerable progress has been made in characterizing uncertainties and ignorance in RAs.⁹¹⁴

5.3.2.1.1 Broadening the scope of RA Traditional RA procedures focus only on a small subset of the totality of issues of concern in the wider debate. The selected issues are more readily quantifiable because they are more amenable to measurement under an individual favoured metric (such as human mortality or monetary value). A number of risks thus lie outside the conceptual framework of formal risk regulation. Furthermore, synergistic or additive effects of different compounds are not assessed under current regulatory appraisal in the EU and in the United States, each substance being taken in isolation on a case-by-case basis.⁹¹⁵ Finally, the potential benefits of a technological risk which might be offset against any adverse effects are excluded from the scope of present regulatory RA.⁹¹⁶

However, the total risk for a person is an aggregate of many individual risks. Protective measures should therefore be based on RA, taking into account all relevant risk factors. This requires that the scope of RA be broadened to evaluate all uncertainties. These include direct or indirect and immediate or delayed risks, as well as any of their additive, cumulative, and synergistic effects, not only foreseeable risks.⁹¹⁷ These limitations of the RA approach have become even more obvious in the face of new environmental challenges such as endocrine disrupting substances and POPs. Scientific proof of cause-and-effect relationships between these classes of chemicals and adverse effects on human health and the environment may take several years or decades to establish and may never be fully demonstrated owing to limitations in experimental design and the complexity of natural ecosystems. Therefore the wider the scope adopted during appraisal is, the more 'precautionary' and 'scientifically sound' the associated regulatory decisions will be.⁹¹⁸

Secondly, greater emphasis should be given to comparative assessment with substances or products with less harmful effects.⁹¹⁹ At present RA procedures are

⁹¹⁴ EEA Report 1/2013 (n 300) 676.

⁹¹⁵ Case C-282/15 *Queisser Pharma* (n 340).

⁹¹⁶ By way of illustration, the CJEU ruled that the mere finding of the absence of a nutritional need is not enough to justify a general prohibition on foodstuffs enriched with vitamins or minerals. The Member State must show on a case-by-case basis the reasons why the vitamin and mineral content of the foodstuffs in question is a threat to public health. Case C-192/01 *Commission v Denmark* (n 334) paras 54–6.

⁹¹⁷ Stirling, *On Precautionary and Science Based Approaches* (n 716). See, for instance, Directive 2001/18/EC on the deliberate release of GMOs, Art 2(8) and Annex II.

⁹¹⁸ Stirling, *On Precautionary and Science Based Approaches* (n 716) 33.

⁹¹⁹ For plant protection products containing active substances that were identified as 'candidates for substitution' (PPPR, Art 80(7)), the Member States are required to evaluate whether they can be replaced (substituted) by other adequate solutions (chemical and non-chemical). On the other hand, the

usually designed to provide quantitative estimates of the risk associated with a single proposed action rather than to compare alternatives. Therefore regulatory authorities are often presented with a more or less finished product by risk assessors in the form of a risk recommendation which leaves them very little margin in choosing an alternative. Normative decisions are thus completely determined by the scope of the assessment.

Nevertheless, a broader consideration of problems might give rise to more beneficial solutions and foster innovation in other areas.⁹²⁰ Thus, to give more leeway to the decision-maker, decisions should be taken only after comparing the risks and benefits associated with a range of alternative options rather than a single option considered in isolation.⁹²¹ RA must therefore be conceived in such a way that it serves to inform decision-makers and allow them to select the right regulatory action rather than leave decisions to assessors. Comparing information relating to different classes of chemicals, for example, makes it possible for regulatory authorities to prioritize according to the relative degree of assessed risks. In this way hazardous substances can be prohibited on the grounds that less hazardous alternatives have been identified.⁹²² In the same way, the environmental impacts of the deliberate release into the environment of GMOs should be compared with the effects of agricultural production methods (ranging from intensive to organic) in order to allow public authorities carrying out risk management to favour products or substances whose effects are most likely to be reversible.

5.3.2.1.2 Refining the methodology of RA In the hazard evaluation phase, a problem must be assessed and assigned a ranking to determine the full RA procedure. An RA approach must then be chosen. However, experts will only assess what they are told to assess. Therefore reform of the system will require new thinking about the normative assumptions proper to the assessment procedure, such as a high level of environmental or health protection. This would include experts more fully considering normative needs following from the management of risk.⁹²³ We identify a number of key elements that should be taken into account below.

5.3.2.1.2.1 Conservative assumptions for quantitative assessment Scientific uncertainty is inherent in most situations. In fact, at every stage of the assessment

1989 Massachusetts Toxics Use Reduction Act requires that manufacturing firms using specific quantities of industrial chemicals identify alternatives every two years to reduce use of those chemicals.

⁹²⁰ The regulation of specific substances such as CFCs and PCBs has not only reduced overall environmental costs but has also stimulated scientific innovation in the search for commercial substitutes. For example, EEA, *Late Lessons* (n 209) 182.

⁹²¹ O'Brien, *Making Better Environmental Decisions* (n 907) 213; Stirling, *On Precautionary and Science Based Approaches* (n 716) 20; EEA, *Late Lessons* (n 209) 177.

⁹²² See the discussion on the developments of the principle of substitution in Subsection 3.5.3.4.5.

⁹²³ Case T-31/07 *Du Pont de Nemours* (n 299) para 145.

process risk assessors are confronted with incomplete information and knowledge gaps. When data is imperfect or clear indications about impacts are lacking, RA leaves room for uncertainty and error.⁹²⁴ The PP should attempt to bridge gaps in our knowledge by making conservative assumptions that tend to overestimate risk. Even though they might appear overcautious, public expectations of safer standards should also be taken into account by risk assessors. Experts should err on the safe side by incorporating a number of such conservative assumptions in their procedures. In this regard, worst-case analysis should also be conducted, especially when risks include the possibility of accidental contamination.⁹²⁵

This trend is not entirely new, although it needs to be developed further. For example, even in the absence of statutory authorization, US environmental law is precautionary, using conservative evidentiary presumptions that tend to overestimate risk, and US agencies administering environmental and public health laws are known to overestimate true risks.⁹²⁶ In the EU context, conservative assumptions and broad safety margins are to be applied in the treatment of carcinogens.

5.3.2.1.2 Generic versus substance-by-substance assessment There is a temptation to demand more detailed scientific evaluation on a case-by-case basis of substances considered for regulation, in order to overcome the uncertainties inherent in the various steps of RA. For instance, courts in the United States⁹²⁷ and the WTO AB⁹²⁸ both require regulatory bodies to undertake a substance-by-substance approach. The CJEU considers that the practical difficulties in carrying out an exhaustive assessment of the risk to health cannot justify the absence of such an assessment prior to the adoption of a systematic and untargeted prior authorization scheme.⁹²⁹

⁹²⁴ Cranor, *Toxic Torts* (n 298) 12–48.

⁹²⁵ J Gray and J Bewers, 'Towards a Scientific Definition of the Precautionary Principle' 32:11 (1996) MPB 768–71.

⁹²⁶ The 1996 US Food Quality Protection Act introduces safety factors. When setting standards for Superfund Cleanups, EPA uses very conservative assumptions through far-fetched exposure scenarios to increase the apparent risk. For an overview of the agencies conservative assumptions in the field of RA, see, e.g., D Bodansky, 'The Precautionary Principle: The US Experience' in O'Riordan and Cameron, *Interpreting the Precautionary Principle* (n 65) 215. The dose–response relationship for a chemical is based on a threshold such as 'No observable adverse effect level' (NOAEL) which is divided by a safety factor in view of protecting sensitive segments of human populations. See, e.g., A Rosenthal, G Gray, and J Graham, 'Legislating Acceptable Cancer Risk from Exposure to Toxic Chemicals' 19:2 (1992) ELQ 269–362. Such a cautious approach has been endorsed by the US SCT in the *Benzene* case. The Court ruled that: 'So long as [assumptions] are supported by a body of reputable scientific thought, [agencies are] free to use conservative assumptions in interpreting the data with respect to carcinogens, risking error on the side of overprotection rather than underprotection' (*Industrial Union Department. AFL-CIO v American Petroleum Institute* (n 510), 656). On the obligation to carry out worst-case analysis in EIAs, see the discussion in Subsection 5.1 below.

⁹²⁷ See, for instance, the requirement made by the 11th Circuit Court that the OSHA has to develop an elaborate record for each chemical: *AFL-CIO v OSHA* (n 521).

⁹²⁸ AB, EC—*Hormones* (n 876) para 194.

⁹²⁹ Case C-333/08 *Commission v France* (n 17) para 103; Case C-282/15 *Queisser Pharma* (n 340), para 66.

Nevertheless, it has been shown in the past that too much scientific analysis can produce regulatory paralysis, with little useful information gained as a result. One has to wait for the adoption of REACH to speed up the identification and assessment of the risks posed by the 30,000 chemical substances currently in commercial circulation. One should therefore avoid the temptation to require more detailed information in the face of uncertainty.⁹³⁰

5.3.2.1.2.3 Shift from risk to hazard In the majority of legal regimes, the appraisal of a chemical's impact is based on the notion of risk (a lion is becoming a risk when it escapes the zoo since there is exposure) and not of hazard (when it is confined in a cage a lion is not a risk). Without exposure, there can be no harm. Accordingly, the traditional view is that adequate knowledge about exposure is an absolute requirement for any reliable RA.⁹³¹

However, the regulatory challenge in the light of the PP is precisely to favour alternative approaches which could be based on regulation of chemicals according to hazard. With the adoption of the Pesticides (PPPR), Biocides (BPR), and REACH Regulations, the EU regulatory approach has been shifting from risk to hazard: substances which do not meet the EU's predetermined cut-off hazard-based criteria (PBT, POP, vPvB, or endocrine disruptive) cannot receive approval, or renewal of approval.⁹³² Whenever one of these properties is ascertained, the substance is deemed to be intrinsically dangerous and its use has to be forbidden.⁹³³ These cut-off criteria require any additional risk exposure assessment.⁹³⁴ It follows that the Commission cannot list an active substance if it displays some hazardous properties, regardless of the likelihood of the hazard causing actual harm (i.e. the risk).

⁹³⁰ Cranor, *Toxic Torts* (n 298) 116–29; EEA, *Late Lessons* (n 209) 181–2.

⁹³¹ However, information about exposure arising from downstream uses of chemicals is scarce. See Royal Commission on Environmental Pollution, *Chemicals in Products: Safeguarding the Environment and Human Health*, 24th Report (2004) 30.

⁹³² PPPR, Annex II, 3.6.2 to 3.6.5; BPR, Preamble Recital 12. Under REACH, the sole potential of the intrinsic properties of a given chemical is sufficient to trigger the authorization arrangement. However, in 2017 the Commission took on board 'potency' and transformed the hazard-based listing of endocrine disruptive chemicals (EDCs) (PPPR, Annex II, 3.6.5) into a risk-based one. See Commission Delegated Regulation (EU) 2017/2100 (OJ L 301, 17.11.17, 1) and Commission Regulation (EU) 2018/605 (OJ L 101, 33). See also Kuraj, 'Complexities and Conflicts in Controlling Dangerous Chemicals' (n 904) 299.

⁹³³ E Bozzini, *Pesticides Policy and Politics in the EU* (Springer, 2017) 30.

⁹³⁴ The intrinsic properties are sufficient to justify the identification of a substance as being of VHC in order to include them on the list of substances subject to authorization set out in Annex XIV. However, in determining that REACH, Art 57(f) requires an analysis of the intrinsic properties of the substances concerned, to the exclusion of any consideration of data relating to human exposure reflecting the risk management measures, the CJEU ruled that the GCt erred in law (Case C-323/15 P, *Polynt SpA* [2017] C:2017:207). A substance can be considered to be an endocrine disruptor of VHC when it is demonstrated that it 'may' have adverse effects. The assessment of the intrinsic properties of the substances referred to in REACH, Art. 57(f) is not in fact an assessment of the risks arising from the practical use of a substance or exposure to it, but rather an assessment of the hazards of that substance. There can be a finding as to the existence of a risk only in so far as it is a question of probable effects. As regards the hazardous nature of a substance, any scientific finding should be based on the 'possible' undesirable effects

That being said, a lion in a cage does not become a pussycat. So far, few substances have been regulated in relation to their hazard. In the field of water management, the EU has also been favouring simplified RA.⁹³⁵

In avoiding the need to perform an entire RA on a case-by-case basis, which can be time and resource consuming,⁹³⁶ this approach reduces considerably the administrative burden entailed by full RA procedures and consequently is faster and less expensive.⁹³⁷ In practical terms this means that experts are not called on to fully perform the four steps of the assessment procedure. It thus comes as no surprise that this regulatory approach has been championed by different EU institutions and several Member States and strongly resisted by others.

5.3.2.1.2.4 Qualitative versus quantitative assessment Although techniques may vary tremendously from one discipline to another, the most commonly used analytical tool of prediction is quantified RA (e.g. one case of cancer in the exposed population). Required to adhere to established laboratory procedures, risk assessors have until now excluded public perceptions, priorities, and needs from the assessment procedure. Established assessment methodologies leave hardly any scope for the integration of non-scientific factors.

However, risk is multidimensional.⁹³⁸ Nearly all studies of public risk perception show that ordinary people bring more to their definitions and evaluations of risk than is recognized in the reductionist framework used by experts. Public perceptions may be influenced by a number of non-scientific factors, such as the origin of the risk (natural or man-made), whether it is assumed voluntarily or not (people will accept far greater risk when driving a car than they will from breathing its emissions), whether it is general or particular (the risk can be distributed throughout the population or may affect a small identifiable group), its degree of familiarity (smoking versus indoor pollution) and its time element (immediate versus long term). As subjective perceptions are not fully captured by RAs, experts and the

of that substance, not the 'probable' effects. This regulatory approach is in line with the PP referred to, *inter alia*, in REACH, Art. 1(3) (Case T-115/15 *Deza* [2017] T:2017:329, para 173).

⁹³⁵ The EU has moved to an intermediate approach between classical RA and assessment based on hazard, in the form of a simplified risk assessment. This is set out in the Water FD (Art 16(l)(c)). Substances have to be prioritized for regulatory action on the basis of a procedure based largely on evidence of intrinsic hazard of the substance concerned.

⁹³⁶ Cranor, *Toxic Torts* (n 298) 103.

⁹³⁷ Bozzini, *Pesticides* (n 933) 32 and 67.

⁹³⁸ Major sociological studies of the 1990s in Germany, France, and the United Kingdom have shown that the traditional distinction between scientific facts and values is constantly blurred. See, e.g., U Beck, *Risk Society: Towards a New Modernity* (Sage, 1992); B Latour, *Nous n'avons jamais été modernes* (La Découverte, 1991); R Smith and B Wynne, *Expert Evidence: Interpreting Science and the Law* (Routledge, 1989); S Lash, B Szerszynski, and B Wynne (eds), *Risk, Environment and Modernity* (Sage, 1996); S Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Harvard UP, 1990); B Wynne, 'Scientific Knowledge and the Global Environment' in M Redclift and T Benton (eds), *Social Theory and the Global Environment* (Routledge, 1994).

public have rather different ways of looking at risks.⁹³⁹ This can be explained partly by the fact that risks will often be imposed on those who are not the recipients of the benefits of a risk-creating activity. It can also be explained by the inevitable gap between the controlled and artificial conditions assumed in the analytical process (given the inherent difficulties of extrapolating data obtained in controlled laboratory conditions to human beings living in complex ecosystems) and the real-world conditions in which risks are actually experienced;⁹⁴⁰ the knowledge created through testing is partial, and at best approximate. And the belief that increased risk communication will obviate the fears of the layperson is naïve.

Because risks are co-determined by sets of social values which affect their public acceptability, it might be more productive to accept those values as an integral part of the procedure, by making them explicit and co-ordinating them with regulatory goals instead of excluding them. In addition, a responsive RA should not neglect lay knowledge (e.g. industry workers, users of the technology) which might be more firmly grounded in real-world conditions (e.g. workplace awareness of emerging patterns of ill health) than laboratory experiments are.⁹⁴¹ In other words, rather than hiding behind the fortress of science, RA should become better attuned to public perceptions and lay knowledge as well as to regulatory goals.

Moreover, given the sparser knowledge regarding ecological processes, their interdependency, and frequently ill-defined cause and effect relationships, qualitative RA, which characterizes risk in non-quantitative terms (high, moderate, low) is becoming more prevalent.⁹⁴² Indeed, qualitative information seems to be needed in order to obtain a more comprehensive understanding of complex scientific situations.

Qualitative assessment is beginning to be integrated in RA procedures. For instance, in its 1983 Report on 'Risk Assessment in the Federal Government' the US National Research Council already stressed that as quantitative estimates are not always feasible they may be eschewed for policy reasons in favour of qualitative expressions of risk. Likewise, the WTO AB acknowledged in the *EC—Hormones* case that RA should take into account qualitative elements as well as quantitative information:⁹⁴³ 'matters not susceptible of quantitative analysis by the empirical

⁹³⁹ Nuclear power, for example, is regarded as relatively non-risky by experts and relatively dangerous by laypersons. Contrariwise, X-rays are regarded as quite risky by experts and not very risky by laypersons. For example, P Slovic, 'Risk Perception' (1987) *Science* 280–5.

⁹⁴⁰ B Wynne, 'May the Sheep Safely Graze? A Reflexive View of the Expert—Lay Knowledge Divide' in S Lash, B Szerszynski, and B Wynne (eds), *Risk, Environment and Modernity* (Sage, 1998) 58.

⁹⁴¹ Often, too, lay knowledge may be based on different assumptions about what is salient, or what degree of control is reasonable to expect. See, e.g., A Stirling, 'Risk at a Turning Point' 1:2 (1998) *Journal of Risk Research* 97–109; EEA, *Late Lessons* (n 209) 177–8.

⁹⁴² Godden, *Environmental Law* (n 852) 352.

⁹⁴³ *EC—Hormones* (n 348) paras 184–6; *Australia—Salmon* (n 370) para 124. The AB clearly overturned the view of the Panel that social value judgements made by politicians, as 'non-scientific elements', pertained to risk management rather than to risk assessment (US Panel Report, para 8.94; Canada Panel Report, para 8.97).

or experimental methods commonly associated with the physical sciences' should therefore also be considered.⁹⁴⁴ Such an option can already be found in some EU chemicals legislation.⁹⁴⁵

From this perspective, risks arising from difficulties of control, inspection, or enforcement or from the possibility of accidental pollution are relevant for the public authorities because they are related to the real world. As reflected in the WTO *Asbestos* case, concrete technological applications and the difficulty of controlling risks should be taken into account when assessing the need for a ban. Canada, although not disputing that chrysolite fibres pose health risks, claimed that those risks ceased to exist once asbestos was encapsulated in chrysolite-cement materials. However, both the Panel and the AB considered that there was enough evidence to show that such products continued to pose a risk to health in this type of application.⁹⁴⁶ In fact, since most safety regulations are poorly implemented—especially those relating to environmental protection—it is important that risk assessors take such situations into account.

Clearly, confining scientific expertise to an ivory tower serves no purpose. On the contrary, the PP means that scientific expertise and the decision-making process should be brought closer to one another.

5.3.2.2 *Strengthening expertise*

5.3.2.2.1 Inclusive expertise It is not unusual for scientists viewing the same evidence to draw different conclusions. Indeed, the history of science is full of contradictory theories and fierce competition between diametrically opposed views and ideas. Consequently the progress of scientific research is punctuated by ruptures, and those responsible for breakthroughs must often wander in the scientific wilderness before their theories are widely accepted. Many important discoveries were born as controversial ideas that were initially contested bitterly by the mainstream scientific establishment.

Changes to the methodology of RA such as those described above would strongly influence the type of expertise needed to carry out such assessments. The fact that science would no longer constitute an absolute criterion does not mean that it is no longer necessary to heed the advice of scientists: indeed, they have never been so important. However, their contribution to political decision-making must be substantially modified. By requiring the active exercise of doubt, the PP

⁹⁴⁴ *EC—Hormones* (n 348), para 187.

⁹⁴⁵ For instance, REACH leaves a choice between qualitative and quantitative approaches when the experts have to estimate the dose–response concentration to which a population is or may be exposed (Chapter R.8, Guidance on information requirements and chemical safety assessment Characterisation of dose [concentration]–response for human health (ECHA, 2012)).

⁹⁴⁶ The Panel noted that, owing to the diversity of applications for chrysolite fibres in industrial, commercial, and residential buildings, 'there are areas in which health controls are difficult to apply'. (*EC—Asbestos* (n 309), paras 162, 174.

invites decision-makers to open the debate to marginal and dissent opinions and to the conjectures and questions of a minority of the scientific community.⁹⁴⁷ The appraisal of risks should therefore be conducted in an open fashion: ‘only in this way are the framing assumptions adopted in the RA and the treatment of associated uncertainties and trade-offs tested and validated against the wider socio-political realities.’⁹⁴⁸ As a result, it will no longer be possible systematically to ignore the alarms sounded by a small group of experts until such time as the entire scientific community supports a minority opinion.⁹⁴⁹ Decision-making will no longer be the prerogative of majority discourse alone, or the preserve of a scientific class close to the political elite. Expertise should therefore be employed in an open, transparent, and pluralistic fashion.

As noted above, some case law is already characterized by this new relation to science. Of particular interest in this regard is the case of the Whyl nuclear power plant, where the German Federal Administrative Tribunal ruled that the administrative authorities should not have relied on majority opinion alone but should have given equal consideration to minority views.⁹⁵⁰ As was acknowledged by the WTO AB in the *EC—Hormones* case, the fact that a RA is based on a scientific minority viewpoint does not invalidate the procedure.⁹⁵¹ Indeed, responsible authorities can act in good faith on the basis of contradictory opinions from equally qualified or respected sources.⁹⁵²

Experts, for their part, should more explicitly acknowledge the fact that they cannot eliminate all scientific uncertainties. Substantial uncertainties must be addressed through normative choices (high level of protection, precaution, substitution, etc.); they should rely upon such choices and make those choices explicit.⁹⁵³

5.3.2.2.2 Pluralistic expertise By primarily taking into account quantifiable, direct, and linear factors (e.g. toxicity leading to cancer) risk assessors tend to address single hazards, single effects, and single media. Qualitative factors (e.g.

⁹⁴⁷ It is an awesome responsibility for decision-makers to choose between majority and minority opinion. On one hand, unorthodox new ideas put forward by scientific minorities may ultimately constitute sound science. On the other hand, dissenting opinions can turn out to be based on false hypotheses. Regarding dissenting opinions, see Case C-3/00 *Denmark v Commission* [2003] C:2003:167, para 63; Case C-360/14 P *Germany v Commission* [2015] para 32.

⁹⁴⁸ Stirling, *On Precautionary and Science Based Approaches* (n 716) 7.

⁹⁴⁹ Such a demand has seemed particularly important since the discussion on reducing CFC emissions into the stratosphere demonstrated that initial regulation had been delayed by certain scientific groups insisting on ever-greater certainty about the phenomenon of ozone layer destruction.

⁹⁵⁰ See the discussion in Subsection 3.6.4 above.

⁹⁵¹ In the *Beef Hormones* dispute, the WTO AB did not believe that: ‘a risk assessment has to come to a monolithic conclusion that coincides with the scientific conclusion or view implicit in the SPS measure. The risk assessment could set out both the prevailing view representing the “mainstream” of scientific opinion, as well as the opinions of scientists taking a divergent view.’ (*EC—Hormones* (n 348), para 194).

⁹⁵² *EC—Hormones* (n 348) para 194.

⁹⁵³ Cranor, *Toxic Torts* (n 298) 131.

poverty, consumer habits) as well as multiple pathways of exposure tend not to be analysed. However, compartmentalized science, no matter how erudite, is an insufficient basis for anticipating or mitigating the impacts of complex substances in ecosystems characterized by feedback loops and complex interactions. Reflecting the different perceptions of risk, multidisciplinary RA could better strike a balance between facts and values and between science and society than compartmentalized research does. Wherever possible, the PP calls for an interdisciplinary approach that pools wisdom garnered from the natural and social sciences.⁹⁵⁴ The information assembled by multidisciplinary teams (ecologists, biologists, neurologists, economists, sociologists) must be used to complement the quantitative probability of harm determined through epidemiologic and toxicological studies, exposure assessments, and monitoring studies (for instance, one cancer for one million people exposed to a hazard). Of course, a mixed quantitative/qualitative RA will increase the level of complexity and sophistication of ranking different types of risks and setting priorities.⁹⁵⁵ Nevertheless, that is the way forward, because science is complex. Its complexity must be accepted rather than dissipated through a simplistic and abstract image of reality.

5.3.2.2.3 Independent expertise In order to develop risk-regulatory strategies in a more systematic and coherent manner, some authors have supported the idea that the problems of risk regulation call for the creation of an administrative organization that is mission oriented and enjoys broad authority, independence, and prestige, with the goal of bringing a degree of uniformity and rationality to decision-making.⁹⁵⁶ If the PP is to be observed, such an organization would have to remain independent, with that independence being both fostered and monitored (open to independent peer review).⁹⁵⁷ In that connection, the CJEU held that the RA should be undertaken in ‘an independent, objective and transparent manner’.⁹⁵⁸ Realistically, however, such experts are always subject to political and industrial pressures that can lead to less independent results. Given these circumstances it would perhaps be more satisfactory to acknowledge the dependence of experts by measures such as ‘declarations of interests’.

⁹⁵⁴ EEA Report 1/2013 (n 300) 674.

⁹⁵⁵ Heyvaert, *Coping With Uncertainty* (n 851) 191.

⁹⁵⁶ S Breyer and V Heyvaert, ‘Institutions for Regulating Risks’ in RL Revesz, P Sands, and R Stewart (eds), *Environmental Law, the Economy, and Sustainable Development* (CUP, 2000), 302.

⁹⁵⁷ In particular, GFL, Art 6(1) and (2) requires that the risk assessment, upon which food legislation must be established, is based on available scientific evidence and is undertaken in an ‘independent, objective and transparent manner’. Likewise, Recitals 20 and 21 of the Preamble of Directive 2001/18/EC on the deliberate release of GMOs state: ‘It is necessary to establish a common methodology to carry out the environmental risk assessment based on *independent scientific advice*’. See also EEA, *Late Lessons* (n 209) 178–80.

⁹⁵⁸ Case T-31/07 *Du Pont de Nemours* (n 299) para 141; Joined Cases T-429/13 and T-451/13 *Bayer CropScience* (n 13) paras 115–17.

5.3.2.2.4 Participation by interest groups Unlike EIA, which is intended to increase the accountability of decision-making to interest groups, RA frequently functions as a more arcane expert procedure, couched in technical terms such as 'risk probability' or 'dose-response curve' that have little meaning to most laypersons. At present, values are hidden behind quantitative models that leave very little room for deliberation. Scientists adhere to the view that RA is in essence a scientific undertaking, and interest groups are therefore afforded few opportunities to make recommendations. Thus, RA is technocratic rather than democratic. As a result, public participation is usually confined to the risk management stage, when judgements are made about acceptable levels of risk.⁹⁵⁹

However, as we noted earlier, risk regulation is beset by divergent perceptions, interests, and value judgements. Complex environmental risks cannot be adequately addressed through a purely expert driven 'sound science' approach. Experts are just as prone to biases as lay people in their assessment of risks.⁹⁶⁰ Risk assessors should therefore become more aware of the 'social dimensions' of their expertise by creating greater room for deliberation. RA must not be considered as a purely scientific enterprise to which only experts have access; it should become more pluralistic in character. Public consultation is thus a necessary part of any 'sound scientific' approach to the regulatory appraisal of ecological risks.⁹⁶¹ For this reason public authorities should ensure that the viewpoints of various stakeholders (e.g. workers, consumers, environmentalists, industrialists) are openly discussed in the RA process.⁹⁶² These stakeholders should also be allowed to contribute to determining the relevant factors that scientists should take into consideration when carrying out assessments and the form in which those findings should be expressed.⁹⁶³ One may take an example from the Opinion of Preston CJ in *Telstra*: 'taking into account the views of relevant stakeholders and rightholders' is important 'because different judgments, values and cultural perceptions of risk, threat and required action play a role in the assessment process.'⁹⁶⁴

5.3.2.2.5 Reviewing risk management in the light of the PP Owing to the pluralistic character of democratic society and the multidimensional character of risk, risk management cannot be dealt with by a single approach, nor can it lead to a

⁹⁵⁹ Godden, *Environmental Law* (n 852) 352.

⁹⁶⁰ *Ibid*, 353.

⁹⁶¹ Kuehn, 'Quantitative Risk Assessment' (n 909) 169; Stirling, *On Precautionary and Science Based Approaches* (n 716) 34; EEA, *Late Lessons* (n 209) 185–6.

⁹⁶² According to the Commission Communication on the PP, it is essential that the decision-making process gathers the views of all interested parties at a very early stage (para 5).

⁹⁶³ 'Adequate risk analysis depends on incorporating the perspectives and knowledge of the interested and affected parties from the earliest phase of the effort to understand the risks ... Deliberation is important at each step of the process that informs risk decisions ... Appropriately structured deliberation contributes to sound analysis by adding knowledge and perspectives that improve understanding and contributes to the acceptability of risk characterization' (NRC, *Understanding Risk* (n 878) 4).

⁹⁶⁴ *Telstra Corporation Ltd* (n 659), para 132.

definitive or unique authoritative conclusion. Recognizing plural interests also leads automatically to the acceptance of a certain pluralism in the decision-making process.

5.3.3.1 *Aiming at a high level of health and environmental protection*

The PP is not taking root in virgin soil; it has neighbours: other rules that occupy a high position in the hierarchy of norms.⁹⁶⁵ Among these are the TFEU obligation to promote a high level of health and environmental protection.⁹⁶⁶ By the same token, according to their constitutional provisions concerning environmental and health protection, most national authorities in Europe must also seek to achieve a high level of protection.⁹⁶⁷ Several US environmental statutes, such as the CAA, require protection with an ‘adequate’ or ‘ample’ margin of safety.⁹⁶⁸ Last but not least, according to the WTO AB’s case law, WTO Members have the right to establish the level of protection that they deem appropriate: a level which might be higher than that implied in existing international standards, guidelines, and recommendations.⁹⁶⁹ A Member’s acceptable level of risk may even be set at ‘zero risk.’⁹⁷⁰

Public authorities may thus determine the level of risk they are ready to accept in the light of their international and constitutional obligations. In doing so they should embrace the PP’s devotion to erring on the side of caution. They must have the discretion to base their measures on social or policy choices, as long as these bear a relation to the scientific conclusions of an RA procedure,⁹⁷¹ which may, as we have seen, include the assessment of non-quantifiable factors.⁹⁷² Finally, the objective of a high level of human health and environmental protection is not to be made subordinate to the objective of minimizing trade effects or encouraging the freedom to conduct a business.

5.3.3.2 *Science should be on tap, not on top*

Decision-making must obviously be based on available scientific information. However, scientific analysis is unavoidably and inextricably intertwined with subjective assumptions: risk analysts often have no choice but to make simplifying,

⁹⁶⁵ On the interaction between the PP and the obligation to seek a high level of environmental protection, see Chapter 3, Section 3.5.3.3.6.

⁹⁶⁶ In virtue of TFEU, Arts 114(3) and 168(1), 169(1), and 192(2), EU institutions must seek to achieve a high level of environmental, consumer, and health protection.

⁹⁶⁷ Pursuant to the Italian (Art 301), the Flemish (Art 1.2.1, §2) and the Walloon (Livre I, Art D.2) Environmental Codes, the PP is linked to the obligation to seek a high level of protection.

⁹⁶⁸ RL Revesz, *Foundations of Environmental Law and Policy* (OUP, 1997) 77.

⁹⁶⁹ EC—*Hormones* (n 348), para 124.

⁹⁷⁰ *Australia—Salmon* (n 370), para 125; *EC—Asbestos* (n 309), paras 168, 174. For instance, a zero-risk policy can be justified for carcinogenic substances such as asbestos, as there is no known safety threshold. For example, D Gee and M Greenber, ‘Asbestos: From Magic to Malevolent Mineral’ in EEA, *Late lessons* (n 209) 57.

⁹⁷¹ *Japan—Varietals* (n 349) para 84.

⁹⁷² *EC—Hormones* (n 348) paras 184–6; *Australia—Salmon* (n 370) para 124.

and scientifically questionable, assumptions which can either underestimate or overestimate risks.⁹⁷³ So far, risk managers uncritically accept the risk estimates as the gospel truth. In particular, they claim that they are not equipped or disposed to call into question these estimates.⁹⁷⁴

In accordance with the PP, where no consensus exists on how to resolve scientific uncertainties, it is necessary that policy-makers take action to prevent irreversible or significant risks. Against this background, RA must be understood to be nothing more than a tool; it has a role to play in decision-making, but only a partial role. Given that scientists are unlikely to be held accountable for their decisions, it is not up to them to decide on the acceptable level of risk imposed on society as a whole. Decisions on how far and how fast to reduce assessed risks are essentially political or societal value judgements to be made by the responsible regulatory authorities.⁹⁷⁵ The public authorities must therefore enjoy a degree of discretion in regards to RA:⁹⁷⁶ that is, they should bear a reasonable relationship to the relevant scientific findings.⁹⁷⁷ Science is thus a necessary but not a sufficient basis of regulation.

What is more, regulators have to pay heed to the non-probabilistic facets of the risk, such as distribution, familiarity, fairness, and environmental justice; issues that cannot be addressed by risk assessors.⁹⁷⁸

5.3.3.3 *Acting when information is at the frontier of scientific knowledge*

When information is at the frontier of scientific knowledge or a full RA is not possible, regulatory bodies must be able to regulate risks even though a RA procedure has not conclusively demonstrated adverse health or environmental effects. The question of what society should do in the face of uncertainty regarding cause-and-effect relationships is necessarily a question of public policy, not science. In those circumstances, decision-making must depend to a greater extent on policy judgements that do not wait for absolute scientific proof. In other words, the decision to act or to abstain must be a political decision where there is an indication that action is justified, as we know that 'awaiting certainty will often allow for only reactive, not preventive regulation.'⁹⁷⁹

⁹⁷³ Stirling, *On Precautionary and Science Based Approaches* (n 716) 29.

⁹⁷⁴ Latin, 'Good Science' (n 511) 146.

⁹⁷⁵ See the CJEU case law above, Section 3.4.3.

⁹⁷⁶ S Breyer has been advocating that, in the US institutional context, more, not less, discretionary power must be granted to regulatory agencies to allow them to deal with problems of risk management. S Breyer, *Breaking the Vicious Circle: Toward Effective Risk Regulation* (Harvard UP, 1993).

⁹⁷⁷ In this respect, the WTO AB considers that in order for an SPS measure to be based on a risk assessment, the measure must be rationally related to a risk assessment (*Japan—Varietals* (n 349) para 84).

⁹⁷⁸ Kuehn, 'Quantitative Risk Assessment' (n 909) 129.

⁹⁷⁹ On this point see the case law of the US Appeals Courts (Subsection 3.5.6 above). For example, *Ethyl Corp v US EPA*, 541 F.2d, 24–5 (DC Cir. 1976); *Lead Indus. Ass'n Inc v US EPA*, 647 F.2d 1130 (DC Cir. 1979).

In addition, when public authorities fear significant or irreversible damage, action should precede RA.⁹⁸⁰ This is particularly the case when scientists conclude that they are unable to assess a risk clearly or when their conclusions are inconclusive or divergent. In this case the risk manager should be able to take provisional measures without having to wait until the reality and seriousness of the identified risk become fully apparent.

Nonetheless, public authorities should seek to obtain the additional information needed for a more objective RA. Efforts should be made to reduce the uncertainty that may have prompted the adoption of a precautionary measure. This viewpoint seems to be shared by international organizations. According to the Commission's Communication on the PP, 'the measures must be of a provisional nature pending the availability of more reliable scientific data' and 'scientific research shall be continued with a view to obtaining more complete data.'⁹⁸¹ Analogously, the case law of the WTO AB stresses that SPS Agreement Members must seek to obtain the 'additional information necessary for a more objective assessment of risk.'⁹⁸² A precautionary measure decided according to Article 5(7) of the SPS Agreement is only provisional.

However, it must be stressed that under most international and national legislation precautionary action is not always confined to 'provisional measures'. For example, under the 2000 CPB there is no requirement that a precautionary measure be provisional or that a review be carried out within a reasonable period of time, as is the case under the SPS Agreement.

Moreover, the question of how provisional such measures should be is difficult to answer. The above statements from the European Commission and SPS case law presume that it is only a matter of time until certainty can be achieved.⁹⁸³ It is thus assumed that science can always provide definitive answers. However, as uncertainty is rarely due to a simple need to do more research, one may ask what a national authority is to do when no additional information becomes available, or when such information is still insufficient. There are areas where it is likely that no amount of time or spending will allow for full certainty and where the seriousness of possible harm justifies a precautionary approach even in the long run.⁹⁸⁴ The maintenance of a precautionary measure should therefore not be linked to a time limit, but rather to the development of scientific knowledge. Precautionary

⁹⁸⁰ Such a possibility is recognized by several international agreements. See, e.g., SPS Agreement, Art 5(7). In EU law see, e.g., Directive 2001/18/EC on the deliberate release of GMOs, Art 16(1).

⁹⁸¹ Under UNFSA, the emergency measures are temporary.

⁹⁸² See also GLF, Art 7; French Charter for the Environment, Art 5.

⁹⁸³ However, according to the WTO AB, 'what constitutes a "reasonable period of time" has to be established on a case-by-case basis and depends on the specific circumstances of each case, including the difficulty of obtaining the additional information necessary for the review and the characteristics of the SPS measure' (*Japan—Varietals* (n 349) para 93).

⁹⁸⁴ E Fisher, 'Drowning by Numbers: Standard Setting in Risk Regulation and the Pursuit of Accountable Public Administration' 20:1 (2000) OJLS 115.

measures should be maintained as long as scientific data remains incomplete, imprecise, or inconclusive, and as long as a risk is considered too high to be imposed on society.⁹⁸⁵

5.3.3.4 *Balancing advantages and disadvantages and not merely costs and benefits*

For practical reasons, achieving a 'zero-risk' policy might be difficult to achieve, and the PP does not tell the authorities how much risk uncertainty should be allowed under a regulation. Risk management is primarily a question of decision-making. Authorities must determine a level of acceptable risk. Yet that decision is likely to come up against economic interests in cases where risk-producing activities are prohibited and environmental interests are authorized. What is action to one is inaction to the other; what one gains, the other loses. It can even involve trade-offs between lives and jobs. Settling these claims calls for a balancing of interests. In order to ensure that the assessment of the proportionate or disproportionate character of a measure is as objective as possible, public authorities should have at their disposal all the elements needed to compare the costs and benefits of the contested measure. In effect, without being thoroughly informed, the decision-maker will not be able to form a precise idea of the justification for allowing one interest to encroach upon another.

In some legal systems (e.g. the US legal system) cost-benefit analysis (CBA) has become the method most often used by the law-makers to weigh the various interests at stake. Action is taken only if the cost of damages exceeds the cost of intervention. Economic effects are expressed in monetary units, health and safety effects are expressed in mortality and morbidity terms, and environmental effects are expressed in appropriate descriptive terms. Then the traditional CBA translates all consequences into their current monetary value.

However, CBA may rival RA with respect to both their complexity and modelling uncertainties.⁹⁸⁶ The obligation to carry out a CBA is also likely to delay the decision due to the additional time and resources their completion requires.

In addition, this method raises problems in that current estimates of regulatory benefits are too low: possibly far too low. In addition it tries to quantify the unquantifiable. It is already difficult to translate all adverse effects of a project into monetary units, as many dimensions of risk are irreducibly qualitative in nature. In other words, they are irreducible: they cannot readily or unambiguously be reduced to a single measure of performance (in this case, monetary value).⁹⁸⁷ In addition, CBA fails to take into account the long-term benefits of regulation (which are more difficult to quantify) by overestimating the cost of regulatory intervention

⁹⁸⁵ Commission Communication on the PP, 20.

⁹⁸⁶ Wagner, 'The Science Charade' (n 749) 1698.

⁹⁸⁷ Stirling, *On Precautionary and Science Based Approaches* (n 716) 18.

(which is usually easy to quantify). The monetization of non-traded goods is misleading and should be avoided.⁹⁸⁸

Categories of interests which cannot be translated into monetary units should therefore also have to be considered as legitimate subjects of public policy. Considerations other than purely economic ones, usually relating to free trade, must also be taken into account. Consequently the traditional CBA should be replaced by a more global comparison of the advantages and disadvantages of a regulatory measure.

This viewpoint seems to be shared by some regional organizations. According to the EU Commission Communication on the PP, examining costs and benefits has a much broader scope than CBA and includes non-economic considerations such as the efficacy of possible options and their acceptance by the public.⁹⁸⁹ Indeed, health and environmental protection levels are largely derived from societal choices which are more subjective than objective. For example, the banning of hormones in beef in the EU can be justified by social considerations ranging from animal welfare to consumer safety.

Article 26 of the 2000 CPB allows Parties to take socio-economic considerations into account when reaching a decision on import insofar as those considerations arise from the impact of LMOs on the conservation and sustainable use of biodiversity, and especially on the value of biological diversity to indigenous and local authorities. The inclusion of such considerations is innovative in international law, in comparison with the SPS Agreement provisions, according to which risk management measures shall only be imposed to the extent necessary to prevent adverse effects detected in an RA carried out in a scientifically sound manner.⁹⁹⁰

The Commission Communication on PP, which is a non-binding document, doesn't require the performance of a CBA but of an 'impact assessment' (IA) prior to the adoption of the preventive measure.⁹⁹¹ Nonetheless, 'it is not necessary for the economic analysis of the costs and benefits to be made on the basis of a precise calculation of the respective costs of the action proposed or of inaction. Such precise calculations will in most cases be impossible to make, given that, in the context of the application of the precautionary principle, their results depend on different variables which are, by definition, unknown.'⁹⁹² It follows that EU institutions are

⁹⁸⁸ GN Mandel and J Thuo Gathii, 'Cost Benefit Analysis versus the Precautionary Principle. Beyond Cass Sustein's Laws of Fear' (2006) University of Illinois Law Rev 1046.

⁹⁸⁹ According to the European Commission: 'Examining costs and benefits entails comparing the overall cost to the Community of action and lack of action, in both the short and long term. This is not simply an economic cost-benefit analysis: its scope is much broader, and includes non-economic considerations.' According to the Italian Environmental Code, Art 301, precautionary measures are subject to an examination of the potential benefits and costs. Finally, it must also be noted that the SPS Agreement does not direct WTO panels to apply a CBA.

⁹⁹⁰ SPS Agreement, Art 2(2).

⁹⁹¹ Regarding the failure of the Commission to spell out the criteria for listing EDCs, the GcT observed that the BPR did not require the Commission to perform an IA. See T-521/14 *Sweden v Commission* (n 313) para 74.

⁹⁹² Case T-584/13 *BASF Agro* (n 35), para 163.

left with a large degree of discretion relating to the means of assessing the benefits and the drawbacks of the relevant measure. In this respect, it should be pointed out that the different commitments of the EU institutions offer substantial leeway.

By the same token, under TSCA 2016, the identification of priority substances by the EPA is undertaken ‘without consideration of costs or other nonrisk factors.’⁹⁹³

Finally, the US Court of Appeals⁹⁹⁴ and EU courts⁹⁹⁵ both clearly favour non-economic elements such as human health in the process of reviewing regulatory standards, in situations where those interests must be balanced against economic interests.

5.4 Critical assessment

At first glance the PP seems to occupy a paradoxical position at the interface between science and normative decision-making. On one hand, it would reaffirm the primacy of political decision-making in determining the contents and timing of preventive measures, thereby limiting the role of scientists. Indeed, RA is not deemed to be the final arbitrator of a complex decision-making process; it is merely an aid to the regulator. On the other hand, although arising from a lack of scientific information, precaution calls for ever-increasing scientific knowledge, thus serving to reinforce the power of experts and consequently the dependence of decision-makers on science. Scientific expertise, initially rejected as insufficient, would thereafter be sought to balance the scope of anticipatory measures. However, as we have demonstrated in this section through consideration of the articulation between risk assessment and risk management, these two tendencies can operate in a complementary fashion. In other words, precaution comes within the competence of engineers and toxicologists working to assess a particular type of risk as much as that of the decision-maker. Risk assessors have to explain the prevailing uncertainties and the assumptions they use to resolve them. It is a question of knowing how to arbitrate between these two fields when knowledge is uncertain and imperfect, so that no single party can make a decisive case to convince others, obtain their agreement, and put an end to the debate.

The PP is thus in no way anti-scientific. On the contrary, it is precisely at that level that it demonstrates its innovative character, by forcing scientists to admit the existence of uncertainty and decision-makers not to hide behind Fortress Science.

⁹⁹³ Section 6(3)(b)(B)(i).

⁹⁹⁴ See, e.g., *Lead Indus. Ass'n* (n 979); *American Petroleum Institute v Costle*, 665 F.2d 1176, 1185 (DC Cir. 1981).

⁹⁹⁵ Case T-199/96 *Bergaderm* (n 382); Case T-79/99P *Alpharma* (n 351).

6. Applications of the principle

The appearance of new principles is generally signalled by both major and minor modifications of existing laws. These could be significant in the case of the PP, which is based on assumptions completely contrary to those underlying the principle of prevention, the latter having until now shaped environmental law. This renegade principle could ruffle the tranquil course of positive law by leading to a genuine change of perspective in the elaboration of norms. As explained earlier, both *ex ante* and *ex post* procedures for environmental decisions have been subject to change owing to the effect of the PP. For the sake of greater clarity, we have distinguished between the effects of the principle on the elaboration of standards (Subsection 6.1) and its effects on civil liability (Subsection 6.2).

6.1 The effects of the precautionary principle on the elaboration of standards

6.1.1 Introductory note

The PP has its greatest impact prior to decision-making, since its logic relates to the formulation of decisions rather than their implementation. Under the principle, duty of care becomes essential.⁹⁹⁶ It is no longer a question merely of foreseeing or averting a known danger, but of preventing a risk that cannot be fully assessed: a new type of risk, an uncertain risk. Consideration of such risks as part of the decision-making process must above all aim to avoid irreversible situations; the absence of certainty should no longer delay the adoption by the public authorities of suitable measures to protect against risks, nor the cessation of certain dangerous activities.

The PP should at the very least lead to the generalization of procedures for assessing and reducing risks, including those that have a low probability of occurring. However, it is not sufficient to gather relevant information: authorities must also be prepared to take decisions before full information has become available. In addition to enhanced information requirements, public authorities should henceforth consider the reversibility of their decisions in order to reflect advances in scientific knowledge. By urging the decision-maker to choose a different course of action or to declare a moratorium, the principle may play a decisive role in the battle against risk. Finally, the statement of reasons for a given decision should reflect not only factual elements but also those uncertainties that can no longer be ignored. These aspects of the PP are considered in the following subsections.

⁹⁹⁶ Case C-19/00135 *Urgenda* [2019] HR:2019:2006, paras 5.3.2, 5.6.2.

6.1.2 Reversal of the burden of proof in regulating risks

6.1.2.1 *The need for a shift*

Under public law, the competent authorities are called on to demonstrate the need to ban or regulate a given activity.⁹⁹⁷ That requirement derives from the need to justify any constraining regulatory measure on the basis of objective considerations; in the field of environment, this implies that decisions must be based on proven scientific fact. The decision to protect a species or to ban the marketing or the use of a chemical substance may be censured for exceeding an authority's powers, lacking adequate substantiation, or violating the principle of non-discrimination if the scientific assumptions upon which it is based bear no relation to the objective towards which the legislator or his administration is pursuing.

This logic, which has strongly marked the evolution of environment law up to the present day, should be reconsidered in the light of the PP.⁹⁹⁸ If the absence of scientific certainty may no longer serve as a pretext for delaying the adoption of measures to protect the environment, the regulatory agencies formulating standards should no longer be required to justify their actions on the basis of absolute scientific certainty.

According to the adage *in dubio pro natura* deduced from the constitutional right to environmental protection,⁹⁹⁹ harmlessness is a prior requirement for authorization of any technology liable to adversely affect the environment. More concretely, the PP posits a presumption in favour of protection of the environment and public health. Therefore the principle places the responsibility for demonstrating safety on those undertaking potentially harmful activities. Undertakings seeking to introduce new and risky substances into the environment should be required to provide conclusive evidence of their safety. In the absence of sufficient scientific data, the authority should refuse to authorize the substance or the practice at issue. Thus the principle could serve to delay the decision to commercialize a product or undertake an activity until such time as reasonable proof of its adequate safety has been provided. From a regime where any activity must be permitted unless the regulator is able to prove that it is hazardous, we would thus move to a regime where any activity that has not been proved safe by its developer would be forbidden. It would no longer be for those who fear a hazard to prove that such a hazard exists; rather, the applicants would have to demonstrate, on the basis of scientific evidence, that regulation of their activity would be inappropriate. This

⁹⁹⁷ The burden of proving that a GATT, Art XX exception applies is imposed on the party asserting it as a defence. By the same token, SPS Agreement, Art 2 provides that an SPS measure must not 'not [be] maintained without sufficient scientific evidence, except as provided for in paragraph 7 of Article 5'.

⁹⁹⁸ E Reh binder, 'The Precautionary Principle in an International Perspective' in *Miljørettens Grundsorgsmaal* (Copenhagen, 1994) 91; A Nollkaemper, 'What You Risk Reveals What You Value . . .' in Freestone and Hey, *The Precautionary Principle* (n 763) 73.

⁹⁹⁹ See Chapter 5, Section 4.3.

is quite simply a new paradigm: previously the polluter benefited from scientific doubt; henceforth doubt will work to the benefit of the environment.

Must the operator or producer then be able to prove a complete absence of risk to the environment? Would that not be to require a *probatio diabolica*?¹⁰⁰⁰ Since the absence of an effect is scientifically impossible to prove, there is always a potential for unforeseen risks.¹⁰⁰¹ Taken to an extreme, this requirement, which is in many respects impossible, would merely serve to recreate the current problem in other terms. On the grounds that the impact of certain technologies is uncertain, operators would be asked to provide absolute proof of their safety. Yet the very elements that give rise to that uncertainty make it impossible to provide absolute proof. In the uncertain and controversial contexts in which the PP applies, science is no more capable of providing definitive proof of the absence of risk than of its presence. This reversal merely reformulates the positivist belief that science could reduce uncertainty by simply carrying out further research.¹⁰⁰² Yet demonstrating 'zero risk' necessarily leads to perplexity, since all human activity is likely to have an impact of one sort or another on the environment. Nothing will entirely eliminate the unforeseeability inherent in certain dangerous activities.

We must nonetheless ask whether this discussion is not overly theoretical. One has to differentiate the allocation of the burden of proof in administrative law from the judicial realm.

6.1.2.2 *The shift of the burden of proof in international, EU, and US law*

The 1982 UNGA World Charter for Nature established this change by requiring that: 'Activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential damage to nature ...'¹⁰⁰³ Since then, there has been a clear need to reduce the burden of proof when information is 'at the frontiers of scientific knowledge'.¹⁰⁰⁴ If the burden of proof cannot be shifted to the operator, law-makers should at least lessen the burden of proof required to trigger public intervention in order to prevent or mitigate harm to the environment. Various international law instruments have applied this reversal of the burden of proof in a pre-emptive manner.

¹⁰⁰⁰ In the French *Greenpeace France* GMOs case, AG J Misho judged that the PP 'does not require that, whenever the complete absence of any risk may not be scientifically demonstrated, an activity be forbidden or subjected to Draconian restrictions, since everyone knows that it is not for nothing that negative proof has always been characterised by jurists as *probatio diabolica*' (Opinion of 25 November 1999 in Case C-6/99, *Greenpeace France* (n 22), para 72).

¹⁰⁰¹ SAM Group of Chief Scientific Advisors, *EU Authorisation Processes of Plant Protection Products*, Scientific Opinion 5/2018 (POUE, 2018) 26.

¹⁰⁰² B Wynne, 'Uncertainty and Environmental Learning: Reconciling Science and Policy in the Preventive Paradigm' 2:2 (1992) *Global Environmental Change* 111.

¹⁰⁰³ UNGA Resolution 37/7 on a World Charter for Nature, 37 UN GAOR (Supp. No. 51) 17, para 11(b).

¹⁰⁰⁴ According to the Commission's Communication on the PP, 'action taken under the head of the PP must in certain cases include a clause reversing the burden of proof and placing it on the producer,

It has been the international instruments for protection of the marine environment that have given concrete form to this advance. Created within the framework of the 1972 Convention for the Prevention of Marine Pollution by Dumping, the Oslo Commission in 1989 adopted a decision that clearly illustrates this change.¹⁰⁰⁵ Whereas formerly industrial wastes could be dumped at sea freely, with the entry into force of this decision those seeking to dispose of such wastes found that disposal could only be authorized if they had proved, according to an ad hoc procedure, that there was no practical alternative on land and that disposal at sea would pose no harm to the marine environment. Similarly, the 1992 OSPAR Convention requires parties wishing to continue to dump low- and intermediate-level radioactive substances to report at two-yearly intervals on 'the results of scientific studies which show that any potential dumping operations would not result in hazards to human health, harm to living resources or marine ecosystems, damage to amenities or interference with other legitimate uses of the sea'.¹⁰⁰⁶ This evolution is even more marked as regards the management of marine resources, particularly the use of driftnets. According to UNGA Resolution 44/225, States choosing not to observe the international moratorium on driftnets are required to 'anticipate all unacceptable impacts of such practices'.¹⁰⁰⁷ This Resolution shifts the burden of proof (i.e. the use of 'statistically sound analysis') in favour of conservation, even though it does not constitute a complete reversal of the burden of proof.¹⁰⁰⁸ This trend is even more remarkable in the 1995 UNFSA. For instance, while UNCLOS, Articles 61(2) and 119(l)(a) require the use of 'best scientific evidence available', Article 6(3)(a) of the UNFSA, which sets out how States should implement the PP, refers to 'adequate scientific information', a less stringent requirement. Last but not least, in the 2000 CPB the party proposing to export an LMO can be required by the potential importing country to undertake and finance RA studies to prove that its product is safe.¹⁰⁰⁹

Both the Council of Europe¹⁰¹⁰ and EU law displayed a tendency to shift the burden of proving the harmlessness of certain activities onto operators. In view of the *a priori* potential risk, decisions concerning drugs, pesticides, food products, additives, foodstuffs, and GMOs require pre-marketing approval based on

manufacturer or importer, but such an obligation cannot be systematically entertained as a general principle' (para 6.4).

¹⁰⁰⁵ OSCOM Decision 89/1 of 14 June 1989 on the Reduction and Cessation of Dumping Industrial Wastes at Sea.

¹⁰⁰⁶ 1992 OSPAR Convention, Art 3(3)(c) of Annex II.

¹⁰⁰⁷ UNGA Resolution 44/225 on Drift-Nets and their Impact on the Conservation of Marine Resources, ILM, 29 (15 March 1990), 1555.

¹⁰⁰⁸ Freestone, 'International Fisheries since Rio' (n 166) 152.

¹⁰⁰⁹ CPB, Art 10(2) and (3).

¹⁰¹⁰ Council of Europe Model Act on the Protection of the Environment, Art 5(3), that has been implemented by a number of Central European States, shifts the burden of proving the absence of adverse impact to the proponent of the activity that 'is likely to cause a risk to the environment'.

scientific studies and experimental data, which must be supplied by the applicant company. The burden of proof is thus transferred to the latter.

Whilst in the past regulators had to prove that particular substances were hazardous,¹⁰¹¹ those who wish to place an active substance on the market must provide evidence that it is safe for health and the environment.¹⁰¹² Adopted between 2006 and 2011, REACH,¹⁰¹³ the PPPR, and the BPR epitomize a paradigmatic shift by imposing the burden of proof on the supplier or manufacturer, requiring companies to identify and manage the risks associated with the substances they intend to market in the EU. The petitioners must demonstrate to the ECHA or the EFSA how these substances can be safely used, and must provide health and safety information to other users in the supply chain.¹⁰¹⁴ In other words, undertakings may only place new active substances on the EU market after they have first established that they are safe for human health and the environment.

Moreover, the REACH authorization procedure bears the hallmarks of precaution. An SVHC cannot be placed on the market unless an authorization has been granted by the Commission.¹⁰¹⁵

As regards the placing of GMOs on the internal market, whilst the United States has been endorsing a permissive approach (authorized unless proven risky), since the early 1990s the EU has pursued a precautionary approach (prohibited unless proven safe). Accordingly, under EU law, any person that intends to market a GMO bears the burden of proving that it is harmless. By contrast, the permissive approach implies that the regulator must present evidence that the GM crop entails a risk.¹⁰¹⁶

Similarly, the EU's hazardous waste regime rests on a presumption of toxicity with regards to 200 categories of listed wastes. That presumption is only rebuttable in 'exceptional cases' and 'on the basis of documentary proof furnished in an appropriate manner' by the holders of such wastes.¹⁰¹⁷ In particular, where the composition of waste that could be qualified as hazardous is not immediately known, it falls to the holder of that waste, as the party responsible for its management, to

¹⁰¹¹ By way of illustration, Council Regulation (EEC) 793/93 required the Member States to carry out the RA of priority substances because of their potential impacts on people or the environment. The implementation of that Regulation has been so laborious that it has paralysed regulatory action.

¹⁰¹² Bozzini, *Pesticides* (n 933) 37.

¹⁰¹³ Previously, the institutions had to prove the risks entailed by chemicals before they could place restrictions on substances. The onus of the proof placed on the EU institutions combined with laborious RA requirements paralysed regulatory action. Owing to a huge backlog of data, the EU system was unable to cope with the increasing problems caused by hazardous chemicals. This paralysis has called for a reversal of the process of assessing the risks of 30.000 chemical substances in the name of the PP, thus accelerating the decision-making process as it relates to risk. Hence, the core innovation of REACH was undoubtedly to oblige manufacturers and importers to register their existing substances in accordance with a 'no data, no market' principle. See Art 5.

¹⁰¹⁴ REACH, Art 33.

¹⁰¹⁵ *Ibid*, Art 57.

¹⁰¹⁶ See Subsection 3.6.1 above.

¹⁰¹⁷ Commission Decision 2000/532/EC of 3 May 2000 establishing a list of hazardous wastes, Art 3.

carry out analyses in order to ensure that the waste in question is devoid of any hazardous substance ‘which may reasonably be found in that waste.’¹⁰¹⁸ Such an interpretation is consistent with the PP.¹⁰¹⁹ Furthermore, where there are doubts over the hazardous properties of waste that may be classified under EU law, or where it is impossible to determine with certainty that there are no hazardous substances in that waste, it must be classified as hazardous waste in accordance with that principle.¹⁰²⁰ This mechanism is clearly advantageous for the public authorities in that it places the burden of proof for the harmlessness of waste on the waste holder.

In contrast to these developments, under US law, in general, the proponent of the regulation (i.e. the regulator) must prove that an activity or product poses a risk and that environmental measures are warranted, as the SCt emphasized in *Industrial Union Department, AFL-CIO v American Petroleum Institute*.¹⁰²¹ In the TSCA there is no clear shifting of the burden of proof onto the applicants; rather, the task to prove harm or the absence of harm shifts back and forth between the chemical producers and the EPA. In the field of biodiversity conservation, the Marine Mammal Protection Act requires applicants for permits to take marine mammals to show that taking them will not have adverse effects.¹⁰²² The ‘no jeopardy’ procedure of the ESA,¹⁰²³ which requires agencies to ensure that their actions are not likely to jeopardize the continued existence of any endangered or threatened species, shifts the burden of proof by requiring agencies to give ‘the benefit of the doubt to the species’ and stating that they should not proceed in the face of inadequate knowledge.¹⁰²⁴ Nevertheless, the Department of the Interior cannot list an endangered species until it has completed an exhaustive study of the ‘best scientific and commercial data available’.

Considering all of these regulatory developments, the onus is on an applicant seeking authorization to market a product rather than on the public authority; nonetheless, there is no obligation to prove absolute harmlessness, the *probatio diabolica*. In fact, an applicant seeking authorization to market a substance is required to conduct research in order to reduce uncertainty as far as possible, and finally to obtain the necessary proof. Logically speaking, the extent of that burden will vary depending on the seriousness of the suspected damage, the usefulness of the product, the availability of scientific evidence, etc.

Finally, burden shifting need not be an all-or-nothing proposition. It might be possible to lower the burden of proof (from beyond all reasonable doubt to a balance of probabilities). It might also be possible to share the burden of proof

¹⁰¹⁸ Cases C-487/17 to C-489/17 *Verlezza* [2019] C:2019:270, paras 40, 46.

¹⁰¹⁹ *Ibid*, para 48.

¹⁰²⁰ *Ibid*, para 62.

¹⁰²¹ Administration Protection Act (APA), 5 USC § 556(d); *Industrial Union Department, AFL-CIO v American Petroleum Institute* (n 510). See Subsection 3.5.6.1 above.

¹⁰²² 16 USC §1371.

¹⁰²³ ESA §7(a)(2), 16 USC §1536.

¹⁰²⁴ *Roosevelt Campobello Int'l Park v EPA*, 684 F.2d 1041, 1049 (DC Cir. 1982).

between the regulatory authority and the industry. For example, in proceedings to suspend or cancel existing substances, the regulatory agency could have the initial burden of producing evidence suggesting that a substance is unsafe, and the holder of the substance would subsequently have the chance to establish the safety of his substance on the basis of documentary proof furnished in an appropriate manner. For instance, the higher administrative court in Kassel held that new technologies are prohibited so long as the law-maker does not adopt a statute with the aim of minimizing their risks.¹⁰²⁵

6.1.2.3 *The shift of the burden of proof in courts*

In contrast with developments at administrative level, be it in relation to international, EU, or domestic authorities, courts require a party alleging a risk of serious environmental harm to adduce sufficient evidence to establish a *prima facie* case. A question arises as to whether the PP could shift or at least lower that burden. A number of States have argued before international courts that the PP requires the source State to prove an absence of risk, rather than establishing a failure to exercise due diligence or a breach of treaty obligations. Courts have traditionally been reluctant to take the dramatic step of shifting the burden of proof in the name of the PP. *Pulp Mills* is a case in point. The ICJ considered that 'while a PA may be relevant in the interpretation and application of the provisions of the Statute, it does not follow that it operates as a reversal of the burden of proof'. Moreover, it held that nothing in the 1975 Statute indicated that it placed the burden of proof equally on both Parties.¹⁰²⁶

That said, a number of national courts tend to reapportion the burden of proof when confronted with uncertainty. For instance, the Indian SCt has held that the 'onus of proof is on the actor or the developer/industrialist to show that his action is environmentally benign'.¹⁰²⁷ Along the same lines, the Brazilian SCt has ruled that the PP implies a reversal of the burden of proof in environmental matters.¹⁰²⁸ Several German courts have lowered the standard of probability applied for the purposes of hazard prevention on the grounds that electro-smog entails a potential danger for human health.¹⁰²⁹ In *Telstra*, the NSWLEC held that when the seriousness or the irreversibility of the damage is demonstrated, the burden of proof must be shifted to the party supporting the development in order to demonstrate that the 'threat does not in fact exist or is negligible'.¹⁰³⁰ That said, if that party fails to

¹⁰²⁵ VGH Kassel, *NJW*, 1990, 336 et seq.

¹⁰²⁶ *Pulp Mills* (n 138), para 164.

¹⁰²⁷ *Vellore Citizens Welfare Forum v Union of India and Others* (1996) AIR 734.

¹⁰²⁸ STJ, REsp 1,060,753/SP, 2nd Panel. See AH Benjamin and N Bryner, 'Brazil' in Lees and Viñuales, *Oxford Handbook of Comparative Environmental Law* (n 546) 91.

¹⁰²⁹ D Hanschel, 'Progress and the Precautionary Principle in Administrative Law' in Pâques, *Precautionary Principle* (n 677) 111.

¹⁰³⁰ *Telstra* (n 659) 42–3.

discharge the burden of proving that there is no threat, it does not necessarily mean that the authorization must be refused.¹⁰³¹

6.1.3 Environmental Impact Assessment (EIA)

As is the case for the RA, the EIA is intended to reduce the uncertainty associated with the potential impacts of a project. The jewel in the crown of prevention, the EIA procedure is nonetheless undermined by serious shortcomings. First, scientific uncertainty in relation to ecosystems, coupled with the value judgements made by assessors concerning the importance that is to be afforded to certain environmental components and the project's impacts to the detriment of others, are an inevitable part of the EIA.¹⁰³² Secondly, to the extent that the decision-maker retains complete freedom of choice as to whether to carry out a project—the obligation to integrate the results of an impact assessment into a decision being of a purely formal nature—its preventive effects remain dependent on the authority's willingness to take evaluation results into account. Consequently, we should consider whether it might not be possible to take assessment a step further with the help of the PP, through procedural modifications that accord a greater role to uncertainty.

First of all, EIAs should not be restricted merely to the known impacts of a project but should also consider those impacts that are less clearly determined and define ways to take precautions against these, or at least attempt to reduce them. Therefore EIA procedures should not only reduce uncertainty but also explicitly acknowledge sources of uncertainty that remain, instead of burying these in arbitrary assumptions. One way in which assessors' biases (value judgements undermining lingering uncertainty, discounting of long-term effects that are subject to greater uncertainty) could be alleviated is to ensure broader consideration of uncertainties during the scoping stage and public enquiries.¹⁰³³

Secondly, the identification of any lingering uncertainties should trigger a greater level of caution amongst decision-makers. In recent judgments, the CJEU has considered new ways of interpreting the requirements applicable to traditional EIAs, which must be carried out whenever there is a probability or a risk that an Annex II Directive 2011/92 project may have 'significant effects on the environment by virtue, inter alia, of their nature, size or location'. The Court ruled that 'in the light, in particular, of the PP ... such a risk exists if it cannot be excluded, on the basis of objective information, that the plan or project will have significant effects on the environment.'¹⁰³⁴ Thus the rationale of the *Waddenzee* case law¹⁰³⁵ applies henceforth to all projects and not exclusively to projects jeopardizing the

¹⁰³¹ Ibid, 152.

¹⁰³² Peel, *The Precautionary Principle in Practice* (n 9) 143–4.

¹⁰³³ Ibid, 144.

¹⁰³⁴ Case C-526/16 *Commission v Poland* [2017] C:2018:356, para 66.

¹⁰³⁵ See Subsection 3.4.3 on nature protection above.

conservation of Natura 2000 sites. It follows that an EIA is indispensable as long as there is no absolute certainty regarding the absence of any environmental impact on any natural sites. Along the same lines, the Belgian *Conseil d'État* has held that, where there is a doubt concerning the absence of any significant impact of a project on a protected species, an EIA is required.¹⁰³⁶ As far as the conduct of an EIA in relation to Annex II projects is concerned, this case law replaces the positive criterion (ascertaining a significant impact) with a negative criterion (demonstrating the absence of a significant impact in order to preclude the need for an EIA). In so doing, the CJEU applies an *in dubio pro natura* standard.

Likewise, US law is particularly instructive in this regard.¹⁰³⁷ Although the National Environmental Policy Act (NEPA) itself does not explicitly require a worst-case analysis, a US District Court interpreted in *Sierra Club v Siegler*,¹⁰³⁸ the NEPA's EIA requirement as requiring a worst-case analysis on the grounds that it was needed 'to assist decision making in the face of scientific uncertainty'. NEPA has since 1986 settled for an assessment of 'reasonably foreseeable' adverse effects based on theoretical approaches and research methods taking into account 'credible scientific evidence'. This amendment of the NEPA undoubtedly excludes an assessment of purely hypothetical risks; however, the requirement to assess reasonably foreseeable risks—in other words, those we are terming uncertain—has been maintained.¹⁰³⁹ On this point the US model is far more anticipatory than the EU Directive 2011/92 on the assessment of the effects of certain public and private projects on the environment.

An even more important step would be for the EIA procedure to force decision-makers to consider a number of reversible courses of action in order to take advantage of new knowledge. Even if it means forgoing a project, the author of an EIA should recommend reversible options in preference to irreversible options. The search for variants should become the author's principle task. While this requirement is at present ignored in most regulations, it would eliminate the partisan character of assessment and would oblige planners to reason on the basis of other than purely financial criteria.

As long as risks evolve as a function of scientific and technological knowledge the final word will never be said. It is difficult to imagine that the assessment of a hazardous activity might one day be definitively concluded; it will always be advisable

¹⁰³⁶ CE Bg, no. 230, 237, 18 February 2015, *Poli*.

¹⁰³⁷ D Shelton, 'The Impact of Scientific Uncertainty on Environmental Law and Policy in the United States', in Freestone and Hey, *The Precautionary Principle* (n 763) 216.

¹⁰³⁸ *Sierra Club v Siegler*, 532 F (SD Texas 1982).

¹⁰³⁹ When information is incomplete or unavoidable on 'reasonably foreseeable' risks, the agency is instructed to assess uncertainties and to include potential catastrophic impacts if there is credible scientific evidence to support them, even if their probability of occurrence is low. Even the simple fact that a geological study differed from the conclusions of preliminary studies of the risks of a dam bursting was able to create a scientific uncertainty that obliged the author of the study to carry out further investigations. See *Warm Springs Dam Task Force v Gribble*, 621 F.2d 1017, 1025 (9th Cir. 1980).

to repeat the EIA at regular intervals so that public authorities can adapt their decisions to new results. The 1991 Espoo Convention on EIA in a Transboundary Context (CEIATC) reflects that understanding in its Article 7, which foresees a 'post-project analysis' that has no equivalent in EU law. Lastly, even if the ICJ did not address in *Gabčíkovo-Nagymaros* the need for a prior EIA for a hydro-electric project on the Danube, the Court stressed that new environmental norms have to be taken into account not only when States contemplate new activities but also when continuing activities had begun in the past. Consequently, States are required to monitor ongoing environmental risks throughout the life of the project they have been allowing.¹⁰⁴⁰

6.1.4 Strengthening the statement of reasons for standards

The formal obligation to provide a statement of reasons for certain decisions, an obligation found in most Continental administrative legal systems and in several EU environmental directives¹⁰⁴¹ as well as in international conventions,¹⁰⁴² would also be influenced by the PP. Public authorities are required to provide reasons for their choice of standards based on the principles intended to guide their actions. Of course the authorities have the option of not applying a principle such as that of precaution (e.g. if an anticipatory measure proves to be disproportionate to the importance of the potential risks or damages); but if they decide to forgo the principle they must nonetheless be able to state the reasons for that decision. The impossibility of recourse to a precautionary approach would therefore have to be set out in the statement of reasons for the decision. The effect of this obligation on the decision-making process should not be underestimated; the requirement to justify any deviation from the PP forces the authority to consider the impact of its decision carefully.¹⁰⁴³

The PP could also modify the requirements for the statement of reasons for administrative decisions, which is meant to depend on considerations of fact and law. Administrative case law in Belgium, France, Germany, and the Netherlands requires that considerations of fact be certain and duly established and does not allow an administrative authority to base decisions on uncertain elements. The effect of this overly restrictive perspective is to exclude as a basis for administrative decisions those presumptions which are not fully supported by factual evidence. The PP will lead to a wider concept of 'considerations of fact' by integrating uncertainty therein. By reference to this principle, administrations can validly take

¹⁰⁴⁰ Judge Weeramantry outlined that many projects are subject not merely to an assessment prior to their commencement, but to a continuing assessment and evaluation as long as the project is in operation. See Separate Opinion, at 21.

¹⁰⁴¹ Directive 2011/92 on EIA, Art 9; Directive 2003/4 on public access to environmental information, Art 4(5).

¹⁰⁴² 1998 Aarhus Convention on Access to Information, Public Participation in Decision-Making Process, and Access to Justice in Environmental Matters, Art 6(9).

¹⁰⁴³ Verschuren, *Principles of Environmental Law* (Nomos, 2003) 39.

decisions which might not be based entirely on considerations of certain and duly established fact, for example, a decision ordering that a polluting installation be closed or that a product be withdrawn from the market for reasons of health, even when the evidence of harm is not yet irrefutable.¹⁰⁴⁴

Finally, the extent to which RA can be entangled with risk-management decisions was stressed above. For the sake of administrative transparency,¹⁰⁴⁵ policy choices cannot be disguised as scientific truths. In fact, administrators must be able to distinguish between policy judgments and scientific facts. Against this backdrop, the decision must acknowledge any lingering uncertainty and explain why it cannot be eliminated. In addition, it must reveal any assumptions and policy choices made in order to address these uncertainties. By ensuring greater transparency through the statement of reasons, the public authority will undoubtedly increase public confidence in its decision-making mechanisms.

6.1.5 Monitoring of activities giving rise to risk

It is not sufficient that the PP guide a decision, because a risk may only become apparent subsequently and thus not have been identified, or may have appeared insignificant, when the evaluation was taking place. A number of international instruments already require parties to reconsider their obligations continually in the light of improved scientific knowledge, and if necessary to undertake more stringent requirements.¹⁰⁴⁶ Precaution therefore does not call for stasis: on the contrary, management of risk must be flexible and progressive, and measures must be continuously adapted and revised as a risk is more thoroughly understood.¹⁰⁴⁷ In other words, acting prudently means to design resilient measures that allow flexible responses to unexpected developments. Precaution should thus lead public authorities to establish mechanisms to monitor products and activities in order to make necessary adjustments to decisions by suspending an activity or withdrawing a product. From that perspective, monitoring products that present a potential risk is essential, since it creates an information feedback mechanism that will allow

¹⁰⁴⁴ For example the decision *Pro-Nat* of 1999 of the French *Conseil d'État* set out in Subsection 3.6.4 above.

¹⁰⁴⁵ TFEU, Art 15(1).

¹⁰⁴⁶ This obligation is reflected, for instance, in 1982 UNCLOS, Art 200; 1979 CLRATP, Art 2; 1991 ECE Convention on EIA in a Transboundary Context, Art 9; 1992 UNFCCC, Art 7; 1992 CBD, Art 23. See also Directive 96/29 Euratom laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation, Art 6(2).

¹⁰⁴⁷ Thus the PP does not imply a definitive decision that would permanently penalize the economic operator who generates a risk. On the contrary, it entails waiting in order to avoid an irreversible situation later on, simply because we no longer have the right to make errors. Even though destruction leads to irreparability, the nature of a moratorium is never definitive. A precautionary measure should therefore be understood in the legal sense as a temporary arrangement affecting a situation that could prove injurious. The case law referred to above underlines the dynamic, rather than static, character of the PP. This is undoubtedly the meaning of the decision by the Belgian Constitutional Court concerning exploitation of the Meuse quarries, which tipped the scales in favour of reversibility of the legal norm and against a risk of irreversible damage to the aquatic environment due to continuing gravel quarrying. See Subsection 3.2.3.2 above.

the public authorities to withdraw a product from the market quickly if a problem arises.¹⁰⁴⁸

EU secondary law contains different provisions relating to the monitoring of activities giving rise to risk. Directive 2001/18 on the deliberate release into the environment of GMOs reflects the PP, in that the notifier is obliged to inform the competent national authority immediately of new information concerning the risk posed by a product to human health or the environment, and the authorities must subsequently inform the Commission and other Member States of that information.¹⁰⁴⁹ This presupposes that a product will be traced throughout the chain of production and commercialization ('from the farm to the fork'). For listed installations, the monitoring of activities that pose a risk is widespread. Thus the IED requires that competent authorities periodically update permit conditions when it appears that substantial changes in BAT make it possible to significantly reduce emissions.¹⁰⁵⁰

6.2 Effect of the precautionary principle on civil liability

6.2.1 Introductory note

We should first ask whether the premises of the PP are inherent in liability or if, by contrast, liability hinders the principle's progress. To the extent that civil liability is above all intended to guarantee the reparation of existing damage, one is tempted to respond that it bears no relation to measures meant to prevent the occurrence of future damage. Consequently the PP, which is meant to protect against uncertain risk, is not relevant to civil liability. In fact, however, the incompatibility between a legal institution oriented towards the past and a principle oriented towards the future is only apparent. The days of absolute certainty are over; in the future greater importance will necessarily be attached to doubt and consequently to the PP within the mechanisms of liability.

Such an evolution is particularly desirable given the obstacle course which confronts the victim of environmental damage who must not only prove that damage has occurred but also show a causal link to the tortfeasor. The sometimes considerable time and space between the event and the damage, as well as the difficulty in determining the extent of reparation, constitute formidable barriers. Even if a plaintiff manages to produce such proof, the defendant can always seek refuge in unforeseeability. Thus the uncertainties inherent in the three conditions of

¹⁰⁴⁸ In the case of the French embargo on British beef, AG J Misho stated that 'traceability is one of the preferred techniques of preventive action' (Opinion of 20 September 2001 in Case C-1/00 *Commission v France* (n 345), para 86).

¹⁰⁴⁹ Case C-6/99 *Greenpeace France* (n 22), para 44.

¹⁰⁵⁰ Art 17, 19.

liability—fault, damage, and the causal link between the two—make compensation uncertain.

If liability is to play an effective role in the reparation and prevention of ecological damage, it will probably be necessary to remove the multiple constraints resulting from the certainty requirement.¹⁰⁵¹

If we are to take account of environmental damage we will in effect have to leave behind the overly rigid realm of civil liability.¹⁰⁵² We will have to require a lesser degree of certainty: i.e. replace certainties with scenarios contemplating the unresolved uncertainty.

The PP should shed new light on the duty of care which dominates the field, and at the same time lessen the severity of having to prove causation.¹⁰⁵³

6.2.2 Personal scope

According to some commentators, the PP only applies in relation to acts carried out by public or administrative authorities, and is not applicable to private parties, whether businesses or private individuals. Generally speaking, the public authorities must abide by the principle when performing their tasks, failing which they may incur liability under tort. In France, whilst Article 5 of the Charter for the Environment that enshrines the PP applies only to public authorities, Article L-110-1 II 1 of the Environmental Code is silent regarding its personal scope. An extension of the scope of the principle *ratione personae* has been encouraged by a broad interpretation of this provision.

As early as 2006, the French Court of Cassation ruled against the producer of the drug Distilbène in a tort action, holding that it was subject to a duty of care, which was closely related to the PP.¹⁰⁵⁴ On 3 March 2010, the Court of Cassation unexpectedly held that the principle could be invoked against ordinary private individuals.¹⁰⁵⁵ In principle, an ordinary private citizen may incur liability for the pollution risk that they are liable to cause for a water-producing company as a result of digging carried out their garden. In this case, the Court of Cassation referred

¹⁰⁵¹ A striking example is the judgment in *Bosphorus*. In virtue of Art 7(2) of Directive 2005/35 on ship-source pollution the coastal State can order remedial measures against a vessel discharging oil at sea provided that it has 'clear objective evidence' within the meaning of UNCLOS, Art 220(6) that the vessel has committed the infringements. The CJEU endorsed a rather restrictive interpretation of that requirement in holding that the coastal State must have 'sufficient evidence and not just a clear grounds for believing that that violation has been committed by the vessel' (Case C-15/17 *Bosphorus* [2018] C:2018:557, para 64). It follows that the administration cannot base its decision on a bundle of indications provided by corroborating evidence.

¹⁰⁵² The Criminal Division of the Italian Court of Cassation has held that an assessment of the risk of asbestos can be carried out where a 'high probability' of risk can be proven (Cass. it., No. 3567, 20 March 2000).

¹⁰⁵³ This analysis was originally written on the basis of civil liability regimes in the French and Belgian Civil Codes. For an overview of those regimes see W Van Gerven, *Tort Law* (Hart, 1999).

¹⁰⁵⁴ Cass fr., 24 January 2006, *Professions médicales et paramédicales*.

¹⁰⁵⁵ Cass fr., 3 March 2010, *SA des eaux minérales de Vals c/ Di Mayo*, case note of S Nadaud 4 (2010) RJE 689–700.

directly to Article L-110-1 II 1 of the Environmental Code. It held that, as a matter of principle, liability may be incurred not simply due to the breach of a mandatory administrative requirement (prohibition, authorization etc.), but rather directly as a result of the failure to comply with the PP.¹⁰⁵⁶ It is therefore necessary to assess compliance with the PP separately from the issue of whether the defendant was diligent in complying with legal and administrative requirements.

6.2.3 Fault

First of all, the PP may encourage law-makers to stipulate more stringent security measures, imposing a duty to provide information and issue warnings, as well as to monitor at-risk activities. Any failure to comply with these obligations will in itself constitute fault. However, the recognition of the PP could shed new light on the issue of fault. We must thus verify whether the PP can be instrumental in interpreting fault, which forms an integral part of the civil liability regime in both common law and continental legal systems.

6.2.3.1 *Shedding a new light on the duty of care*

Until now the notion of fault has been defined with regard to duty of care. In effect, most liability regimes consider that normal and reasonable care is required and that measures taken under normal circumstances are sufficient to avoid incurring responsibility in the case of damage to the environment.¹⁰⁵⁷ In other words, the fact of having acted as a *bonus pater familias* or respecting the standards of professional conduct or professional rules currently in force is sufficient to exonerate a person from liability. The duty of care is thus linked to well established practices (state of the art) where doubt and uncertainty have no place.¹⁰⁵⁸ A person cannot be blamed for something they could not know, and can only be held responsible to the extent that knowledge is possible.

Precaution, however, echoes doubt: uncertainty replaces knowledge, and anticipation takes the place of foreseeability. The duty of care must therefore be rethought in the light of this new principle. In this context, it is not merely the person who has failed to take all preventive measures against a well understood or foreseeable risk who should be considered at fault, but also the person who, in a situation of uncertainty or doubt, has failed to adopt a precautionary approach in order to avert a still uncertain risk. There would thus be fault where an operator failed to explore all the potential risks posed by their activity and consequently to take the appropriate precautions. The fact of having acted according to the current level of

¹⁰⁵⁶ MP Camproux-Dufrene and A Muller-Curzydlo, 'Chronique de droit privé de l'environnement, civile et commerciale (2009-2011)' 1 RJE (2003) 373.

¹⁰⁵⁷ The capacity of ecosystems for self-purification does not entirely exonerate those responsible for the pollution.

¹⁰⁵⁸ Ewald, 'The Return of the Crafty Genius' (n 784) 47.

scientific knowledge and established techniques would no longer be sufficient to exonerate the operator from liability. In practical terms, the PP translates into a duty to investigate.¹⁰⁵⁹

The determination of fault would not be limited to the information in the defendant's possession at the time an event occurred but would also consider information that should have been known, including working hypotheses not yet fully proven at the time of the event. As a result, the principle would preclude the defence 'I did not know'.

In addition to its *ex ante* dimension, the PP thus sets in place *ex post* the conditions to ensure that those who cause environmental damage will more easily incur liability for their acts. By raising the requirement for care up a notch, the principle could prompt more prudent anticipation of injurious consequences that might result from hazardous activities and compel economic actors to discover facts that they would generally not seek to know. By imposing a requirement that risks be anticipated, uncertainty redefines the extent of liability.

Given the highly flexible character of the concept of fault, Article 1420/1382 of the French and Belgian Civil Codes, for example, should pose no obstacle to this evolution.¹⁰⁶⁰ English and US Courts already impose a duty of 'high care', 'highest care', or 'utmost care' on firms that deal in dangerous substances, proportional to the magnitude of the risk.¹⁰⁶¹

The Dutch case law on danger creation is also particularly relevant to the precautionary measures required in environmental litigation. Under Dutch tort law, anyone who creates a danger is under a duty to prevent damage arising as a result of that danger;¹⁰⁶² a person who fails to take measures to that effect or does so inadequately will be liable for the ensuing damage.¹⁰⁶³ However, this is not a true strict liability regime, in that a person who is not aware, and is not legally obliged

¹⁰⁵⁹ In the Netherlands, the *Hoge Raad* ruled in an asbestos case that when there are no specific statutory rules on the dangers of hazardous substances the employer is under a 'duty to investigate which dangers may be created for his employees by the substances he produces or processes'. The Court also insisted that 'depending on the circumstances, it may be relevant to the duty to investigate whether information concerning the danger was available outside the Netherlands, in particular when the substance had been occupationally utilised or produced abroad prior to [use] in the Netherlands' (HR, 6 April 1990). For example, G Betlem, *Civil Liability for Transfrontier Pollution* (Graham & Trotman/Martinus Nijhoff, 1993) 480.

¹⁰⁶⁰ French and Belgian doctrinal and judiciary approaches to the concept of fault emphasize protection against all kinds of harmful behaviour, regardless of who has suffered from it. For example, Van Gerven, *Tort Law* (n 1053) 36.

¹⁰⁶¹ Zweigert and Kötz observe that: 'The degree of "care" demanded of the defendant is often so extreme as to be barely distinguishable from liability without fault. In general, whenever it seems necessary in order to achieve a socially acceptable distribution of the risks peculiar to modern life, the courts tend to insist on precautions which it is virtually impossible to satisfy, and they can do this because, judging a case *ex post facto*, they can always discover some precaution or other which, had the defendant adopted it in time, would have prevented the occurrence of the harm': K Zweigert and H Kötz, *Introduction to Comparative Law*, 2nd ed (Clarendon, 1992) 690.

¹⁰⁶² An example is the duty of a wreck's owner to remove the wreck when it creates a danger for other users of a waterway: HR, 14 October 1994, NJ 1995, 720.

¹⁰⁶³ Betlem, *Civil Liability* (n 1059) 411.

to be aware, of a possible danger cannot be deemed to have acted negligently.¹⁰⁶⁴ The following list of possible obligatory measures has been derived from this case law: duty to warn (and/or consult); duty to monitor and to carry out maintenance; duty to investigate or undertake research; and duty to take residuary safety measures.¹⁰⁶⁵

6.2.3.2 Foreseeability of damage as an obstacle to further advances

If used to justify exoneration from liability, unforeseeability could hinder recourse to liability as a means of compensating environmental damage arising from activities which had not been proved harmless at the time that damage occurred. The requirement of foreseeability of damage is in effect a necessary condition of fault, even if the question remains controversial in French, Belgian, and Dutch law.¹⁰⁶⁶ Even under a no-fault liability regime, unforeseeability is relevant.

For instance, the requirement for foreseeability in English law may serve to limit the liability of the person causing pollution. This was the case for a tannery whose liability for aquifer pollution was not upheld by the House of Lords on the grounds that its operators could not reasonably have foreseen that their solvents would contaminate groundwater at the time the activities in question took place.¹⁰⁶⁷

However, the requirement of foreseeability should be put into perspective by distinguishing between foreseeability *in abstracto* and foreseeability *in concreto*.¹⁰⁶⁸ A tortfeasor may be considered liable from the time they were unable in law to exclude the possibility of risk or when they could foresee the emergence of damage *in abstracto*. It is thus not a requirement that damage *in concreto* be foreseeable. The tortfeasor would consequently not be permitted to take refuge behind the impossibility of foreseeing the precise results of his action. It suffices that damage within a certain category can be foreseen. In other words, only the complete unforeseeability of an occurrence of damage could justify exoneration from liability. This restrictive interpretation leaves the door wide open to precaution in the field of fault. The condition of foreseeability of damage is thus less absolute than it at first appears and is in fact able to integrate uncertainty.

6.2.3.3 Possible misuse of the PP

A number of criticisms could be raised in response to the preceding discussion on the PP. Reformulating the notion of duty of care could give rise to certain

¹⁰⁶⁴ HR, 23 June 1989.

¹⁰⁶⁵ Betlem, *Civil Liability* (n 1059) 417.

¹⁰⁶⁶ For France, see Ph. Letourneau, *Droit de la responsabilité* (Daloz, 1996) 263 no. 911. For Belgium, see L. Cornelis, *Les principes du droit belge de la responsabilité extra-contractuelle* (Bruylant, 1991) 46. For the Netherlands, see Betlem, *Civil Liability* (n 1059) 454.

¹⁰⁶⁷ *Cambridge Water Co. v Eastern Counties Leather Plc* (1994) 2 AC 264; (1994) 1 All ER, 53 (HL).

¹⁰⁶⁸ For Dutch Law, see Betlem, *Civil Liability* (n 1059) 415; for Belgian civil law, see Cornelis *Les principes du droit belge de la responsabilité extra-contractuelle* (n 1066) 46; RO Dalcq and G Schamps, 'La responsabilité délictuelle et quasi délictuelle' 3:6 (1995) RCJB 537.

reservations from the perspective of equity. Care would no longer be judged on the basis of what should have been known, for example, but rather of what ought to have been suspected. Operators might consequently incur liability in cases where they had neglected to explore possible risks before undertaking action. But would it not be unjust to hold them liable in situations where they could neither foresee nor avoid damage? Is it acceptable that a court would penalize behaviour eventually proved to have been negligent on the basis of methods, arguments, and concepts not yet unanimously accepted within the scientific community at the time when the acts in question took place and which could only be formulated after the event? Is it not unfair to judge an act according to a different state of knowledge from that under which it was carried out?

This would amount to judging the operator according to rules that evolved to meet risks that they did not know about at the time of the acts in question and that they could not have known in advance. An individual needs to know what rule applies to them; they cannot respect a rule except under those terms. Moreover, they will only consider themselves liable if they have failed to comply with the law.

In response to these criticisms, we would distinguish between the person who could in the strict sense not have known the consequences of their activities and the person who could have been aware of them had they taken the trouble to explore more carefully the risks their activities posed to the environment. It is the liability of the latter which must be judged according to precaution, not that of the person who could not possibly have detected a risk. The opposite would amount to excluding any notion of fault, which would be equivalent to establishing an absolute liability regime, as was done in Germany for GMOs.¹⁰⁶⁹ In this respect, Article 7(e) of Directive 85/374/EEC concerning liability for defective products permits a 'development risk' defence¹⁰⁷⁰ and allows producers to prove that the objective state of scientific and technical knowledge, including the most advanced level of such knowledge, was not such as to enable the defect to be discovered. In order for the relevant knowledge to be successfully pleaded as arguing against the producer, that knowledge must have been accessible at the time when the product in question was put into circulation.¹⁰⁷¹

It will also be necessary to determine at what moment the operator must become aware of a risk in order to incur liability. Should they only have known of the risk at the time of the act that caused the damage? Must it be proved that they

¹⁰⁶⁹ Art 32 of the Law of 1 July 1990 on Biotechnology (*Gentech*) which, on the basis of the PP, excludes a 'development risk' defence.

¹⁰⁷⁰ Under this provision, 'the producer shall not be liable if he proves ... that the state of scientific and technical knowledge at the time when he puts the product into circulation was not such as to enable the existence of the defect to be discovered'.

¹⁰⁷¹ Case C-300/95 *Commission v UK* [1997] ECR I-2649. Reiterating this interpretation, in a judgment of 22 February 2004, the Toulouse Court of Appeal held that 'the relevant state of scientific and technical knowledge is the most advanced knowledge worldwide at the time the product was placed into circulation', CA, Toulouse, 22 February 2000, *MAPA Professions alimentaires et Guardia*.

knew? Concern for precaution should in any case lead to a restrictive interpretation of exoneration for liability on the basis of development risks.

6.2.3.4 *The Trojan horse of fault*

The PP would allow a return in full force to the concept of fault, which has increasingly been disregarded in recent legal developments.¹⁰⁷² Fault would return to centre stage, decked out in new finery. According to Martin,¹⁰⁷³ if the obligation to assume a risk—the sign of a system that is sure of itself—gives way to an ethic of duty of care, where each person is expected to take multiple precautions in the face of the unknown, the concept of fault will be revived. Rediscovered, fault could unexpectedly legitimate a questioning of the axioms of liability for risk, despite its extensive presence in environmental law. We should therefore ask ourselves whether the PP threatens to put an end to the further development of strict liability regimes in this legal discipline. The advantages and disadvantages of these two competing regimes must be carefully weighed.

It is true that classic fault liability is capable of providing compensation to victims of industrial hazards, for example personal injury as a result of exposure to asbestos.¹⁰⁷⁴ However, considered from the perspective of risk theory, the person who profits from a technology must engage its liability regardless of any fault on their part. The advantage of a strict liability regime for the plaintiff is precisely that they need not produce proof of negligence, since this is assumed. It could even be an advantage for the defendant to know what risks they will be held responsible for.

From the perspective of the PP, civil liability can only be understood with reference to negligence or omission. Nevertheless, an evolution may be observed in countries like Belgium and France. The disadvantage for the plaintiff of being required to prove negligence or omission by the tortfeasor would be partially compensated by the extension of the concept of fault, which henceforth—in pursuance of the PP—must cover behaviour in situations that could not easily be foreseen. The relaxation of the burden of proof, dictated by the same principle, would also benefit the plaintiff.

Must we therefore conclude that fault and non-fault liability regimes are of equal merit? Such a conclusion disregards the fact that even when it is imbued with the PP, a fault-based liability regime will always be less favourable to the victim than a strict liability regime. Demonstrating negligence which has caused damage constitutes an obstacle that even the boldest interpretation of the PP cannot easily brush aside. Restructuring the notion of fault by integrating precaution should therefore not be allowed to bring into question the advances already made in strict liability regimes relating to environmental damage.

¹⁰⁷² See the discussion in Subsection 4.2.1.1 above.

¹⁰⁷³ G Martin, 'Précaution et évolution du droit' (1995) D. chr. 304.

¹⁰⁷⁴ See, e.g., Court of Appeals, 2 April 1996, *The Times*, 17 April 1996.

Should the PP really be seen as a Trojan horse that will open the way to blocking the development of strict liability? It might make sense to use precaution to influence classical fault-based regimes where they still dominate. But this is not the case in most Continental liability regimes, where activities that are deemed to be hazardous are not subject to strict liability.

As we have seen, whether or not strict liability regimes are developed depends on political will rather than case law development. It is up to the legislator to opt either for a regime of strict liability, where precaution plays no role in informing norms of conduct, or for a fault-based regime where the behaviour of the tortfeasor would be judged in light of the PP. In the latter case, the PP should enlarge the field of foreseeability. It should encourage courts to interpret foreseeability by adopting a stricter approach to what the defendant should and could have known at the time when the act in question occurred.

6.2.4 Damage

6.2.4.1 *Exclusion of uncertain harm*

It is crucial to delimit environmental damage, since this will determine the type of liability proceedings that may be used, and consequently the extent of the reparations that the polluter may be obliged to assume. Oriented towards the past, civil liability is in principle limited to guaranteeing the reparation of damage that has already occurred.

Under French and Belgian law, the damage cannot be hypothetical; it must be certain in terms of its existence, even if the precise amount has not yet been established. Hypothetical harm cannot constitute grounds for compensation. Yet this limits the effectiveness of civil liability law as a remedy against environmental degradation.¹⁰⁷⁵ To require that damage be certain is to demand that there be no lingering doubt whatsoever as to its existence or how it will develop in future, although in practice both its character and its scope will constantly be the subject of scientific uncertainty. Nothing is sure in this sense: pollution may be reabsorbed owing to the regenerative capacity of a natural ecosystem; but it may instead grow worse as the result of cumulative or synergistic effects. Natural scientists trained in methods of rigorous proof will in any case be reluctant to assess the precise scope of a particular case of damage, pleading the uncertain and progressive character of the phenomena concerned.

Continuing a hazardous activity therefore does not in and of itself represent an obstacle to admitting the principle of reparation when the original harm is deemed certain. Otherwise courts would be obliged to hand down an infinite series of successive judgments every time further evidence of progressive damage becomes

¹⁰⁷⁵ H Bocken, *Het aansprakelijkheidsrecht als sanctie tegen de verstoring van het leefmilieu* (Bruylant, 1979) 81 and 112.

apparent. Consequently, any extension of existing damage may give rise to liability for the operator concerned where future losses are certain.

However, it is also true that a higher coefficient of uncertainty will make it more difficult to exercise the right to obtain compensation for future damage.¹⁰⁷⁶ In order to quantify redress for existing damage that is likely to develop further, it must be possible to trace its outlines with at least a minimum degree of precision. Whilst the harm need not be tangible, its existence must however be established. In other words, even if it only becomes apparent in the future, damage must be apprehended, according to the case law of the French Court of Cassation, to be 'the certain and direct extension of an existing situation, admitting of immediate assessment'.¹⁰⁷⁷ Whatever its nature, future damage must proceed from the 'certain and direct prolongation of an existing situation' if it is to be compensated. Application of the principle is not a problem as long as the future—but certain—damage is the inevitable extension of existing damage.

However, demonstrating this could be difficult when a victim is unable to anticipate all the possible consequences of damage which has just begun to appear. Future damage that is purely 'hypothetical' is thus overlooked by civil liability,¹⁰⁷⁸ which is quite stubborn on this point. The virtual may never give rise to compensation when a judgment is handed down. The victim must therefore wait until new damage actually occurs before initiating new proceedings.

To the extent that it rests more on a difference of degree than on one of nature, the distinction between damage that may be characterized as the 'direct extension of the current situation' and that which is virtual or 'potential' is not easy to draw.¹⁰⁷⁹ As a result, the case law of French courts and tribunals is divided between an overly generous interpretation and a too severe interpretation of the hazardous nature of damage.

In dealing with nuisance, some jurisdictions have recognized damage caused to crops by factory emissions as well as depreciation of goods resulting from the

¹⁰⁷⁶ G Viney, *Traité de droit civil* (LGDJ, 1982) 339.

¹⁰⁷⁷ The French courts and tribunals have never departed from this principle. In a case involving damage caused to livestock, the cause was found to lie in the failure on the part of an electricity company to take action, given the lack of certainty concerning the effects on the health of farm animals of electromagnetic fields around a high voltage line. More specifically, the French Court of Cassation held that 'there were serious, diverging and contrary indications in opposition to existing information concerning the possible impact of electromagnetic fields on farms, with the result that there was considerable uncertainty concerning this impact'. However, scientific uncertainty does not establish a legal presumption of causality. The Court of Cassation thus held that the Limoges Court of Appeal had 'rightly concluded that the precautionary principle did not call into question the rules according to which it falls to those seeking the payment of damages against the holder of the easement to establish that the loss in question was a direct and certain consequence of the actions of that party'. Cass fr., 18 May 2011, No. 10-17645.

¹⁰⁷⁸ H-L Mazeaud and A Tunc, *Traité théorique et pratique de la responsabilité civile délictuelle et contractuelle*, 6th ed (Montchrestien, 1965) no. 216; P Le Tourneau, *La responsabilité civile*, 3rd ed (Daloz) 240; Y Chartier, *La réparation du préjudice* (Daloz, 1989) 27.

¹⁰⁷⁹ Viney, *Droit civil* (n 1076) 339.

establishment of a polluting activity in its vicinity as certain, although future.¹⁰⁸⁰ On the other hand, the French Court of Cassation refused to compensate an owner for property depreciation due to risk of electrocution from the installation of an electric lead, since this was a purely contingent injury.¹⁰⁸¹ The French *Conseil d'État*, for its part, sometimes recognizes the certainty of damage on the basis of mere probability.¹⁰⁸²

6.2.4.2 *Contradictory logics: precaution and the reparation of damage*

Does the PP offer a new opportunity to victims seeking to establish the liability of polluters for damage that is still uncertain in nature? The response to this question must be negative, for this venerable legal institution is unable to manage uncertainty and would have to alter its character completely to do so. Moreover, a liability regime that established damage on the basis of doubt would hardly be equitable for all the parties involved. We must therefore express serious reservations about how the PP would affect the reparation of uncertain future damage. Below we consider two examples of how the PP cannot influence damage assessment.

Some international texts appear to open up new perspectives. The 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, for example, includes 'the cost of measures of reinstatement that have been taken or that will be taken' among those losses liable to be compensated. Plaintiffs could consequently be awarded compensation although costs are not yet accurately known. In practice, however, this provision is less revolutionary than it might appear, since nothing prevents a judge from awarding the plaintiff an advance on damages.

Secondly, the PP is irrelevant in determining the amount of damage, even though a system of fixed compensation for certain types of injury (such as the loss of a leg) reduces uncertainty relating to the assessment of damage and, as a result, allows the plaintiff to avoid being caught up in a net of interminable and costly expert opinion.

While the PP can play a significant role with respect to the extent of fault and causality, it is not obvious how it could restructure the question of damage. This is because precaution is dependent on a different logic from that underpinning civil liability, which requires that damage has already been caused in order for it to be made good.

6.2.5 Causation

6.2.5.1 *Proof of causation under scientific uncertainty*

In addition to both fault and damage, causation must—like the other basic elements of liability—be certain.¹⁰⁸³ Required under both strict liability and fault-based

¹⁰⁸⁰ See the case law cited by Chartier, *La réparation du préjudice* (n 1078) 28.

¹⁰⁸¹ Cass fr., 19 March 1947 (1947) D. 2.313.

¹⁰⁸² CE fr., 28 July 1951 (1952) D. 22.

¹⁰⁸³ The requirements for proving causation differ within the common law family ('more likely than not') from those applicable in civil law countries (*conditio sine qua non*).

regimes, proof of a causal connection between the tortious act and the ensuing damage is the main stumbling block for victims of pollution, in particular in air and water pollution cases. In fact, demonstrating a causal link can prove to be tricky where the harm occurs after some time or is the result of a complex process. Thus, the complex nature of polluting phenomena does not make it easy to identify the responsible party. The point of departure is that the onus is on the plaintiff to establish this requirement. In its 1867 report on the pollution of rivers,¹⁰⁸⁴ the Royal Commission on the Pollution of Rivers had already drawn attention to the fact that: 'The plaintiff may prove that he has suffered injury from the pollution of the river and that the defendant has polluted the river above him; but this is not enough. The plaintiff has also to prove that what he has suffered has been caused wholly or in part by the special act of the defendant, which is always difficult—often impossible.'

Moreover, the introduction of a polluting substance into the natural environment does not directly affect private property. In the first instance it affects either air or water, *res communes*, and the question of liability will only arise to the extent that these collective goods are connected to economic rights: for example, salt-water fish caught by fishermen. It is extremely difficult to establish causation in cases involving compensation for indirect damages, and proving causation has become even more difficult as environmental deterioration is increasingly caused by new and less well understood types of pollution.

Damage caused by diffuse pollution, for example, from automotive emissions and individual heating systems, results from the accumulation of emissions which may be inoffensive taken individually. Added together, however, they rapidly exceed the absorptive and regenerative capacity of receiving media and cause damage of an often unexpected character. In addition, when pollutants mix with various substances synergies may create yet other pollutants, the precise sources of which are particularly difficult to identify. In such situations a plaintiff is confronted with intermixed, multiple, and confused causations which further erode the concept of individual liability.

These new pollutions are no longer indicative of the proximity, acuteness, or instantaneousness which generally characterize localized pollution of the chronic or accidental variety. Considerable distance and extremely long time lags often separate their detrimental effects from their cause. It then becomes difficult for experts to express opinions on causation with even a minimum of certainty. Pollution shifts in space; causation weakens over time. Despite this, the law remains firm: the requirement of causation between the defendant's tortious act and the ensuing damage is carved in stone.

Furthermore, the evolution of the dialectic between science and the law is making it harder to prove the causal link between a defective product and a polluting activity on the one hand and the damage suffered on the other hand.

¹⁰⁸⁴ Cited by W Howarth, *Water Pollution Law* (Shaw & Sons, 1988) 119.

Regarding the causal link between the relevant event and disease or death, the US SCt case law features an idealized view of science. In *Daubert*, the US SCt held that ‘the trial judge must ... (conduct) ... a preliminary assessment whether the reasoning or methodology underlying the testimony is scientifically valid and of whether the reasoning or methodology properly can be applied to the facts in issue.’¹⁰⁸⁵ Trial courts thus perform a gatekeeping function in reviewing expert evidence and the related scientific basis,¹⁰⁸⁶ although they must focus solely on the principles and methodology and not on the conclusions drawn from them.¹⁰⁸⁷ Accordingly, if an expert opinion is considered to be insufficiently reliable in the light of the scientific community’s standards, in other words if it is not grounded ‘in the reasoning or methodology’ of science, it may be discounted. The SCt has thus left trial courts considerable latitude in reviewing expert opinions. However, given their non-scientific education, it is difficult for federal judges to perform the challenging task of reviewing experts’ testimony. In addition, various courts require that experts base their testimony on a particular kind of evidence, such as statistically significant epidemiological studies, mechanistic evidence, or detailed exposure data.¹⁰⁸⁸ The more demanding the scientific requirements that trial judges place on the evidence that can be used as the basis for expert testimony, the more this heightens obstacles for plaintiffs since the universe of hazardous substances is shrouded in scientific uncertainty.

That said, the evolution of a theory of causality against a backdrop of scientific uncertainty as regards the award of compensation to the victims of defective medical products is undoubtedly of interest for environmental law. In France, the presumption of a causal link has resulted in approaches within the case law that are even contradictory in some cases. In this regard, the French Court of Cassation referred questions for preliminary ruling as to whether the proof of a causal link between a defect in the Hepatitis B vaccine and the damage suffered by the victim could be inferred from serious, specific, and consistent presumptions in accordance with the Product Liability Directive. In this case, medical research neither confirms nor rules out a link between the administration of the vaccine and the occurrence of multiple sclerosis.

The CJEU framed the problem in the following terms. If the regime of presumption-based evidence proves to be too flexible, it will end up imposing the burden of proof on the producer of the defective product. On the other hand, if it is too stringent, it will lead to the systematic exclusion of compensation for victims. Against, this backdrop, the CJEU steered a middle course.

¹⁰⁸⁵ *Daubert v Merrell Dow Pharmaceuticals, Inc*, 509 US 579 (1993) at 590. Following that Decision the Federal Rules of Evidence have been amended (Rule 702) with a view to codifying these case law changes.

¹⁰⁸⁶ Cranor, *Toxic Torts* (n 298) 63.

¹⁰⁸⁷ *Daubert* (n 1085) 594–5.

¹⁰⁸⁸ Cranor, *Toxic Torts* (n 298) 218–64, 280.

The Court found that Article 4 of the Product Liability Directive does not preclude evidentiary rules that rely on presumptions. It held that a national court may consider that ‘certain factual evidence relied on by the applicant constitutes serious, specific and consistent evidence enabling it to conclude that there is a defect in the vaccine and that there is a causal link between that defect and that disease.’¹⁰⁸⁹ However, this does not result in a reversal of the burden of proof.¹⁰⁹⁰ Indeed, the victim bears the onus of proving ‘through the production of serious, specific and consistent evidence, that there is a defect in the vaccine and a causal link, remains intact.’¹⁰⁹¹

The Court thus rejected a regime providing for a presumption that was practically impossible to rebut, under which the causal link is automatically presumed wherever a certain number of factual indications are established. Consequently, the nature of the causal link remains a matter for interpretation falling to the merits court, which must ensure that ‘the evidence adduced is sufficiently serious, specific and consistent to warrant the conclusion that . . . a defect in the product appears to be the most plausible explanation for the occurrence of the damage.’¹⁰⁹²

By introducing a new manner of conceptualizing time within the legal system and allowing wider scope for presumptive evidence, will the PP eventually increase the flexibility of the traditional elements of causation? To answer this question, we consider the progress of the principle in case law as well as in legislation.

6.2.5.2. *Developments in comparative law*

The context of uncertainty justifies replacing full, scientifically proven cause and effect with a more probabilistic approach. Scientific uncertainty cannot be an obstacle for victims seeking to demonstrate the link between an event and damage when there are indications that the substance or activity in question is capable of having caused that harm.

Even where no explicit claims are being made for its use, the PP is advancing in both national legal systems and international law. Thus Section 6 of the 1990 German Environmental Liability Act facilitates proof of causation through a presumption of liability which is integrated into the industrial process that gives rise to damage. The plaintiff need only show, through expert opinion or statistics, that the defendant’s facility is likely to have caused the damage. The presumption can be rebutted by the operator by showing that his facility was complying with the conditions of its licence or that other circumstances may have caused the damage.

¹⁰⁸⁹ Case C-620/15 NW [2017] C:2017:484, para 43, case note of E Brosset 55: 6 (2018) CMLR 1889.

¹⁰⁹⁰ *Ibid*, para 34. It must be noted that the Court of Cassation took the view that the burden of proof under French tort law had not been reversed. See Court of Cassation, Civil Division, judgment No. 10-17,645 of 18 May 2011, *FS-P+B*.

¹⁰⁹¹ Case C-620/15 NW (n 1089) para 38.

¹⁰⁹² *Ibid*, para 37.

Article 10 of the 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment attempts to echo this advance in a more modest fashion by inviting the judge who evaluates a proof of causation to adopt probabilistic reasoning in considering the risks inherent in the activity in question. This must ‘take due account of the increased danger of causing such damage inherent in the dangerous activity’. While this technique eases the burden of proof, it does not eliminate it.

Finally, in the United States, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) practically relieves the Federal Administration of the need to demonstrate causation. Liability is engaged from the moment the EPA succeeds in proving that polluted land was being used for the disposal of waste, that these were placed in the area where the pollution appeared, and that the polluting substances correspond to those found in the waste.

The PP should at least encourage the adoption of mechanisms which make the requirement to demonstrate causation more flexible and accord greater importance to doubt in the field of civil liability, thereby preventing litigation from turning into a battle of experts. For instance, the Canadian Supreme Court has relaxed the rules governing causation where the defendant negligently creates a risk whilst scientific uncertainty prevents the plaintiff from proving causation.¹⁰⁹³ This of course does not alter the fact that the plaintiff must always be able to demonstrate some link, no matter how tenuous, between the damage suffered and the source of pollution. Such demonstration may prove difficult when the emission source is geographically or temporally distant from where the damage occurred.

7. Concluding observations

In matters of the environment everything has become a matter of time: we must not lose any more time, we cannot make up for lost time, we cannot predict the future ... But a change in thinking about time should translate into a change of tone. The PP symbolically marks just such a passage. It transforms duty of care into an essential element of any policy: in other words, ‘a policy for action in the face of uncertainty’.

Conceived to prevent serious or irreversible harm, the principle urges the authorities to act, or to abstain from action, in cases of uncertainty. In all cases it should encourage the delay, and in some cases even the abandonment, of activities suspected of having serious consequences for environmental protection; this will be the case even in the absence of full scientific proof for such suspicions. Inversely, it should accelerate the adoption of decisions intended to ensure better

¹⁰⁹³ *Resurfice Corp v Hanke* 2007 SCC 7; *Clements v Clements* 2012 SCC 32.

environmental protection, even if their validity is not unanimously accepted by expert opinion.

Precaution is determined by the characteristics of sectoral policies: fishing, climate, marine pollution, technological risks, food safety. The standard of precaution is therefore likely to vary as a function not only of the technical requirements related to the nature of a risk, but also of the political needs of the field in question. As a result, no single regulatory scheme is capable of implementing the principle. One can envisage as many types of precaution as there are situations in which the principle might be applied; thus there is no point in seeking to set a precautionary standard *in abstracto*. For the same reason a multitude of differing measures may follow from this one principle: precaution is to act, and abstention is merely one way of acting. According to the magnitude of harm which is suspected, different types of precautionary measures ranging from weak to strong can thus be taken (e.g. bans, phase-out, BAT, notification procedures, etc.). That being said, the PP is no more indeterminate than a number of other customary principles or general principles of law.

In any case, the principle must be seen as part of a dynamic process. Decisions taken under the aegis of precaution should be understood as open to review: it must be possible to forbid something that has already been authorized, just as it must be possible to relax protective controls in cases where fears are dissipated by more accurate information. Irreversible decisions are the antithesis of the PP. Restructuring the very nature of standards, the principle's implementation goes far beyond simply setting procedures for decision-making.

In some ways prevention and precaution appear intimately linked: two sides of the same coin. However, these two principles should not be confused: while certain risks call for a preventive approach, uncertainty requires precaution. Therefore, while precaution may well be the natural extension of prevention, it is far more than a simple variant. A difference in both degree and nature separates the principles: a difference of degree in that precaution urges prevention forward in the hope of closing the gap that always exists between decision-making and the mastery of risk. Institutionalizing duty of care at a higher level than has yet been achieved, the principle is a landmark in the battle against environmental threats. A difference of nature, in that the PP transforms doubt into possible certainty and hence strengthens action by the public authorities in the face of uncertainty. In this way it restructures, sometimes substantially, the policy measures on which environment policy depends. This is particularly the case for RA procedures, which are expected to integrate uncertainty more effectively than other approaches.

The implementation of the PP also presents other difficulties, which are no less serious for being identical in the various legal orders considered above. Since it does not determine the degree of care needed to protect against risk, the principle's application will in effect depend on the potential seriousness of damages and the plausibility of their occurrence. Will it impel the authorities to set constraints on

behalf of hypothetical stakes and to require compensation for uncertain damage, thereby undermining confidence in the legal system?

Perception of the data underlying uncertain risks is largely subjective. A serious danger in certain circumstances is not necessarily serious in another case. Moreover, the definitive elimination of risk—‘zero risk’—is an ideal, as risk is inherent in our activities. Interpreted in too radical a manner, the PP could sacrifice innovation to security. Guidelines must therefore be established; in particular, scientific hypotheses must be minimally verifiable. Yet one should be wary of pushing these requirements too far, for they would then deprive the principle of its substance.

We observed in Section 5 above that by marking the passage from a Cartesian science that obeys the laws of reason to a science of uncertainty, the PP contributes to the emergence of a plurality of truth which could fundamentally redefine the relationship between science and law. In the long run, a classical conception of science, based on objective data and facts derived from experiment and verified—in short, clothed in the appearance of truth—will give way to a type of scientific expertise whose essential function would consist in the qualitative and comprehensive presentation of scientific data bearing the stamp of uncertainty.

The road that remains to be travelled before we see the PP begin to take root in positive law at first glance appears strewn with obstacles, given the heavy reliance of legal systems on certainty rather than uncertainty. We have had occasion to observe, however, throughout the developments related in Section 6 above, that most of the reforms advocated in the name of precaution may already be found, in bits and pieces, in normative texts. This movement will undoubtedly develop further as legal systems are forced to adapt in order to anticipate ecological risks. To the extent that the PP aims to govern decision-making in a situation of uncertainty, it will very quickly be exported beyond its original territory into areas such as public health and product safety.

Now that the era of certainty has passed, precaution must take the place of prevention. However, despite the high hopes that have been placed in a new principle, we cannot expect it to replace the principle of prevention entirely. The latter is more relevant than ever, since the most deleterious effects on the environment are not necessarily attributable to a lack of foresight.¹⁰⁹⁴ Whilst our knowledge concerning the state of the environment has indisputably grown over the past two decades, thus making it possible to establish the cause of various types of environmental damage, policy-makers have unfortunately not always been able to infer from this precisely which measures should be taken. It is disturbing that some public authorities implement policies that they are fully aware will cause harm to the environment. So

¹⁰⁹⁴ The delay by public authorities in taking preventive measures when confronting the risk of damage has been analysed through various case studies (fisheries, asbestos, halocarbons, benzene, BSE, etc.) in EEA, *Late Lessons* (n 209).

Table 3.10 Categories of precautionary measures

Level of protection	Modalities	Cost-effectiveness	Illustrations
Minimal approach: encouraging State authorities	Regulatory intervention conditioned by minimal scientific evidence of risk notwithstanding scientific uncertainty about the link of causation	Intervention demonstrably cost-effective	Rio Declaration, principle 15
Intermediate approach: empowering State authorities	Uncertainty justifies the public intervention. Shift the onus of proof towards the risk creator	Little credence in cost effectiveness	French Charter for the Environment, Art 5
Maximal approach: requiring State authorities	Authorities are obliged to intervene (refusal or suspension of the licence) insofar as the applicant is unable to demonstrate the absence of risk	Environmental conservation prevails over cost effectiveness	CJEU, <i>Waddenzee</i> case law

despite the advent of precaution, we must therefore not forget that the battle for prevention is far from over.

Last but not least, conceptions of the PP vary depending on the level of environmental protection provided for under constitutional or ordinary law. As is clear from Table 3.10, a distinction can be drawn between a minimal, a medium and a maximal approach.¹⁰⁹⁵

¹⁰⁹⁵ Mandel and Thuo Gathii, 'Cost Benefit Analysis' (n 988) 1072–3.

Part I Conclusions

Part I, given over to consideration of the origin, legal status, and applications of the polluter-pays, prevention, and precautionary principles, has led us to elaborate a first thesis. As a result of the strong growth of a generation of risks permeated by uncertainty, environmental law is today profoundly marked by a reflex towards security. Emphasis is being given to prevention and even anticipation of risks in a quest for a more sustainable form of development. Although linked to distinct models, the principles of precaution and prevention are thus the most striking symbols of this reaction, which seeks to frustrate the occurrence of ecological risk and thereby avoid irreparable damage.

Consequently we should consider these three principles in terms of interaction rather than opposition, particularly since they are operationally interdependent. The precautionary principle (PP) calls for the presence of prevention, which in turn implies support for the polluter-pays principle. A preventive policy that would no longer be financed by the polluter-pays principle would be destined to fail. With a few adjustments, preventive techniques such as thresholds and impact assessment could equally well serve anticipatory objectives. Similarly, the polluter-pays principle is capable of assuming both a preventive dimension (e.g. through a sizeable tax) and an anticipatory dimension (for instance, a dissuasive tax that would apply to an activity even while its deleterious effects remained a matter of controversy). Moreover, it is not uncommon to see these different principles contained within a single regulation. Thus, even if they sometimes result in contradictory solutions, the three principles are in reality interdependent.

The polluter-pays, prevention, and precautionary principles are certainly well represented in positive law; they are helping to shape new legal instruments and adapt mechanisms, not necessarily specific to environmental law, intended to achieve protective ends. Brought into the realm of civil liability, the three principles have, each in their own ways, succeeded in modifying this classical legal institution. Moreover, the diversity of their applications is striking: they have given rise to widely differing norms, in fields ranging from administrative law to civil law.

These principles appear to be self-evident but tend to become increasingly elusive the more precisely one tries to define them. Whether it is a question of the polluter-pays, which has passed from a partial to a full internalization of cost, or of precaution, which is being applied to increasingly uncertain risks, the progressive character of these principles is obvious. We can conclude from this that all three principles, despite their seeming simplicity, contain concepts that are nebulous,

protean, and flexible and will therefore not be easy to implement. Part I of this work has sought to clarify these problems by examining the difficulties of interpretation and application the principles confront when called upon to integrate positive law.

We can see from that examination that it is crucial to introduce greater rigour into these principles. This is fully justified by a recognition of the right to environmental protection, considered in Part II below, which requires that public authorities do everything possible towards that end. Consequently the PP should not be encumbered by too many limitations, the polluter-pays principle should be viewed in a perspective of utmost prevention, and the principle of prevention should favour the adoption of those instruments that will best guarantee environmental protection.

Of course this theoretical presentation is merely a partial reflection of reality. The establishment of a legal principle only becomes effective if it is reflected in significant changes in positive law. Although the PP has given rise to a great deal of hope, we should remember that the polluter-pays and prevention principles have not yet succeeded in deeply penetrating legal systems, as shown by the growth in ecological problems. It would not be unreasonable to denounce the hypocrisy of international institutions and national governments that solemnly proclaim principles which they then take great care not to apply. In the light of these realities it appears we have a long road to travel before we witness the emergence of environmental policies that are truly informed by these guiding principles.

PART II

THE LEGAL STATUS AND
ROLE OF THE POLLUTER-
PAYS, PREVENTIVE, AND
PRECAUTIONARY PRINCIPLES:
A SHIFT FROM MODERN
TO POST-MODERN LAW

Part II Introduction

In Part I of this work we examined the role played by the principles of the polluter-pays, prevention, and precaution in the gradual progression from a curative model of approaching ecological risks to a preventive model, which in turn gave way to an anticipatory model. That evolution demonstrates how the law, having grasped the concept of *certain* risk, has proceeded to tackle the problem of *uncertain* risk. This initial thesis was based on a systematic analysis of the genesis, definition, and legal scope of each of these three principles.

In Part II we demonstrate that the polluter-pays, preventive, and precautionary principles described in Part I mark an epistemological shift between modern law, which rests on the fixed standards of traditional legal rule-making, and post-modern law, which emphasizes the pragmatic, gradual, unstable, and reversible nature of rules. This calls for a change of perspective; we therefore consider these three principles horizontally, with a view to their legal status and functions, rather than separately, as was done in Part I. We also comment on other, related principles (rectification at source, integration, etc.) where these are relevant to our analysis.

We describe the paradigm shift from modern to post-modern law in the course of Chapters 4 to 6. As was emphasized in the General Introduction, environmental law has undergone a number of transformations during the past decades, which have brought it far from the assumptions of modern law. It has experienced a more profound transformation than any other field of law. Since the concepts of modernity and post-modernity are both ambiguous, clarification of these terms must necessarily precede further analysis. Chapter 4 therefore begins by identifying the various elements that together define modern and post-modern law. We explain how legal principles function within each of these legal models, for both international and municipal law, with particular attention to the role they assume in the field of environment law. We particularly stress the distinction that must be made between general principles of law, which are characteristic of modernity, and directing principles, which are better suited to adapting to the shifting forms that characterize current public policies, including environment policy. At the same time, however, we shall see that directing principles do not represent a complete break with modernity since they eventually result in the rediscovery of the same values upon which modernity is based. In other words, post-modernity is not merely a chaotic system composed of anti-modern elements; rather, it is a system

whereby chaotic elements are ordered¹ differently from modern law (e.g. regulatory flexibility versus codification, chaos versus rationality). The result is a complex model that can only be understood by means of extensive comparison.

The analysis of general legal theory presented in this first chapter forms an essential basis for the reasoning that follows in Chapters 5 to 7. There, we attempt to show that the polluter-pays, preventive, and precautionary principles serve to re-establish rationality, which did not in fact disappear in the shift to post-modernity.

Symbolizing the increasing importance of environmental public policy, directing principles such as the polluter-pays, preventive, and precautionary principles present undeniable advantages within a changing concept of the State wherein coercion gives way to negotiation as State sovereignty cedes ground to globalization and a third generation of human rights refashions the character of the polity. Indeed, the mechanical model of modern law, whereby solutions to an infinite number of cases may be deduced from a legal norm, is now being replaced by other types of reasoning, which seek to balance interests by applying directing principles set out in legislative instruments. In this context, directing principles are preferable to rigid rules, since their flexibility makes it possible for divergent values and interests or contradictory policies to co-exist. Couched in extremely vague terms, directing principles are able to make an important contribution to the development of positive law by providing conceptual flexibility for legislators, administrators, and courts in their practical work. Constituting a common resource for international, European Union (EU), and national legal orders, such directing principles also encourage a *rapprochement* among various legal spheres. These principles allow us to construct bridges between the global and local levels and between international and EC law. Chapter 5 considers the various functions that the polluter-pays, preventive, and precautionary principles may fulfil within a post-modern legal prospect, seeking to strike a balance among multiple and conflicting interests.

Recourse to directing principles such as the polluter-pays, preventive and precautionary principles described in Part I is often disparaged despite their usefulness, on the grounds that they are not sufficiently definite to ensure legal certainty. These principles are generally described as having no prescriptive effect—until one fine day a court makes use of them, to the great surprise of the legislator. These principles may thereby serve to conceal a return to judicial activism. This possibility raises the question of the legal status of the principles in both international and EC law, as well as in national legal orders. Some authors consider that these directing principles should be devoid of any legal effect; others demand that their autonomous normative content be recognized. In Chapter 6, we will explain that the fact that these directing principles are set out in texts of varying status does not

¹ I Prigogine and I Stengers, *Order out of Chaos* (Flamingo, 1992) 291–313.

deprive them of normative effect. On the contrary: by being recognized in provisions with normative effect, the principles of the polluter-pays, prevention, and precaution have specific normative effect rather than being mere regulatory ideals. Nonetheless, their legal status is quite unusual and typifies post-modern law, in that it is concerned with norms whose content is quite vague and which therefore lend themselves to a wide range of applications.

The potential importance of directing principles in weighing differing interests will be considered in greater detail in Chapter 7, which focuses on the conflict between environmental principles and free trade within the World Trade Organization (WTO). That conflict illustrates the role that these principles can play in reshaping a debate with major legal as well as societal implications. This chapter highlights the odd twists and tangled hierarchies characteristic of post-modern law which may be encountered in disputes involving trade and the environment.

This four-stage approach will allow us to demonstrate how the polluter-pays, preventive, and precautionary principles help shape an ideal of rationality in a chaotic legal universe. While that ideal differs significantly from the concept of rationality that characterized modern law, it remains an essential element if legal systems are to survive in the face of proliferating regulatory instruments, an accelerated legal process, and a weakening of the command and control approach. Thus, the directing principles that have emerged within the framework of post-modern law do not represent a complete break with modernity, but rather a revitalization of some of its values with respect to the new challenges that legal systems will have to confront in future (weighing of interests instead of conflict of interests; codification instead of a fragmented regulatory approach; harmony among different legal orders instead of segregated legal regimes).

We should stress that the following analyses are based on recent theoretical research in French-speaking countries, much of which has not been translated into English. For that reason, we have chosen to use the term 'directing principles' instead of the usual English term 'policy principles', which does not fully convey the meaning of the French *principes directeurs*. The term 'policy principles' is not, moreover, appropriate to our analysis, as its use in English implies that such principles are devoid of any prescriptive effect. We defend precisely the opposite thesis in Part II.

4

Theoretical Presentation of Modern and Post-Modern Principles

1. Introductory remarks

Environmental law and policy do not always co-exist harmoniously. Political scientists have forgotten that the most important aspect of environmental policy is the fact that it is set out in legal form (for instance, taxes are not merely economic instruments but also fiscal regulations), while lawyers for their part have not yet grasped that the law is changing shape.

In effect, a new legal model that reflects post-modern conditions is replacing the classical law of modern societies. Under pressure from a globalizing economy, the State has lost its monopolist role as a producer of norms for multilateral and supra-national institutions. The nation-state and even the system of states may be either in crisis or heading towards crisis in the face of the increasing seriousness of many environmental problems. In addition, law-makers have had to renounce general legal formulations and turn to more flexible modes of action, better adapted to dynamic social realities, in order to ensure the effectiveness of public policies. Similarly, they have had to abandon simplicity, systematization, and coherence so that legal norms might respond more rapidly to urgent and complex social needs.¹ Finally, they have had to relinquish constraint in favour of a flexible and decentralized system of rule-making, based on regulatory flexibility.

These conditions have taken our societies fully into the age of post-modernity, a new intellectual construct heavy with ambiguities. In fact the most precise and coherent problem evoked by post-modernity is a series of critical questions concerning the new forms taken by positive law in today's world: a law that has become pluralistic, soft, and negotiated.²

While general principles of law have come to occupy an important place in the modern legal framework, particularly in ensuring a coherent legal order,³ new principles linked to specific public policy advances—which we refer to as 'directing principles'—have come into existence within the post-modern legal framework.

¹ Ch-A Morand, *Le droit néo-moderne des politiques publiques* (LGDJ, 1999) 209.

² F Moderne, 'Légitimité des principes généraux et théorie du droit' 15:4 (1999) RFD Adm. 737.

³ See the discussion in Subsection 2.3.1.

With the guidance of modern and post-modern legal models, legal theory will help us to assess the emblematic role of these ‘directing principles’ by comparing them to the general principles of law. The term ‘directing’ clearly indicates the function assumed by the polluter-pays, prevention, and precautionary principles, particularly in the field of environment law. To assure maximum clarity we examine the modern and post-modern models individually, consider how they are related, and then assess how they differ from one another (Sections 2 and 3 below). We must keep in mind, however, that the two models are not strictly sequential, since post-modern law in no way displaces modern law. There is no ‘point’ at which modern law can be said to end and post-modern law begin. We shall also see that while rationality is inherent in both models, it differs considerably from one to the other. Finally in Section 4 of this chapter we will demonstrate how environmental law bears the mark of post-modernity.

2. Modern law

2.1 The elements of modern law

The term ‘modern law’ is today used to define the legal system which has been in place in our societies since the eighteenth century, based largely on the concept of formal and material rationality set out by Max Weber.⁴ While pre-modern societies were bound by the laws of nature, modern society puts its faith in the virtues of reason. This empire of reason is accompanied by a set of beliefs in the virtues of science, which will endow humankind with an ever-greater mastery of nature; in unstoppable progress; and in a Western model that is the very embodiment of reason and will therefore compel recognition throughout the world.⁵ Modernity also places the individual at the centre of society and restrains State intervention, which could threaten public freedoms.

2.2 The characteristics of modern law

Strongly conditioned by rationality, modern law is seen as an autonomous system that is made up of general and abstract rules⁶ and is complete and coherent to the extent that it is organized in a systematic fashion to form a hierarchical whole. As stressed by Koskenniemi, ‘lawyers have a political responsibility to justify their

⁴ M Weber, *Wirtschaft und Gesellschaft*, 5th ed (Mohr, 1980).

⁵ J Chevallier, ‘Vers un droit post-moderne? Les transformations de la régulation juridique’ 3 (1998) RDP 674.

⁶ It thus mirrors mathematics.

decisions so that they appear coherent with the decision-making activity (by legislators as well as judges) within the legal system as a whole.⁷

2.2.1 A legal system of general and abstract rules

In a liberal vision the function of modern law is to provide for the co-existence of individual freedoms: each person has the right to enjoy maximum freedom to pursue their own interests, as long as they do not impinge on the freedom of others. In order to provide every person with the maximum degree of freedom, modern law concentrates political power in the hands of the State: ‘an institution which is capable of standing above the contention of private wants.’⁸ In that context the need for legal certainty and foreseeability has led relations between individuals to be bound by general rules that refer to abstract concepts grouped together in general categories. Both generality and abstraction guarantee impartiality by drawing a veil of indifference between a norm and specific situations.⁹ With the advent of modern law the general has taken the place of the individual, and the abstract has replaced the concrete. This coherent system of general and abstract rules is able to provide a single, precise solution for every dispute. Judicial decisions are mechanistically deduced from general and abstract norms. Within this formally rational legal system the legal subject is an abstract and autonomous entity entitled to formal equality.¹⁰

2.2.2 A hierarchical legal system

Modern law presents itself as a pyramidal construction, with the most general rules at the apex. It thus appears to constitute a coherent whole—that is, a system of hierarchical rules linked to each other by logical and necessary relationships.¹¹ This systematization confers upon the law the attributes of clarity, simplicity, and certainty. Moreover, the legal hierarchy is secured by the fact that the power of constraint is invested in the State, which therefore puts itself forward as the sole creator of rules.

2.2.3 An autonomous legal system

Formally rational, modern law is characterized by its axiological neutrality—that is, its refusal to take into consideration any elements external to the legal sphere, such as value judgments or ideological considerations. Modern law seeks clearly to distinguish itself from both morality and other pragmatic rules, whether these be

⁷ M Koskenniemi, *From Apology to Utopia: The Structure of International Legal Argument* (Lakimiestliiton Kustannuks, 1989) 410.

⁸ A Barron, ‘Legal Discourse and the Colonization of the Self in the Modern State’, in A Carty (ed), *Post-Modern Law* (Edinburgh UP, 1990) 110.

⁹ Morand, *Droit néo-moderne* (n 1) 30.

¹⁰ Barron, ‘Legal Discourse’ (n 8) 113.

¹¹ H Kelsen, *General Theory of Law and State* (Harvard UP, 1946).

scientific, social, or economic.¹² Fending off rules from outside its own boundaries, modern law defines itself as an autonomous system. Therefore, lawyers believe that ‘they can produce statements relating to the social world which are “objective” in some sense that political, ideological, religious, or other such statements are not.’¹³

2.2.4 A legal system underpinned by science

As the cornerstone of modernity, science is another important feature of modern law. In particular, in the area of risk regulation the emphasis is placed on scientific neutrality and objectivity. Considered as value-free and objective, RA is deemed to be an objective basis for decision-making.¹⁴

2.3 General principles of law in a modern legal perspective

The concept of the ‘General Principles of Law’ is central to modern law, even if it is subject to wide-ranging doctrinal debate at the level of both municipal and international law. The controversy surrounding the exact definition of general principles of law can be explained by varying concepts of the origin and functions of those principles and by the fact that they may be found in different legal orders and in several fields of law.

In addition, the classification of these principles presents difficulties.¹⁵ Indeed, the more the concept is presented as fundamental, the more the uncertainties concerning its scope increase.¹⁶

First, some principles can be seen as tools for describing positive law. Such descriptive statements are more or less factual reconstructions of the law by academic scholars rather than acts of law-making. In other words, they are a kind of a summary of positive law and nothing more portentous.¹⁷ These are not examined here in any detail as we consider that general principles of law are normative principles.

Secondly, some principles of law embody legal logic (e.g. *non bis in idem*, *ubi major minor cessat*, *lex specialis derogat legi generali*, and *lex posterior derogat legi priori*) for the use of courts.¹⁸ Thus they are not so much a source of law as a method of interpretation. For that reason they are not analysed.

¹² Morand, *Droit néo-moderne* (n 1) 47.

¹³ Koskenniemi, *From Apology to Utopia* (n 7) 458.

¹⁴ J Peel, *Science and Risk Regulation in International Law* (CUP, 2010) 64–5. See also Chapter 3, section 5.3.1.1.

¹⁵ For a typology of the different categories of principles in legal theory, see e.g., A Peczenik, ‘Principles of Law: The Search for Legal Theory’ 2 (1971) *Rechtstheorie* 17; J Wrobeliski, *Principes du droit* (PUF, 1979) 474. For a typology in public international law, see e.g., H Mosler, ‘General Principles of Law’, in *Encyclopedia of Public International Law*, vol. 7 (North Holland) 90.

¹⁶ G Morange, ‘Une catégorie juridique ambiguë: les principes généraux du droit’ (1977) *Revue du droit public et de la science politique en France et à l’étranger* 762.

¹⁷ Peczenik, ‘Legal Theory’ (n 15) 29.

¹⁸ Reference may be here made to the Vienna Convention on the Law of Treaties, Art 31, discussed in Chapter 7 below.

Thirdly, the term ‘principle’ is often associated with the term ‘rule’. This is of course a redundant distinction where a general principle has normative status. A principle is in fact defined as a proposition with general scope that is presented in a generalized and synthetic form and expresses a legal norm of particular importance and can moreover serve as a basis for legal rules according to deductive reasoning.¹⁹ At both international and municipal levels, general principles of law have been created by courts to provide greater coherence to the legal system on the one hand, and to fill gaps or mitigate the obscurity of the legal system on the other. Within international law, the term principle is generally synonymous with a rule of customary international law or a fundamental provision of treaty law. Within EU law and domestic law (countries belonging to the civil law family), the term ‘principle’ is also associated with a fundamental provision deduced by the courts from an array of rules. Given their prescriptive application, we consider this third category of principles highly emblematic of modern law.

2.3.1 General principles of law and the coherence of the legal system

The proliferation of sectoral regulations has enabled the courts to infer new general principles that are subsequently applied within areas that do not fall under the regulations concerned. It is this method of expansive induction that justifies the emergence of general principles of law.

From a theoretical point of view, general principles of law are perceived as essential to modern law for the coherence of the legal system: ‘they make the law a consistent system in the sense that they make it possible to ensure systematic unity of the law amid the disorder of positive rules.’ Such a system is above all one in which various elements are carefully set out and arranged with regards to a hierarchy of norms, according to which primary rules generate secondary rules.²⁰ In his work on *Legal Reasoning and Legal Theory*, MacCormick defended the functional legitimacy of recourse to legal principles in contemporaneous legal systems based on a need for coherence that is inherent in the rationality of modern law. MacCormick wrote that: ‘Working out the principles of a legal system to which one is committed involves an attempt to give it *coherence* in terms of a set of general norms which express justifying and explanatory values of the system.’²¹

One can only agree with this analysis. Taken in isolation, the rule often appears obscure; doubts rapidly arise as to its precise effect. When the meaning of a rule within a given context is uncertain, recourse to the principle from which it derives explains why that rule should be applied. Linking a rule to a principle allows the court to clarify with some degree of precision the fundamentals of which any given

¹⁹ J Salmon, *Dictionnaire de Droit International Public* (Bruylant, AUF, 2001) 877.

²⁰ For a critical examination of the pyramid proposed by Kelsen, see, e.g., P Golding, ‘Kelsen and the concept of legal system’, in RS Summers (ed), *More Essays in Legal Philosophy: General Assessments of Legal Philosophies* (Berkeley, 1971) 69.

²¹ N MacCormick, *Legal Reasoning and Legal Theory* (OUP, 1978) 177 (emphasis added).

rule is but a fragmentary manifestation. Faced with the difficulties of interpreting a normative text, the court will be able, prior to choosing among several possible readings, to base its reasoning on the principles it considers relevant to resolving the dispute in conformity with the *ratio legis* of the legal system.

General principles of law will also provide courts with a firmer basis for navigating the intricacies of often conflicting texts. If a rule consists of implementing a principle, the court may go back to that principle to shed new light on the merits of a case; if a rule takes the form of derogation from a principle, the court should interpret it restrictively. Thus, for example, exceptions for public order, public health, and the protection of animals and plants set out in Article 36 of the Treaty on the Functioning of the European Union (TFEU), which derogate from the principle of the free movement of goods following from Articles 34 to 36 of the TFEU, are interpreted restrictively by the Court of Justice of the European Union (CJEU).²² The existence of general principles thus authorizes interpretations of a teleological nature; that is, solutions are sought in the values that inspired the law-maker rather than solely on the basis of a legal formula. Instead of according absolute value to a legal text, principles allow the spirit rather than the letter of the law to prevail. They thereby invite the courts to evaluate the latter in the light of the objectives of the legal system in which it occurs.

In addition, it is widely recognized that the completeness of the legal system is an important element of the formal rationality of modern law, which is strongly supported by general principles of law. General principles of law are thus called upon to help fashion the legal system by filling possible lacunae. At the level of international, EU, and national legal orders courts regularly find themselves confronted by gaps in written sources. To the extent that courts must rectify such deficiencies to rule on a case, they will do so by deducting a relevant principle from a mass of rules. Once enunciated, the principle will be applied as an autonomous norm to resolve the dispute. Subsequently, that same principle can be applied in other cases.²³

2.3.2 The creation of general principles of law

Whether they are called general principles of law, *principes généraux du droit*, *principios general del derecho*, *Rechtsbeginselen*, or *Rechtssprinzipien*,²⁴ a large number have been created by national courts in continental legal regimes since the

²² N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014) 284–320.

²³ We shall not review legal theory discussions about whether it is the judge's function to create general principles of law. We would merely recall that positivists argue that when there is no clear rule to guide them, judges must create legal rules in exercising their discretion; Dworkin, on the other hand, argues that judges are generally bound by existing principles of law and thus are not intended to fulfil the creative role that positivism seems to assign to them. See, e.g., R Dworkin, *Taking Rights Seriously* (Harvard UP, 1977) 35. For a critique of the general legal theory of ideological postulates underlying the creation of general principles of law, see P Gerard, *Droit, égalité et idéologie* (Saint-Louis, 1980) 177.

²⁴ It is not unusual for the term 'general' to be omitted when discussing principles; e.g. Peczenik, 'Legal Theory' (n 15) 17; J Raz, 'Principles and the Limits of Law' (1972) Yale LJ 81.

end of the Second World War, especially in constitutional, administrative, and judicial case law.²⁵ Some of those general principles cover an extremely wide field of application (e.g. the principle of proportionality). Other principles are only applicable in a single field of law (e.g. the principles of criminal law, *nullum crimen and nulla poena sine lege*). The future for general principles of law appears bright, even if recourse to those principles is progressively tapering off in some court systems following a period during which they were widely recognized. Their success in continental legal regimes is attributable to several factors. On one hand some national legal systems, such as French or Belgian civil law, require courts to rule even when the law is silent on an issue and consequently authorize the court to fill in gaps in the written law by recourse to general principles of law.²⁶ On the other hand the success of these principles in fields such as administrative and constitutional law may be explained by the need for courts to find coherent solutions in the face of the gaps that characterize these legal fields. In common law countries principles that are primarily elucidated by the court sometimes provide a basis for the constitutional system of law;²⁷ at other times they are used to complement statute law.²⁸

The technique of inducing a principle relevant to solving a case from a mass of rules is also widely applied at the level of EU law, where the CJEU has been strongly influenced by national techniques for creating general principles of law.²⁹

2.3.2.1 *The general principles of law recognized by civilized nations*

Since the international legal system is not sufficiently developed³⁰ to fully address the problems it confronts,³¹ the technique of general principles of law also exists

²⁵ It is not possible to suggest a complete bibliography, given the numerous texts devoted to general principles of law in national legal systems.

²⁶ For France, C. civ., Art 4; for Belgium, Code judiciaire, Art 6.

²⁷ J Raz, 'The Rule of Law and its Virtue' (1977) LQR 195; TRS Allan, *Law, Liberty and Justice: The Legal Foundation of British Constitutionalism* (Clarendon, 1993).

²⁸ See, e.g., AK Kareleton, *Law in the Making* (Clarendon, 1964) 456: 'there is the dominant principle never absent in the mind of judges, that the Common Law is wider and more fundamental than Statute and that wherever possible legislative enactments should be construed in harmony with established Common Law principles rather than in antagonism with them.'

²⁹ P Reuter, 'Le recours de la Cour de justice des Communautés européennes à des principes généraux de droit', in *Mélanges H Rolin* (Pédone, 1964) 263; J Boulouis, 'A propos de la fonction normative de la jurisprudence: Remarques sur l'oeuvre jurisprudentielle de la Cour de justice des Communautés européennes', in *Mélanges Waline* (LGDJ, 1974); M Akehurst, 'The Application of General Principles of Law by the ECJ' (1981) 52 BYbil 25; G Goletti, 'The General Principles of Law in the European Community' II:61 (1985) Foro Amministrativo 2623; B Spitzer, 'Les principes généraux de droit communautaire dégagés par la Cour de justice des Communautés européennes' (1986) Gaz Pal 732; D Simon, 'Y a-t-il des principes généraux du droit communautaire?' (1991) Droits 73; R Papadopolou, *Principes généraux du droit et principes du droit communautaire* (Bruylant, 1996).

³⁰ Several doctrinal views on international law as a legal system exist. See, e.g., GJH Van Hoof, *Rethinking the Sources of International Law* (Kluwer, 1983) 17–56; J Combacau, 'Le droit international: Bric à brac ou système?' (1986) 31 Arch Ph Dr 85–105; R Higgins, *Problems and Process: International Law and How We Use It* (Clarendon, 1994) 1–16; HJ Steiner, 'International Law, Doctrine and Schools of Thought in the Twentieth Century', in R Bernardt (ed), *Encyclopedia of Public International Law*, vol. II (Elsevier, 1995) 1216–27.

³¹ M Shaw, *International Law*, 4th ed (CUP, 1997) 78.

at this level. In this context, general principles 'constitute both the backbone of the body of law governing international dealings and the potent cement that binds together the various and often disparate cogs and wheels of the normative framework of the international community'.³² It was for that reason that the provision of 'the general principles of law recognised by civilised nations' was inserted into Article 38 (I)(c) of the Permanent Court of International Justice, the forerunner of the International Court of Justice (ICJ), as a source of law.³³ Since the introduction of that provision, the concept of general principles of law has been the subject of numerous analyses, the main lines of which are considered below.³⁴ Three schools of thought may be distinguished in the debates concerning this highly controversial source of international law.

Positivist jurists refuse to consider general principles as a formal source of international law.³⁵ Other authors, by contrast, consider that general principles are simply principles that are generally found in national legal systems.³⁶ A third group of jurists recognizes that Article 38 (I)(c) of the ICJ Statute includes two categories of 'general principles': in addition to general principles arising from national legal systems, other general principles can be induced from positive rules of international law (the principles of non-intervention, reciprocity, equality of States, etc.).³⁷ Finally, there is a group which considers the question of whether

³² A Cassese, *International Law* (OUP, 2001) 151, 157.

³³ I Brownlie, *Principles of Public International Law*, 5th ed (Clarendon, 1998) 15; Shaw, *International Law* (n 31) 81.

³⁴ For an overview see: G Fitzmaurice, 'The General Principles of International Law Considered from the Standpoint of the Rule of Law' II:92 (1957) RCADI 5; M Akehurst, 'Equity and General Principles of Law' (1976) ICLQ 801; W Friedmann, 'The Use of General Principles in the Development of International Law' (1963) AJIL 279; C Parry, *The Sources and Evidences of International Law* (Manchester UP, 1965) 83–91; JG Lammers, 'General Principles of Law Recognized by Civilized Nations' in *Essays on the Development of the International Order* (Panhuis) (Sijthof and Noordhoff, 1980) 53–75; A Vitanyi, 'Les positions doctrinales concernant les sens de la notion de "Principes généraux" de droit reconnus par les nations civilisées' 86 (1982) RGDIP 45–116; Brownlie, *Principles of Public International Law* (n 33) 15–19; M Shaw, *International Law* (n 31) 81; GJH Van Hoof, *Sources of International Law* (n 30) 131–50.

³⁵ E.g. H Kelsen, *Principles of International Law*, 2nd ed (Holt, Rinehart, and Winston, 1956) 539–40; RY Jennings, 'The Identification of International Law', in Bin Cheng (ed), *International Law: Teaching and Practice* (Stevens and Sons, 1982) 4; A Cassese, *International Law in a Divided World* (Clarendon, 1986) 173–4; A Cassese and JH Weiler (eds), *Change and Stability in International Law-Making* (De Gruyter, 1988) 33–7.

³⁶ H Lauterpacht, *Private Law Sources and Analogies of International Law* (Archon, 1970) 69–71; H Bokor-Szegő, 'General Principles of Law', in M Bedjaoui (ed), *International Law: Achievements and Prospects* (Martinus Nijhoff, 1991) 217; J Combacau and S Sur, *Droit international public*, 2nd ed (Montchrestien, 1995) 46; Nguyen Quoc Dinh, *Droit international public*, 6th ed (LGDJ, 1999) 347–8. International courts are therefore keen to develop general principles of law by borrowing elements that are either common to all or most national systems of law or stem from domestic legal systems and have been transplanted into international law (*in dubio pro reo*, denial of justice). E.g. P Malanczuk, *Akehurst's Modern Introduction to International Law* (Routledge, 1993) 49.

³⁷ Brownlie, *Principles of Public International Law* (n 33) 19; M Virally, 'Le rôle des principes dans le développement du droit international', in *Recueil d'études de droit international en hommage de Paul Guggenheim* (Genève, 1968) 533; H Mosler, 'General Principles of Law' 7 EPIL 89; Lammers, 'General Principles of Law' (n 34) 57–9, 66–9.

general principles of law constitute a third source of law, distinct from treaties and customary law.³⁸

This doctrinal controversy as to whether general principles of law constitute a formal source of law should not obscure the fact that a distinction has gradually been established between the general principles that can be induced in accordance with Article 38(I)(c) of the ICJ Statute and the general principles of law that are applicable to inter-State relations without being drawn from *foro domestico*. We should briefly recall the essential characteristics of this distinction, for while the legal status of principles of international law remains controversial they ought nevertheless to help ensure the coherence of the international legal order within a perspective that we are terming 'modern'.

In inserting Article 38(I)(c) into the Statute of the Court, the intention was clearly 'to enable the Court to fill the gaps in the body of law deriving from Convention and custom'³⁹ in order to avoid the *non-liquet* effect.⁴⁰ This is what may be called the 'gap-filling function'.⁴¹ This doctrine is, according to Koskenniemi, based on the idea of the law as a *complete and coherent system*.⁴² That said, the category of 'General Principles of Law Recognised by Civilised Nations' is only applicable when a treaty or customary provision is lacking.⁴³

The general principles recognized by civilized nations referred to in Article 38(I)(c) of the Statute should be comparable to the general principles in *foro domestico* in terms of how they are elaborated.⁴⁴ However, States have seldom based claims before the ICJ on general principles of law recognized by civilized nations, and no decision of the Court has yet been based explicitly upon such a principle.⁴⁵ The difficulty for the ICJ in recognizing such principles arises from the pre-requisite that they need to be common to various national legal regimes.⁴⁶ Even if serious research on comparative law were to be undertaken, it would probably be quite difficult to derive common principles from a multitude of national and highly

³⁸ K Wolfke, *Custom in Present International Law*, 2nd ed (Martinus Nijhoff, 1993) 108.

³⁹ H Thirlway, 'The Law and the Procedure of the ICJ (1960–1989)' (1990) XI BYbIL 305.

⁴⁰ Koskenniemi, *From Apology to Utopia* (n 7) 26–7.

⁴¹ Lammers, 'General Principles of Law' (n 34) 64.

⁴² Koskenniemi, *From Apology to Utopia* (n 7) 24, 36–7. See also Lammers, 'General Principles of Law' (n 34) 64. For a criticism of the idea of material completeness, see J Stone, '*Non liquet and the International Judicial Function*' XXXV (1959) BYbIL 124–61.

⁴³ *Rights of Passage* (Portugal v India) [1960] ICJ Rep 43. In contrast to custom, general principles of law have a life of their own; their existence does not depend on being actively applied in international relations or State practice.

⁴⁴ Bokor-Szegő, 'General Principles of Law' (n 36) 215.

⁴⁵ Thirlway, 'The Law and the Procedure of the ICJ' (n 39) 110–11; Lammers, 'General Principles of Law' (n 34) 71. In its 1996 advisory opinion on the legality of the threat or use of nuclear weapons, the majority of the ICJ made no reference to general principles of law to fill the lacuna caused by the lack of any relevant treaty obligations in this field. *Legality of the Threat or Use of Nuclear Weapons* [1996] ICJ Rep 226, AO.

⁴⁶ *Contra* A Verdross, 'Les principes généraux de droit dans le système des sources de droit international public' in *Recueil P. Guggenheim* (n 37) 525; Nguyen Quoc Dinh, *Droit international public* (n 36) 347.

heterogeneous legal systems. In addition, the ICJ, as well as other international courts, exercise great caution in applying general principles of law because they 'depend for their jurisdiction, as well as for the acceptability of their decisions and opinions, upon the consent of states.'⁴⁷ Finally, it would seem that the main reason for the decline of these principles is that scores of treaty rules have been established in the past few decades and that, in addition, numerous customary rules have emerged, translating dormant or potential general principles of law into treaty or customary rules.⁴⁸

2.3.2.2 *General principles of international law*

Despite its reticence about formulating general principles in the meaning of Article 38(I)(c) of the ICJ Statute, case law is abounds with references to principles of all kinds, sometimes qualified as 'general'.⁴⁹ Thus an additional source of international law distinct from the sources provided by Article 38 exists. This terminology is not always consistent, however.⁵⁰

One has to bear in mind that international law, and in particular International Environmental Law (IEL), is far from being complete. There is no central law-making body, and multilateral environment agreements (MEAs) coverage is far from impressive. The few customary rules that exist are the result of a slow and controversial sedimentation process. Spelled out by courts when adjudicating cases that are not entirely regulated by treaty or customary rules,⁵¹ general principles of international law fill the gaps. In that connection, courts play an essential role.

Two distinct categories of general principles of international law must be distinguished. General principles can be inferred or they can be extracted by way of induction and generalization from conventional and customary rules (principles of sovereignty, self-determination of peoples, etc.).⁵² While not common in *foro domestico*, this second category of principles is applicable to inter-State

⁴⁷ W Friedmann, *The Changing Structure of International Law* (Stevens and Sons, 1964) 189. See also Van Hoof, *Rethinking the Sources of International Law* (n 30) 144–6; Combacau and Sur, *Droit international public* (n 36) 46.

⁴⁸ Cassese, *International Law* (n 35).

⁴⁹ The ICJ has applied general principles of a broad kind not derived from analysis of municipal systems without making any reference to Art 38. See *Nuclear Tests* (Australia v France) [1974] ICJ Rep 253. In this case, for instance, the ICJ declared that: 'One of the basic principles governing the creation and performance of legal obligations, whatever their source, is the principle of good faith. Trust and confidence are inherent in international co-operation, in particular in an age when this co-operation in many fields is becoming increasingly essential. Just as the very rule of *pacta sunt servanda* in the law of treaties is based on good faith, so also is the binding character of an international obligation assumed by unilateral obligation.' See also *United States Diplomatic and Consular Staff in Tehran* (US v Iran) [1980] ICJ Rep, para 86.

⁵⁰ *Military and Paramilitary Activities in and Against Nicaragua* (Nicaragua v USA) [1986] ICJ Rep 111, paras 190 and 202.

⁵¹ Cassese, *International Law* (n 35) 151.

⁵² *Ibid.*, 152.

relations.⁵³ The repeated implementation of these general principles transforms them into customary rules. Whilst they do not however disappear, they are masked by those customary rules with identical content.

On the other hand, within the new fields of international relations such as climate and the environment where problems have to be resolved without being able to invoke any international precedents, new general principles are being developed. General principles can thus be unique to a particular branch of international law. This could be the case for the general principles of humanitarian law⁵⁴ and those of environmental law. Although they have been playing a marginal role so far in the development of international law, these general principles are likely to have a more prominent function in international environmental law due to the novelty of these particular legal branches. The general principles classified in this second category share a number of similar features.

First, the general principles are derived through a process of induction from positive rules of international law, similar to the method used by constitutional courts and administrative high courts in national legal orders.⁵⁵ Procedural rules can be deduced from substantive obligations through this process of induction.⁵⁶ As stressed by Nollkaemper, 'compliance with certain procedural rules can be a necessary condition for compliance with substantive rules.'⁵⁷

Secondly, in many cases these principles have been generally accepted for so long that they are no longer directly connected to state practice.⁵⁸

Thirdly, both sub-categories fulfil the same functions. On the one hand, they fill the possible gaps in the body of conventional and customary law in cases where treaty law and customary law do not foresee solutions, with the aim of ensuring the coherence of the legal system, which is characteristic of modern law. In so doing, the international courts aim at avoiding as much as possible a *non liquet*.⁵⁹ On the other, they may also fulfil an interpretative function,⁶⁰ serving to clarify uncertainties in conventional law.⁶¹ They play a role in favouring one interpretation over a conflicting one.

⁵³ Friedmann, *International Law* (n 47) 188; Van Hoof, *Rethinking the Sources of International Law* (n 30) 139–48; H Thirlway, 'The Law and the Procedure of the ICJ (1960–1989)' (1990) XI BYbIL 7–76; JG Lammers, *Pollution of International Watercourses* (Martinus Nijhoff, 1984) 164; P-M Dupuy, *Droit International Public* (Dalloz, 1999) 261; Cassese, *International Law* (n 35) 151; Salmon, *Dictionnaire de Droit International Public* (n 19) 880–1.

⁵⁴ *Nicaragua* (n 50) 114, para 219.

⁵⁵ M Akerhust, *A Modern Introduction to International Law*, 3rd ed (George Allen and Unwin, 1977) 40–1; G Schwarzenberger, *The Inductive Approach to International Law* (Stevens and Sons, 1965) 8–42, 109–92; Van Hoof, *Rethinking the Sources of International Law* (n 30) 139–44.

⁵⁶ *Nicaragua* (n 50) para 202.

⁵⁷ A Nollkaemper, *A Legal Regime of Transboundary Water Pollution: Between Discretion and Constraint* (Martinus Nijhoff/Graham & Trotman, 1993) 222.

⁵⁸ Brownlie, *Principles of Public International Law* (n 33) 19.

⁵⁹ Cassese, *International Law* (n 35) 151.

⁶⁰ Lammers, 'General Principles of Law' (n 34) 65.

⁶¹ *Ibid.*, 64–5, 69, 75; Cassese, *International Law* (n 35) 152.

In both cases, they play an important role as an autonomous source of law since, in contrast to customary rules, they may be applied even in the absence of State practice. The behaviour and consent of States is thus not a pre-requisite to recognition of these principles.⁶²

As can be seen from this brief analysis, general principles of law—whether in international or national law—can be seen as a logical postulate for the coherence and completeness of the legal system, despite the controversy surrounding them. So what does the future hold for these principles within international law?

2.4 General principles of international environmental law in a modern perspective

Despite an increasing number of instruments expressed in the form of ‘Declarations of Principles’, the international community has not yet adopted a binding international instrument of global application that sets out the general principles of environmental law. Nevertheless, these principles could play an important role by creating coherence in an international environmental legal order made up of a large number of treaties, each of which addresses a different global or regional environmental issue in response to a specific threat. Not surprisingly, legal scholars have expended considerable effort in identifying, elaborating, and developing various general principles of international environmental law; these can be deduced from a wide variety of sources, ranging from soft law (the Stockholm and Rio Declarations) to arbitral decisions (e.g. the *Trail Smelter* Arbitration) and judicial decisions by the ICJ. Some of the principles, such as good neighbourliness and international co-operation, simply reflect the application of general international law principles to environmental issues. Others, like the obligation not to cause environmental harm, are specific to international environmental law. In the informal taxonomy of international environmental principles developed by scholars, some general principles of international law are widely accepted as reflecting customary law; others constitute emerging legal obligations.⁶³ Consequently, principles such as the obligation not to cause environmental damage or the principle of co-operation can be invoked; principles that are not supported by significant practice through repetitive use in an international legal context cannot give rise to a legal remedy.

However, despite the wide use of principles of legal logic and general jurisprudence, courts have been reluctant to create general principles of international

⁶² Dissenting Opinion by Judge Tanaka in *South West Africa Case* [1966] ICJ Rep 298. According to Bos, ‘With a general principle of law . . . there is no practice to be taken into account—at least not in the sense attributed to the term in the context of custom . . .’: M Bos, ‘The Identification of Custom in International Laws’ 25 (1982) GYBIL 11.

⁶³ See Chapter 6, Section 3.2.

environmental law. This may change in the future; the ICJ and arbitral tribunals have already invoked various equitable ‘principles’ and ‘concepts’ as a means of resolving certain kinds of environmental disputes, for example over shared natural resources such as watercourses. In the *Gabčíkovo-Nagymaros* case, the ICJ invoked the ‘concept’—not the ‘principle’—of sustainable development and stated that it should be given proper weight in interpreting existing environmental obligations.⁶⁴ This means that as new environmental norms and standards are developed, they must be taken into consideration ‘not only when States contemplate new activities but also when continuing with activities begun in the past’. Although this remains controversial, the possibility that an international court will proclaim the polluter-pays, prevention, or precautionary principles as general principles of international environmental law therefore cannot be excluded.⁶⁵

3. Post-modern law

3.1 The elements of post-modernity

The issue of post-modernity⁶⁶ goes far beyond the legal context.⁶⁷ Based on theories of the history of science developed by Thomas Kuhn,⁶⁸ this concept describes the conceptual frameworks of modern culture in its aesthetic, artistic, and political dimensions.⁶⁹ Yet while there has been an explosion of discourse about ‘modernity’ and ‘post-modernity’ during the past two decades, both terms are vague and ambiguous and have been used in conflicting and contradictory ways.⁷⁰ In Jean-François Lyotard’s *The Post-Modern Condition*, which gave rise to a great deal of controversy when it first appeared, post-modernity is defined as ‘incredulity toward meta-narratives. This incredulity is undoubtedly a product of progress in the sciences; but that progress in turn presupposes it.’⁷¹ Eschewing values and politics, modern science suffers from an omission, namely, that knowledge and the knower

⁶⁴ *Gabčíkovo-Nagymaros (Hungary v Slovakia)* [1997] Judgment ICJ Rep 7, para 140.

⁶⁵ There is no contradiction between the function these three principles can carry out in a post-modern law perspective (see the discussion in Subsection 3.3) and the fact that they could also be deduced by courts from a wide range of legal instruments in order to fill a gap in the international legal system. However, we will see in Chapter 6 that courts are still relatively reluctant to deduce the PP as such and to apply it as a binding principle (see the discussion in Chapter 6, Subsection 3.2.3).

⁶⁶ The term ‘post-modern’ was popularized in French primarily by J-F Lyotard, *La condition postmoderne* (éd. de Minuit, 1979); A Touraine, *Critique de la modernité* (Fayard, 1992); AJ Arnaud, *Entre modernité et mondialisation* (LGDJ, 1998) 145.

⁶⁷ B Smart, *Postmodernity* (Routledge, 1992).

⁶⁸ T Kuhn, *The Structure of Scientific Revolution* (University of Chicago, 1962).

⁶⁹ F Jameson, *Postmodernism, or The Cultural Logic of Late Capitalism* (Verso, 1991).

⁷⁰ RJ Bernstein, *The New Constellation: The Ethical-Political Horizons of Modernity/Postmodernity* (Polity, 1991) 200; Jameson (n 69) 55–66.

⁷¹ J-F Lyotard, *The Postmodern Condition: A Report on Knowledge* (University of Minnesota, 1984) 13, 14.

are inseparable.⁷² In contrast, post-modernity questions the very legitimacy of knowledge, the status of which is shifting as societies enter a post-industrial age and cultures a so-called post-modern period.⁷³

The uncertainties attending the exact meaning of post-modernity are also to be found in discussions about the general theory of law. As a result post-modern law remains an incomplete intellectual construct within which a large number of concepts, divergent as well as convergent, jostle each other,⁷⁴ creating significant confusion. In addition, post-modern law is less a phenomenon whose beginnings can be pinpointed at a precise moment of modern history than a complex process built up incrementally as the result of the upheavals which have at regular intervals shaken the order of modern law. As a result of these upheavals, post-modern law is going through a process that is radically different from any of those that characterize modern law.

Several factors have contributed to modern law losing the attributes of generality, systematicity, and autonomy, thus hastening its passage to post-modernity. First, the sovereign State has given way to a plurality of institutions which are as much infra-national as supranational. 'Upstream', inter-governmental institutions such as the World Trade Organization (WTO), the European Union (EU), and the North American Free Trade Agreement (NAFTA), which aim to govern the actions of their members and directly influence the elaboration of rules at national level, are growing in number. 'Downstream', public policies concerning education, health, land-planning, and natural resources generally fall within the competence of the numerous national actors (regions, counties, etc.) most closely involved with the areas being regulated, thus increasing the number of relevant regulators even further. In addition, standard-setting bodies (International Standard Organization (ISO), Comité Européen de Normalisation (CEN), etc.) have established their own functional norms and procedures, giving rise to a non-state law that vies with State law.

Secondly, although the number of regulators has increased dramatically, the speed at which norms are produced has also accelerated drastically.⁷⁵ In the past two decades time seems to have become unhinged. Events are proceeding as though we have become detached from the straight line of historical development that binds the present to the past and the future. Time is no longer a measure of

⁷² V Özdemir, 'Towards an Ethics-of-Ethics for Responsible Innovation' in R von Schomberg and J Hankins (eds) *International Handbook on Responsible Innovation* (E Elgar, 2019) 72.

⁷³ Ibid.

⁷⁴ RM Unger, *Law in Modern Society: Toward a Criticism of Social Theory* (Free Press, Collier Macmillan Publ., 1977); A Carty 'Introduction: Post-Modern Law' in Carty, *Post-Modern Law* (n 8) 1–39; B de Sousa-Santos, 'The Post-Modern Transition: Law and Politics', in A Sarat and TR Kearns (eds), *The Fate of Law* (University of Michigan Press, 1991); B de Sousa-Santos, *Towards a New Common Sense: Law, Science and Politics in the Paradigmatic Transition* (Routledge, 1991).

⁷⁵ C Douzinas, R Warrington, and S McVeigh, *Postmodern Jurisprudence* (Routledge, 1991); P Goodrich and D Gray, *Law and Postmodernity* (University of Michigan Press, 1998).

duration; radically accelerated, it reduces the long term to a short term and continuance to immediacy. Our societies, living in a permanent state of emergency, now favour flexibility over long-term action and action over prediction. Reflecting this, the legal universe has become one of short-term programmes and constant change. By seeking to adhere closely to constantly shifting scientific data, environment law has become the expiatory victim of this acceleration in legal time.

Thirdly, in a world of permanent change action will be more efficient the more easily it can be modified to take account of evolving contexts. This is particularly true since action is expected to immediately result in tangible results. The legitimacy of the State is no longer acquired as of right but is rather a function of the relevance of State-generated programmes. Therefore both States and the international community increasingly act on the basis of recommendations, resolutions, and statements of intent: that is, subdued forms of intervention. This type of law, agreeably termed 'soft law', is replacing the 'hard law' advocated by those who support control and command systems: as if law no longer dared speak its name. This new approach tends to downplay the role of legislation and to dilute the responsibility of public authorities in formulating and implementing public policies.

Fourthly, in order to act efficiently under these conditions, the national law-maker no longer proceeds via a system of unilateral constraints imposing a definition of the common good upon social actors. The State has in effect altered its method of societal (the 'thou shalt not' approach) in favour of a 'let's work together' approach that mingles aspirations, encouragement, and threats. Voluntary participation by those whom the State intends to regulate has in this way come to replace classical forms of State intervention, in the name of 'shared responsibility'. Self-regulatory mechanisms (e.g. voluntary labels, eco-audits, tradable pollution rights) under which those being administered are considered fully involved actors ('stakeholders') play a major role in most of these new public policies. Contract is thus transformed into a technique of governance, whereby everything is negotiable.

Fifthly, the decline of State authority is often associated with an increased political role for civil society. New rights to information, participation, and remedy have been accorded to citizens in order both to integrate them into the process of defining and implementing public policies and to facilitate the subsequent acceptance of negotiated norms. In counterpart to this trend, law-makers at both the international and national levels have become increasingly open to the influence of human rights advocates, environmental NGOs, and other activist groups.

Last but not least, the questioning of the primacy of 'reason' has brought in its wake a loss of confidence in science. The emergence of the precautionary principle (PP) faithfully reflects this scepticism about a mode of science which has for too long been convinced of its supremacy over policy.

To conclude, the evolution of various goal-oriented public policies and their legal instruments gives evidence of a continuous gradation—or degradation—among various normative options, ranging from command and control to

contractual agreement. Rigidity (hard law) has given way to flexibility (e.g. ephemeral programmes, soft law instruments), vertical action (e.g. market licensing) to horizontal measures (e.g. the Global Environment Facility), and hierarchical practices to co-ordination (such as the EU's environmental action programmes). These changes undermine the core premises of modern law (e.g. hierarchy between legislative and executive norms, autonomy of the legal system, the identity of the legal subject). It would be easy to take international, EU, and national legislators to task for these developments, but we must accept that there are legitimate, factual reasons underlying them. Situations that were once simple have become extremely complex; foreseeable situations have become unpredictable. Belief in a single, indisputable scientific truth able to serve as a basis for rational policy decisions has given way to a 'plurality of truths' bearing the imprint of the risk society. These developments are obliging jurists to re-examine the theoretical foundations of law in gradualist terms rather than in terms of a binary opposition between law and non-law.

3.2 The characteristics of post-modern law

Modernity has entered a period of crisis, leading to the emergence of the concept of post-modernity. The linear and ordered structure of modern law has been succeeded—but not replaced—by complex, indeterminate, and disordered forms which recall the rhizome, the labyrinth, or the network: forms better able to account for a complex social organization that has left the path of order and simplicity.⁷⁶ In the world of post-modernity, law loses the attributes of autonomy, systematicity, generality, and stability that characterize modern law. Instead it becomes individualized, complex, and open to other disciplines.

3.2.1 An individualized legal system

One of the most significant characteristics of the post-modern legal paradigm is the individualization of rules in place of generality. Legal output is based less on deductive logic than on initiatives taken by multiple decision-makers enjoying an increasingly wide power of discretion. This has resulted in an anarchic proliferation of rules that has served to blur the outlines of the legal order, undermining the coherence of the system and disturbing its structure.

At both the international and national levels, legislation increasingly takes the form of framework laws formulated in line with major principles, leaving to administrations the task of defining how objectives are to be achieved. Such a legal structure can only encourage the proliferation of fragmentary and unstable

⁷⁶ O Schachter, 'The Decline of the Nation-State and its Implications for International Law', in Charney et al (eds), *Essays in Honor of Prof. L Henkin* (Martinus Nijhoff, 1997) 18–20.

implementing measures. These in turn produce a haphazard collection of very precise rules setting out a wealth of detail in a desperate attempt to adhere to a shifting reality. The application of these rules is narrowly circumscribed in terms of both time and location, thus robbing the legal system of any pretence at the universality and long-term validity to which modern law laid claim.

3.2.2 A legal system of mingling yet competing norms

While modern law was conceived as being monolithic and hierarchical, post-modern law is characterized by circularity,⁷⁷ or at least a baroque approximation thereof. International norms arising in different subject areas (trade law, human rights, economic and social rights, etc.) mingle and compete at the same time. As the globalization of economies progresses national legal orders are converging, at least at the regional level (e.g. the Mercosur, NAFTA). EU law and the ECHR tend to merge into the legal orders of the Member States of the European Community and the Council of Europe. New legal disciplines (such as consumer law or environmental law) challenge established boundaries between private and public law, international and national law, public and private interests.⁷⁸ Furthermore, the line between soft law and hard law is becoming indistinct as treaty mechanisms increasingly turn towards 'soft' obligations and non-binding instruments, in turn, incorporate mechanisms traditionally found in hard-law texts.⁷⁹ Even within national legal regimes the classical distinction between private and public law is growing blurred. With respect to environmental law, the various principles are in a state of tension with each other. In such situations, 'respect for procedural obligations assumes considerable importance and comes to the forefront as being an essential indicator of whether, in a concrete case, substantive obligations were or were not breached.'⁸⁰

3.2.3 An open legal system

While modern law seeks to distinguish itself sharply from non-legal disciplines, rules of law in the post-modern perspective are no longer seen as being completely autonomous in relation to the extra-legal sphere. Rather, post-modern law is characterized by a much greater openness towards the economic, ethical, and policy spheres: in many cases legal and socio-economic realities are interdependent. Indeed, it is neither useful nor ultimately possible to work with international law in isolation, without reference to the social theory that describes inter-State relationships as well as normative views about the principles of justice which should govern

⁷⁷ Chevallier, 'Droit post-moderne' (n 2) 668.

⁷⁸ E Luhmann, *Rechtssoziologie*, 2nd ed (Westdeutscher, 1999).

⁷⁹ On the concept of 'tangled hierarchies', see M Delmas-Marty, *Pour un droit commun* (Le Seuil, 1994) 109.

⁸⁰ See Opinions of Judges Al-Khasweneh and Simma in *Pulp Mills on the River Uruguay* (Argentina v Uruguay) [2010] Judgment ICJ Rep, para 26.

international conduct.⁸¹ In post-modern law highly abstract rules are open-ended in character, providing opposing values with the possibility of dialogue. That opening simultaneously serves to blur the boundaries of the legal system.

Courts will be tempted to draw inspiration from the social and political objectives of institutions that observe these principles to the extent that their wording provides a wide margin for interpretation. On the other hand, the more precise the formulation of these norms, the more restricted that margin will become.

3.2.4 A globalized legal system

Threats that were perceived yesterday as regional, let alone local, have become global. From bilateral obligations mainly focusing in a context of good neighbourliness on preventing transboundary environmental damage, international environmental law (IEL) has progressively become global in order to cope with worldwide threats. However, in the same time the North-South divide fragments even more international law given that responsibilities are henceforth 'common but differentiated'. Accordingly, the propensity to regulate in favour of a common global interest is constantly undermined by contradictory visions.

3.2.5 A legal system coping with scientific uncertainties

While modern science takes a dim view of uncertainty and indeterminacy, post-modernity poses a challenge to the authority of modern law in placing emphasis on the recognition of indeterminacy and ignorance. Indeed, far from being monolithic, science that underscores risk regulation is subject to a significant level of uncertainty.

3.3 The emergence of directing principles in post-modern law

3.3.1 Goal-oriented public principles

Post-modernity is strongly marked by the emergence of a multitude of public policies intended to deal with welfare, unemployment, poverty, and violent crimes. Those post-modern policies are designed to achieve concrete ends in a way that general, impersonal rules are intended not to be. The programmes put in place are vast in scope and may include both legal and other types of measures. The intentions that determine the definition and application of these programmes affect the workings of the legal order. Consequently, the interpretation of post-modern legislations requires 'a purposive, rather than a deductive mode of reasoning, and this in itself appears to erode the distinction between the process of making laws and that of applying them.'⁸²

⁸¹ Friedmann, *International Law* (n 47) 190–5.

⁸² Koskenniemi, *From Apology to Utopia* (n 7) 13.

While modern law is devoid of precise objectives, these goal-oriented public policies are characterized by the proclamation of legal objectives and principles meant to set various social actors in motion. In the perspective of post-modern law, 'principles' no longer serve merely to rationalize law or to fill gaps in a given legal system, as did the general principles of law.⁸³ Rather, they are intended to spur public policies, to allow courts to weigh and reconcile highly divergent interests. These principles mark a policy path to be followed, outline the context within which the law-maker must act, and guide the course of his passage. For this reason we use the term 'directing principles'.⁸⁴ Breaking with the hierarchical model of modern law, which presents itself as a unified whole, directing principles rather serve to reconcile differing legal systems. As legal systems multiply and intersect, this new generation of principles plays an important role in maintaining the links among weakly structured networks, ensuring the practical effectiveness of the legal system as a whole.⁸⁵ While directing principles make it possible more effectively to integrate public laws with differing objectives (e.g. economic development and the environment; the Common Agricultural Policy and protection of the natural environment) they must also be capable of ensuring or guaranteeing effective conciliation between supra-national, national, and sub-national public policies.

In addition, post-modern law is characterized by a range of competing or conflicting social interests (e.g. full employment, clean environment). The task of defining and weighing them is delicate, putting a heavy burden on legislatures.⁸⁶ Executive authorities, under the control of courts, must carefully balance these various interests in order to reconcile them. Consequently, the technique of weighing interests is crucial in the resolution of conflicts (e.g. the principle of proportionality).⁸⁷

Nevertheless, the emergence of a post-modern legal system and directing principles does not mean that its precedents have been set aside. There is no question of drawing a line under earlier forms of law-making and turning the page.⁸⁸ Codification is still fashionable in many Western European countries.⁸⁹ Despite the ascendancy of regulatory flexibility, the general principles of law are for the most part drawn up and applied by courts. In this context directing principles represent a continuation of modern law. They are needed to introduce a degree of

⁸³ Thus, establishing the EC internal market was achieved following the entry into force of the Single European Act, on the basis of an enormous programme. In national legal systems, legally binding programmes (known as *lois-programmes* in France) are numerous, ranging from social security to the fight against pollution. For examples, see Morand, *Droit néo-moderne* (n 1) 74–90.

⁸⁴ Barron, 'Legal Discourse' (n 8) 112.

⁸⁵ Moderne 'Principes généraux du droit' (n 2) 740.

⁸⁶ This term is used by Ch-A Morand in his work on post-modern law and public policy (n 1).

⁸⁷ Morand, *Droit néo-moderne* (n 1) 205; Delmas-Marty, *Pour un droit commun* (n 79) 117.

⁸⁸ Barron, 'Legal Discourse' (n 8) 113.

⁸⁹ In fact, codification remains a cherished ambition of governments. In France, for instance, a general programme of codification, aimed at creating forty-two codes, was ordered on 4 December 1995. The Environment Code was published in 2000.

rationality in a world that has become Kafkaesque through the production of an excessive number of rules and a high degree of instability, which social actors find it extremely difficult to master. These principles serve to reassemble dispersed rules into a coherent whole, which in continental Europe has taken the form of attempts at codification. They provide order to this new view of the legal system. Used in this way, the principles assume a major role in carrying out codification.⁹⁰

Thus, the crisis that is shaking legal systems is at the same time giving rise to a return to sources and a revival of rationality. The current phenomenon is therefore more one of co-existence between modern and post-modern law than replacement of the former. Just as it does not condemn rationality, post-modern law does not signal the end of principles. On the contrary: they will have to be rediscovered and adapted to an environment different from that in which they were conceived. In this new model the stress will not be on 'general principles of law', *principes généraux du droit*, *principios general del derecho*, or *Rechtsprinzipien* that ensure the coherence of the legal order, but rather on 'directing principles' intended to act as a spur to public policy.

3.3.2 The limited justiciability of public principles

In drawing a distinction between rights and principles, the EU Charter of Fundamental Rights (CFR) sheds light on the peculiar juridical nature of a new generation of principles.

Several CFR provisions clearly embody rights. By way of illustration, Article 31(1) relating to working conditions states that 'every worker has the right to working conditions which respect his or her health, safety and dignity'. In sharp contrast to that provision, Article 37 asserts the requirement to integrate a 'high level' of environmental protection into the different EU policies and actions.⁹¹ In so doing, such a 'principle'⁹² merely reiterates the programmatic statement embodied in Article 11 of the TFEU. Article 37 is careful not to specify any beneficiary of the environmental policy and confers any right in the sense of an individual entitlement guaranteed to the victims of pollution.⁹³ Therefore, Article 37 cannot be placed on equal footing with other economic rights, such as the freedom to conduct a business or the right to property, which can be invoked directly.⁹⁴ Although

⁹⁰ We therefore reject the deconstructionist theories put forward by many critics of post-modernism.

⁹¹ de Sadeleer, *EU Environmental Law* (n 22) 108–12.

⁹² The explanations accompanying the Charter ascertain that Art 37 contains a principle. By the same token, the European Parliament underlined that Art 37 is 'a political objective, and not a legally binding right': European Parliament, *Freedom, Security and Justice: An Agenda for Europe*. According to EU Network of Independent Experts on Fundamental Rights' interpretations, Art 37 enshrines 'a principle and not a right'. See EU Network of Independent Experts on Fundamental Rights, *Commentary on the Charter of Fundamental Rights of the EU* (2006) 318 (hereinafter, *Commentary*).

⁹³ The drafters of Art 37 came to grips with the scope of that provision. They decided to reiterate the treaty law obligations rather than to proclaim a genuine environmental right. In addition, the drafters discarded any references to procedural rights such as information and participatory rights. See 'Commentary' (n 92) 315.

⁹⁴ CFR, Arts 16 and 17.

little guidance has been provided as to the legal status of the Charter's principles and rights,⁹⁵ we have attempted to capture where the principles at present stand in relation to rights.

The rights enshrined in the CFR are justiciable and can be invoked by litigants before EU courts as well as the domestic courts provided that the subject-matter is covered by EU law. These subjective rights impose *duties* on State authorities. For instance, with respect to Article 47 of the CFR, both the EU and the Member States are obliged to provide litigants with effective remedies and ensure that their courts are fully independent.

The CFR principles⁹⁶ are also binding on the account that they must be 'observed' and 'promoted'⁹⁷ and 'may be implemented' either by the EU institutions or by the Member States when they are implementing EU law.⁹⁸ One significant feature of principles is that their application often requires the adoption of implementing measures.⁹⁹ Accordingly, the principles are primarily binding on the legislature in the course of their implementation. It follows that CFR principles are 'judicially cognisable' *only* when implemented in EU and domestic acts, through their interpretation and the review of their legality.¹⁰⁰ In other words, they can be invoked in courts exclusively in order to interpret and to review the acts that are fleshing them out. According to the Commentary of the CFR, principles can serve as a shield when a party initiates proceedings against EU and domestic acts calling into question the level of protection *already achieved*. However, they cannot act as a sword for obliging the authorities to achieve policy goals.¹⁰¹ Accordingly, the principles enshrined in the Charter cannot by themselves confer on individuals a subjective right which they may invoke as such.¹⁰²

4. Environmental law bears the marks of post-modernity

The factors leading to post-modernity have been felt much more sharply in the field of environment than in other disciplines. Nuisances, originally specific as to location and time, have become diffuse and sustained. The ecological crisis that was once local has become planetary in nature. For this reason the number of

⁹⁵ Art 52(5) is the key provision for distinguishing the scope of the principles from the Charter's rights.

⁹⁶ The principles are not designated as such. The CJEU considered in *Glatzel* that the integration of persons with disabilities laid down in Art 26 of the Charter was a principle. See Case C-356/12 *Glatzel* [2014] C:2014:350, para 74.

⁹⁷ CFR, Art 51(1).

⁹⁸ *Ibid*, Art 52(5).

⁹⁹ AG Trstenjak's Opinion in Case C-282/10 *Dominguez* [2011] C:2011:559, para 74.

¹⁰⁰ *Ibid*.

¹⁰¹ *Commentary* (n 92) 407. That said, the CJEU case law is rather restrictive regarding the justiciability of the CFR principles.

¹⁰² Case C-176/12 *AMS* [2014] C:2014:2, para 45; Case C-356/12 *Glatzel* [2014] C:2014:350, para 78.

institutional actors dealing with environmental risks has increased tremendously, in turn multiplying the number of regulations. In addition, the traditional relationship between science and policy has been disturbed. Harm to the environment, once considered reversible, is now understood often to be irreversible; scientific certainty has given place to uncertainty. Law must therefore constantly adapt to new policy requirements as the policy-maker tries to cope with the latest scientific developments. As a result, rather than being a strongly hierarchical system based on ideas of order, simplicity, and unity, environmental law is flexible, its structure unsettled, and its outlines uncertain (Subsection 4.1). Nonetheless, this legal discipline continues to produce its own 'directing principles' (Subsection 4.2).

4.1 The characteristics of environmental law in a post-modern perspective

4.1.1 The opening of environmental law to non-legal disciplines

While modern law attempts to distinguish itself from non-legal disciplines, post-modern rules are characterized by much greater openness towards other sectors. This is particularly true for environment law: the borders separating this legal discipline from technology and science are becoming increasingly blurred. On one hand rules are tending to lose their specificity in relation to other normative provisions as they come to rely more heavily on the latter (this is the case for precautionary measures that adhere too closely to the latest scientific discoveries). On the other hand rules of varying types are increasingly being muddled. Technical standards are being applied as though they were binding norms (for example, Codex Alimentarius standards are applied as international standards under the SPS Agreement) while classical legal rules are taking on a technical aspect meant to improve their efficiency, as the result of greater contact with science (e.g. EU regulations on hazardous substances).¹⁰³ In addition, the principles of environmental law are more strongly permeated by values than precise and complete rules, because of their high degree of abstraction and generality resulting from the use of vague concepts (precaution, prevention, reduction, integration) with their own dynamic. Moreover, as discussed in Part I of this work, the polluter-pays, prevention, and precautionary principles are located precisely at the point where legal, economic, and scientific disciplines meet. Thus, as has long been evident, the polluter-pays principle (PPP) has been considered more from an economic than from a legal perspective. Similarly, the PP, far from condemning the use of scientific expertise, demands an abundance of research. The same observation applies to the relationship between law and ethics: the PPP translates an ideal of equity, while the PP

¹⁰³ Chapter 3, Section 3.5.

brings ethics into play to defend the interests of future generations. By the same token, the procedural principles are fostering one the fundamental value of the EU legal order, the rule of law.¹⁰⁴ As an expression of liberal democracy, this value places restrictions on the exercise of regulatory powers rather than duties on citizens. A key environmental procedural principle, access to justice before an independent and impartial court, is a core component of the rule of law.¹⁰⁵ To conclude with, these environmental principles are linking values or ideals (such as sustainable development) and rules.¹⁰⁶

4.1.2 The absence of a comprehensive and systematic legal order

The plurality of institutional actors in the field of environmental protection is impressive. ‘Upstream’, inter-governmental institutions such as the OECD, UNEP, UNECE, Council of Europe have been deeply involved in the elaboration of international standards. ‘Downstream’, public policies concerning the environment generally fall within the competence of an array of national authorities. Thus the global aspects of environmental law (harmonization of product standards, etc.) are being taken over by international institutions, while its local elements (nuisances, brown fields, land planning, etc.) are being assigned to domestic actors. In Europe the situation is further complicated by the addition of an extra legal level comprising EU law on one hand and the ECHR on the other. As the result of the principle of primacy and direct effect, these two legal orders are an integral part of national legal systems. Consequently, European legal output is the result of initiatives taken by multiple decision-makers enjoying an increasingly wide margin of discretion. Directing principles of environment law, set out in both international law and in national legal regimes, are in turn characterized precisely by the fact that they are subject to widely varying definitions determined by any of the large number of institutions acting in this field. In addition, those principles are indicative of the quasi-circularities referred to above.¹⁰⁷

Whether in the context of international law, EU law, or national legal regimes, environment law is at present not monolithic in character. It in no way constitutes a coherent model. Law-making is decentralized, and the absence of adequate co-ordination between various initiatives taken at the global, regional, and sub-regional levels often results in measures that are duplicative, and sometimes even inconsistent.¹⁰⁸

¹⁰⁴ Treaty on the European Union (TEU), Art. 2.

¹⁰⁵ Commission of Venice, *The Rule of Law Checklist* (Council of Europe 2016) 33. See Case C-64/16, *Associação Sindical dos Juizes Portugueses* [2018] C:2018:117, para 32.

¹⁰⁶ J Verschuuren, *Principles of Environmental Law* (Nomos, 2003) 25, 49.

¹⁰⁷ As we saw in Chapter 3, the number of actors involved in defining the PP, each in their own way, is so great that it is sometimes difficult to grasp the substance of the principle precisely; disagreements about the correct definition are thus frequent.

¹⁰⁸ The analysis of environmental principles demonstrates confused hierarchies, intermingling rules of law with clear content, and the principles inspiring those rules. For instance, with its origins in the German legal order, the PP was rapidly recognized in international conventions and subsequently

Particularly problematic is the nature of IEL, ‘which has proceeded incrementally and in a piecemeal fashion.’¹⁰⁹ It has not so far been ‘the product of any comprehensive or systematic scheme of law making, nor has it been based on any clearly defined pre-existing code of principles,’ despite the attempts made in 1992 in Rio. Almost every issue has its own specific treaty and institutional structures and mechanisms (ozone pollution, whaling, oil pollution, etc.). In addition, IEL displays uncanny features that do not fit the traditional sources of hard law. For instance, instead of requiring formal consent by the States Parties, a number of MEAs satisfy themselves with a consensual approach to bind them to implement decisions and resolutions that interpret and monitor guidance. Conventional categories of international law are inadequate to capture this consensus-based mode of decision-making.¹¹⁰ In addition, as ‘living instruments,’ MEAs play a remarkable role in the interpretation of other treaties¹¹¹ and thus contribute to their ‘environmental modernisation.’¹¹²

EU environment law, for its part, is particularly characteristic of this fragmentation. Under the pretext of integration, the legal bases for directives and regulations that contribute to protecting the environment are particularly numerous. Instead of being based solely on Article 192 of the TFEU— a provision that comes under the title ‘Environment’—these acts may be based on Article 114 (internal market), Article 43 (Common Agricultural Policy (CAP), Article 194 (energy), or Article 207 (Common Commercial Policy (CCP)).¹¹³ Yet the objective of the internal market does not necessarily correspond to that of environment policy, which also has a conflictual relationship to the CAP. And although ecological risks are generally interlinked they are not considered in a global manner; on the contrary, they are understood through sectoral EU regulations and directives with appreciably differing emphases.

National laws, pulled in several directions by varying logics (civil, public, administrative, patrimonial, etc.) and based on reasoning that looks at once to ecosystems (water, air, soil), species (flora and fauna), activities (economic, social, recreational), and nuisances (pollution, hazardous substances, wastes, discharges,

integrated into the EC Treaty in 1993. Thereafter the relatively bold application of the PP within EU law (hormones, BSE, ozone depletion) influenced both the national legal regimes of the Member States and the international legal order. See Chapter 3, Section 2.

¹⁰⁹ P Sands, ‘Environmental Protection in the Twenty-First Century: Sustainable Development and International Law’, in RL Revesz et al (eds), *Environmental Law, the Economy and Sustainable Development* (CUP, 2000) 372.

¹¹⁰ A Wiersema, ‘The New International Law-Makers? Conferences of the Parties to multilateral environmental agreements’ 31:1 (2009) *Mich J Int’l L* 231–87.

¹¹¹ For instance, the International Tribunal for the Law of the Sea (ITLOS) relied on the Convention on International Trade in Endangered Species (CITES) to interpret the United Nations Convention on the Law of the Sea (UNCLOS). See *Southern Bluefin Tuna (New Zealand v Japan; Australia v Japan)* [1999] ITLOS Rep 3 and 4, 528–9.

¹¹² L Boisson de Chazournes, ‘Environmental Treaties in Time’ 39:6 (2009) *EPL* 297.

¹¹³ N de Sadeleer, ‘Environmental Governance and the Legal Bases Conundrum’ (2012) *YEL* 1–29

etc.) often consist of a set of disconnected provisions of diverse origins, constructed according to autonomous logics (rural, industrial, and land-use law) one part of which happens to have been recycled with the aim of protecting the environment. The numerous rules that comprise environmental law—general and sectoral, recent and expired, progressive and conservative—espouse differing and at times conflicting objectives. Some of these provisions are intended to ‘protect’ or ‘conserve’ the environment, while others serve merely to ‘manage’ it, a neutral concept that seeks to reconcile varying socio-economic interests. Last but not least, environment law appeals to certain concepts that are themselves highly ambiguous: the laws that protect wild game at the same time set out the right to kill these animals; environmental taxes impose charges on the polluter while at the same time legitimizing their act of pollution. We may therefore wonder whether the end result being sought is case-by-case regulation of ecological problems, devoid of any overarching vision.

4.1.3 The uncertain character of environmental norms

Environmental law bears the marks of post-modernity particularly strongly, owing to the uncertain character of a number of its norms. Three factors explain why environmental norms have become uncertain: the increasing influence of regulatory flexibility,¹¹⁴ evolving and controversial scientific and technical data, and the shattering of traditional legal boundaries. The interactions between these three factors have produced a legislative restlessness that is compromising the very concept of law.

In societies that are deeply divided about their core values and what projects should form the basis for societal action (economic growth or environmental protection, sustainable development or tenable growth) law-makers are no longer able to deal with problems in a clear-cut manner. Consequently, the rules of contemporary law seek not so much to order solutions according to a political programme as to manage complex systems through a series of adjustments aimed at achieving an always provisional balance. More than other branches of law, environment law has shown itself to be a field of unresolved compromise, where tensions between opposing interests are partly calmed but never completely eliminated (e.g. authorization systems for placing dangerous substances on the market or operating listed installations).

Decisions generally follow a careful balancing of divergent interests through the use of over-refined procedures. When they do address the heart of a problem, compromise texts immediately peter out in a plethora of detail. Or they make do with

¹¹⁴ In the age of privatization in the 1980s, the statist, top-down regulatory approach gave way to private, self-regulatory instruments. Lately, a somewhat mixed approach combining command-and-control regulation, voluntarism, and so on has prevailed. See H Somsen, ‘Some Reflections on EU Biotechnology Regulation’, in R Macrory (ed), *Reflections on 30 Years of EU Environmental Law* (Europa Law Publ., 2006) 342–3.

setting out the bases for minimal agreement, surrounded by a degree of woolliness that will allow each party provisionally to turn them to account: until the norm is once again renegotiated, having ceased to entirely satisfy the various actors concerned. Environment law at the international, EU, and national levels is completely submerged in this regulatory wave, at once both master and slave of the policy it supports.

The regulatory flexibility phenomenon translates into a weighing of conflicting interests, either through preventive procedures (public inquiries, consultative committees) or deliberative procedures (negotiation among stakeholders). As a result the procedural aspect often overrides the substantive, with procedures serving to settle decisions among conflicting interests. Environmental norms are expressed on a case-by-case basis more often than in a general manner, which adds to their uncertainty. In the context of a profound questioning of the traditional functions of the State, contracts have become a favoured means of regulating the relationships between the public authorities and private actors.¹¹⁵ When the law assumes a more substantive aspect—in other words, when it dares to prohibit—such systems are subject to multiple derogations that deprive basic texts of most of their meaning.

A second element has increased the uncertainty of norms. In addition to being the result of successive political compromises, environmental law is constrained to adapt to a constantly changing dynamic even while, as part of the legal system, it must continue to anticipate long-term developments in order to ensure legal certainty. Indeed, the volume of legislation is merely keeping step with the development of the ecological crisis, like a belated and partial compensation for the results of growth. Law is thus being forced to run along behind evolving and controversial scientific and technical facts.¹¹⁶ And scientific controversies rapidly turn into social—if not political—controversies about acceptable levels of risk (how safe is safe?). This constant questioning leads to the continual rewriting of the rules intended to protect the environment. The duration, content, stringency, and preciseness of rules cannot help but be affected by this process. However, it is when environmental concerns are at their firmest in international law—where the legal principles underlying this branch of law are enunciated by the international courts when ruling on hard cases—that the adoption of MEAs slows down.

Finally, rules have become uncertain as the traditional borders between legal regimes and branches of law are eroded by the constant toing and froing between the specific and the general, the local and the global, the proximate and the biosphere. The distinctions between classical legal categories such as international and

¹¹⁵ This technique was strikingly evident in the regulatory approach put in place to prevent climate change. The very general 1992 United Nations Framework Convention on Climate Change (UNFCCC) gave birth to the 1997 Kyoto Protocol, which has been subject to further clarification (2001 Marrakesh Agreement) and whose implementation was finally 'enhanced' in 2015 by the Paris Agreement.

¹¹⁶ A telling example is WF Directive 2000/60, Art 4(4) and (5) which allows a number of derogations regarding the objective of achieving a good ecological status.

domestic law¹¹⁷ or public and private law are becoming blurred:¹¹⁸ victims of environmental damage do not distinguish between public law pollution and private law pollution: they experience pollution, full stop. Similarly, the jumbling of traditional categories is affecting the legal nature of regulatory acts. Both international and EU law give evidence of this confusion. A number of MEAs contain a string of good intentions which place them in the category of soft rather than hard law. Given the variable normativity of many MEAs and the propensity to complete them with a growing number of non-binding instruments, the *summa divisio* between hard and soft law is fading away. Moreover, these MEAs establish ongoing regulatory and iterative processes that allow them to adjust more rapidly to the emergence of new problems. As a result, the treaty itself represents just the tip of the iceberg; it is enforced by a sheer number of non-binding sources (codes of conduct, guidelines, and the like) that might generate momentum on their own.¹¹⁹ By way of illustration, while some MEAs governing fresh water may codify or operationalize general environmental principles,¹²⁰ this patchwork of treaties is also supplemented by a number of non-binding instruments that aim to codify or progressively develop customary rules at the universal level.¹²¹ For the sake of efficiency, parties accept the ambiguous legal status of these secondary rules. On the other hand, some EU directives have become so precise and binding that they resemble regulations, while other directives are so vague in nature that they are essentially no more than statements of intent. As for EU regulations, although their provisions are obligatory and directly applicable in Member States,¹²² they are at present used as a framework for forms of voluntary participation by businesses (eco-audits, ecolabels).¹²³ In a rather unorthodox manner, their binding character has become dependent upon the agreement of the firms they are meant to regulate. This technique of contractualization gives rise to problems of legality in that directives are in principle meant to be transposed by regulatory acts.¹²⁴

¹¹⁷ It is difficult and sometimes impossible in these some instances to know the exact content of the provisions that have most often been modified and what exactly is in force. The need constantly to reassess and amend existing environmental law in the light of new practices further burdens an already overloaded agenda. See, e.g., J Ebbesson, *Compatibility of International and National Environmental Law* (Kluwer Law Int'l, 1996), xxiii.

¹¹⁸ K-H Ladeur, 'Post-Modern Constitutional Theory: A Prospect for the Self-Organising Society' 60:5 (1997) MLR 620–2.

¹¹⁹ T Ghering, 'Treaty making and Treaty Evolution', in E Lees and J Viñuales (eds), *The Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 481.

¹²⁰ UN Watercourses Convention, Arts 5 and 6.

¹²¹ UNGA, *Gaps in international environmental law and Environment-related instruments: towards a global pact for the environment* (A/73/419, 2018) (hereinafter *Gaps Report*, 22/45).

¹²² TFEU, Art 288.

¹²³ Regulation (EC) 1980/2000 on a revised Community eco-label award scheme; Regulation (EC) 1221/2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS).

¹²⁴ In this regard the Commission Communication on Environmental Agreements (COM(96) 561 Final) allows Member States to implement their obligations under environmental directives through negotiated agreements between government authorities and the private sector. This of course

Environmental law is thus akin to Penelope's tapestry: what is accomplished in the light of day is unravelled under cover of darkness, as the performer-State attempts to avoid displeasing any member of its audience. The result is an ephemeral body of law subject to continuous revision as it seeks to grasp a shifting and uncertain body of scientific data and to satisfy conflicting interests. The effects of that meandering path are clear: normative value is inversely proportional to bureaucracy, while rules become weaker as their numbers grow. The greater the volume of a rule, the flimsier its content; the more prolific a legislator becomes, the less they are heeded; the more often they persist in turning to technology for solutions, the more firmly they become its slave. The result is law by experts, in full contradiction to the democratic ideal of participation and transparency put forward by those who want to protect the environment.¹²⁵ This growing instability of rules gives rise to permanent insecurity among those governed by such systems. The core function of law—to stabilize social relations—is being called into question. Moreover, the proliferation and obsolescence of texts contributes to a failure to apply them. Finding themselves in a legal tangle, courts and administrators will finally adopt an opportunistic approach to law. Rules will only be applied to the extent that they suit a given situation.

Against the backdrop of the far-reaching calling into question of the traditional functions of the State, IEL no longer takes the form of a system of unilateral constraints which impose on States' binding commitments. The Paris Agreement is a case in point: a top-down allocation of binding, individual emission reduction obligations has been dismissed in favour of nationally determined contributions which are so far not ambitious enough to reduce the increase of greenhouse gas (GHG) emissions.¹²⁶ At domestic level, environmental law appears to be the sacrificial victim to new political creeds—Better Regulation, Smart Regulation, best available technologies (BAT), etc.—under which, according to the logic of deregulation, the law was called upon to climb down from its pedestal in order to engage with market requirements.

Last but not least, although environmental concerns have been inserted in trade and investment treaties, international law remains strongly wedded to a hierarchy of values favouring economic integration. In the same vein, at EU level, internal market approach clearly prevails over environmental interests.¹²⁷

constitutes an anomaly in the context of CJEU case law, according to which only binding instruments can implement directives (Case C-361/88, *Commission v Germany* [1991] ECR I-2567).

¹²⁵ See the discussion in Chapter 5, Section 4.3.

¹²⁶ UNEP, *The Emissions Gap Report: A UN Environment Synthesis Report* (2017).

¹²⁷ de Sadeleer, *EU Environmental Law* (n 22) 218.

4.2 The functions of directing principles in a post-modern perspective

We have noted at several junctures in this work how strongly environmental law has been marked by the presence of principles ranging from prevention to the reduction of pollution at source compared with other legal disciplines. Several factors have contributed to the success of principles in the field of environment law. In addition to their symbolic (or political), structuring, interpretative (gap-filling), and legitimizing functions, they facilitate the evolution of environmental law.¹²⁸ The functions they perform—that are likely to differ from one legal order to another—allow us to distinguish them from more precise rules.

First, they assume a symbolic function,¹²⁹ in that law-makers readily set out principles when they are instituting new regimes. It is no accident that the activating principles, whose absence had long been proclaimed a major failing, began to flourish in substantive texts just as a process of codification began. As far as EU law is concerned, it took the amendment of the Treaty of Rome by the Single European Act (SEA) in 1987 formally to recognize a number of principles as guideposts for the EU environmental policy, although they had already been propagated through numerous recommendations and directives. By proclaiming the principles in a treaty or a framework law, States Parties and national legislators elevate an emerging field of law to the level of more established regimes which have over time already taken shape around their own principles. By way of illustration, the procedural principles of information, participation, and access to justice mirror democratic values that need to be fleshed out to a greater extent in the environmental policy. The affirmation of environmental principles thus also fulfils a programmatic, and even pedagogical, function. As instruments that involve public authorities in a process of change, they are reformatory rather than stabilizing. By setting out these principles, the legislator is in fact announcing the norms of tomorrow.

Secondly, in addition to their symbolic and programmatic dimensions, these meta-norms principles maintain a degree of coherence across complex and fragmented clusters of specific legal rules.¹³⁰ They thus function as the keystone for the structuring, rationalization, and systematization intended to remedy the deficiencies of a discipline that developed in a piecemeal manner on the basis of scattered and fragmentary provisions. For instance, the fragmentation of IEL inevitably

¹²⁸ G Martin, 'Principles and Rules', in L Krämer and Orlando (eds), *Environmental Principles* (E Elgar, 2019) 17.

¹²⁹ Scotford takes the view that scholars and international bodies place great weight on principles representing environmental law as a new legal order. See E Scotford, *Environmental Principles* (Hart, 2017) 48–50.

¹³⁰ Martin (n 128) 18; B Milligan and R Macrory, 'The History and Evolution of Environmental Principles' in Krämer and Orlando (n 128) 35; Scotford, *Environmental Principles* (n 129) 44–5.

leads to the situation where some environmental challenges are addressed, while others are not. The division of IEL also weakens the normative scope of environmental principles, in particular in the field of water resources protection.¹³¹ Environmental principles may help unify the current, sectoral, approach to IEL and fill the gaps in the rules laid down in treaties. Moreover, 'a comprehensive and unifying international instrument clarifying all the principles of environmental law would contribute to making them more effective and strengthen their implementation.'¹³² At domestic level, law-makers brought forth principles intended to serve as guide-posts around which dispersed laws could be reassembled and structured within an entirely new rule-making entity. By way of illustration, in order to ensure the coherence of the new environmental civil liability regime with the principle of prevention, the PPP, and the principle of rectification at source, the French law-maker requires the reparation of the environmental damage had to take place, by priority, in nature.¹³³ Last but not least, the codification of environment law and the enunciation of the principles underpinning that new law constitute the culmination of this process of rationalization. Thus, directing principles are primarily intended to impel environment law towards the reforms necessary for adaptation of the new challenges that are constantly arising in the field of the environment. As a matter of course, as discussed as above, these principles do not provide easy solutions to complex environmental problems.

Thirdly, these principles legitimize environmental law as a genuine scholarly subject. In addition, they give orientations to courts as how to interpret specific rules enabling them to refine the objectives set out by the law-maker. In other words, they guide judicial reasoning.¹³⁴ They can enhance the authority of statutory rules.¹³⁵ In the first part of the book we provided a number of illustrations as to the manner in which courts invoke environmental principles in order to justify the salience of their reasoning.

Fourthly, strategic needs also encourage recourse to these principles. Their generality makes it easier to overcome the protests that habitually greet rules that are too precisely formulated. They attract agreement from various interest groups more easily than their more precise counterparts, owing to their relative flexibility. They inevitably facilitate the adoption of reforms that do not dare proclaim their true nature. For instance, international environmental regulation cannot be achieved immediately by clear and precise legal rules applicable in all circumstances. Directing principles, however, make it possible to set parameters for new obligations and thereby encourage subsequent negotiations on more detailed commitments. Principles enshrined in environmental framework conventions are

¹³¹ UNGA, *Gaps Report* (n 121) 23/45.

¹³² *Ibid.*, 4/45 and 7/45.

¹³³ French C. civ., Art 1386-22.

¹³⁴ Scotford, *Environmental Principles* (n 129) 43.

¹³⁵ Verschuuren, *Principles* (n 106) 39.

known to facilitate the adoption of more detailed implementation mechanisms through protocols.¹³⁶

In particular, the polluter-pays, preventive, and precautionary principles are emblematic of the functions that directing principles must assume in the context of a public policy that stresses flexibility, adaptability, and pluralism. They constitute key means by which to attenuate contradictions and antagonisms and harmonize domestic and supra-national policies. Their presence in both soft and hard law is due precisely to the fact that environmental law is more strongly characterized by post-modern elements than any other. These principles may properly be referred to as 'directing principles'. As we shall see in the next chapter, recourse to those directing principles is encouraged to the extent that, unlike precise rules, they make it possible for divergent values and interests to co-exist by providing the flexibility needed for adaptations able to balance all the interests that must be taken into consideration in a given case. Overly precise rules are far too decisive to support multiple public policies liable to contradict each other at every turn. The directing principles do not suffer from this burden of detail and thus allow courts to weigh and reconcile highly divergent interests with maximum flexibility.

Consequently, the highly creative function that the court assumes when elaborating general principles of law is no longer relevant when setting forth these principles. The judicial alchemy that makes it possible to build a general principle of law from a number of dispersed rules by use of inductive reasoning¹³⁷ has no place here. These three principles, which have already been put forward by law-makers at both the international and national levels, are meant to be applied by public authorities. Nonetheless, the distinction in the field of environmental law between general principles of law on one hand and directing principles of statutory origin on the other is more subtle than might at first appear.

The statement that general principles of law are merely the result of judicial activism cannot be taken as absolute, for these principles are often specifically set out in statute provisions. In addition, *a priori* nothing prevents courts from inferring these principles from sources of written law. The PPP could thus be induced from fiscal laws based on the fact that these tend to insist that a polluter bear the cost of the pollution they have caused, while the principle of prevention could be derived from a wide range of legal instruments (planning, assessment, authorization, monitoring, auditing, etc.) that give evidence of an intention to prevent rather than repair environmental damage. Moreover, by reading their own views into broadly worded statutes and vaguely defined principles, judges are likely to assume unaccustomed roles. Thus, no one may be considered to have a monopoly over the

¹³⁶ For instance, UNFCCC, Art 3, sets out 'Principles' intended to guide the Parties 'in their actions to achieve the objective of the Convention and to implement its provisions'. See the discussion in Chapter 3, Section 3.9.4.

¹³⁷ See the discussion in Subsections 2.2.1 and 2.4.

elaboration and use of environmental law principles: the judge as well as the legislator may systematically set out such principles.

Consequently, the distinction to be made between general principles of law and the polluter-pays, preventive, and precautionary principles relates to the functions these latter principles fulfil within the legal order rather than to their origin. In Chapter 5 below we fully examine the varied functions that the polluter-pays, preventive, and precautionary principles play in an increasingly complex legal world.

5. Concluding observations

A new type of law is today emerging which clearly departs from the coherent and deductive methods that form the basis of modern law, considered as an autonomous system. The structure in which basic norms generate derived rules is today being challenged by the appearance of confused hierarchies where norms and derived rules may no longer be distinguished. At first glance this new type of law appears extremely disordered: the general is to give way to the particular and continuity to timeliness, and imprecision is to replace rigour. These changes are not restricted to the legal realm: post-modern ecology led to a paradigmatic shift from the old stereotype of a presumed balanced nature towards a 'holistic/biocentric new ecology based on dynamic non equilibrium'.¹³⁸

How can law be taught in these circumstances? How can it be applied, except by keeping up with legal developments and taking great care to keep abreast of the latest legal texts and most recent case law? Influenced by the acceleration of legal time, an emphasis on negotiation and a rapid growth in the number of law-makers, can such a system remain viable? Not if post-modernism continues to express itself in a form that appears to be chaotic.

Now, it is not at all certain that post-modernism is ringing the knell of rationality. Indeed, there has never been such great need for rationality as there is today, where the legal system is in a state of extreme agitation. For that reason, to posit a rupture between modern law and post-modern law is to underestimate the heritage of modernity. In fact, today's States are based on the rule of law, which has not yet been seriously challenged by contending systems: codification is continuing apace and rules continue to be interpreted according to a principle of the hierarchy of norms. The structure of legal rules has thus resisted the challenge of post-modernity much more effectively than the champions of post-modernity would have us believe.

Following upon a series of doctrinal studies carried out in francophone Europe, this book has strongly supported the thesis that post-modernity cannot

¹³⁸ PH Sand, 'The Evolution of International Law', in *The Oxford Handbook of International Environmental Law* (OUP, 2007) 41.

be understood in a deconstructionist perspective¹³⁹ as an anti-modernist system; rather, it must be seen as the rediscovery of the values that form the basis for modernity.¹⁴⁰ Hence rationality must be restored to its rightful place, serving as a corrective to the results of post-modernity, even if it differs conceptually from the rationality that permeated the elaboration of modern law. This rediscovery of rationality, expressed particularly through the mediation of directing principles, should lead us to reconsider the relationships among conflicting interests, different branches of law, and varying legal systems. Their purpose is to construct the bridges needed to provide rationality to a system characterized by multiplicity rather than unity.

In addition, we consider that post-modernism in no way threatens the legitimacy of general principles of law¹⁴¹ but rather serves to establish them more firmly, by adding a new category of principles—directing principles—which play an essential role in defining and implementing public policies. They are more useful in identifying the aims that public authorities should pursue than as a postulate of coherence and completeness. Finally, nothing would prevent the directing principles that we have described in Part I from eventually evolving into general principles of law that could be used to fill the gaps arising in a legal discipline which has not yet attained full maturity.

¹³⁹ The deconstruction of secular rationalism is central to post-modernism. See, e.g., Carty, *Post-Modern Law* (n 8) 4.

¹⁴⁰ Chevallier, 'Droit post-moderne' (n 5) 682–7.

¹⁴¹ Moderne, 'Principes généraux du droit' (n 2) 742.

The Evolving Function of Environmental Directing Principles in the Transition from Modern to Post-Modern Law

1. Introductory remarks

In contrast to rules with determinate content, principles can be characterized based on the different functions they perform within a legal system: purposive, interpretative, legitimizing, guidance, and gap-filling functions. In the Introduction to Part II we emphasized the modifications that legal principles have undergone in the passage from modern to post-modern law. General principles of law formulated by the courts in order to fill legal gaps (e.g. the principle of good faith) would be supplemented by directing principles set out by the law-maker with the aim of providing a more precise orientation for public policies (e.g. the principles of social security). Nevertheless, the emergence of this new category of principles does not replace the general principles of law, just as the growing importance of post-modernity does not eliminate all the characteristics of modern law. Indeed, in Chapter 4 we put forward the thesis that post-modernity is less a complete rupture with modernity than the rediscovery of the values underlying modernity within an evolving context. In reality the passage from modern to post-modern law is an extremely subtle phenomenon with constant interaction between these two models. The tensions between them appear precisely at the level of legal principles.

In the field of environment law, the polluter-pays, prevention, and precautionary principles discussed in Part I lie at the heart of the interaction between modernity and post-modernity: Janus-like, modernity looks to the past while post-modernity looks towards the future. We consider these two facets in the two first sections of this chapter through a theoretical analysis of the phenomena of procedural law and codification, among others (Sections 2 and 3).

Post-modern law is characterized by the emergence of a new generation of human rights, among them the human right to environmental protection. That right could reinforce the duty of the public authorities to err on the side of caution by granting greater protection to environmental interests. We therefore also address the subtle interaction between this right and the polluter-pays, preventive, and precautionary principles (Section 4).

Furthermore, in a post-modern context directing principles make it possible to resolve hard cases and bear heavily on the weighing of interests. Looking carefully at World Trade Organization (WTO), Court of Justice of the European Union (CJEU), and European Court of Human Rights (ECtHR) case law one can already observe the impact those principles could have on the constitutive elements of proportionality (Section 5).

2. Directing principles maintain a link with modern law

The ideal of rationality upon which modernity is based does not disappear with the emergence of these three directing principles. On the contrary, as we will see below, these principles may serve to enhance the importance of this slightly tarnished ideal. Rationality in this context takes the form of an antidote against the transformations undergone by the legal system as a whole under the influence of regulatory flexibility, the acceleration of legal time, and the multiplicity of normative authorities. Nonetheless, the establishment of directing principles could provide greater coherence to this field of law; indeed, without directing principles there is a risk that the evolution of environment law will continue to be determined by political fashion. These principles should serve to clarify the object of environment law. Such precision is indispensable given the conflicts of interest that set this branch of law apart from other public policies and from basic rights and fundamental freedoms (Subsection 2.1). At the same time, these directing principles can also play a major role in the codification processes taking place in several continental States (Subsection 2.2).

2.1 Directing principles serve to refine the purposes of environmental law

Under modern law the State renounced the right to introduce specific public policy objectives into private law. Thus, private law, particularly contract law, has always been considered a mere framework within which economic actors could freely engage in contractual relations, without State interference. Modern law thus leaves actors (e.g. contracting parties) free to follow their own ends.

In contrast, as we saw in Chapter 4, post-modern law is characterized by the increase in public policies, including that of environmental protection. Those policies are strongly marked by the objectives assigned to them, expressed in the form of either goals or principles. In that context public authorities attempt to depart from the role of arbiter that modern law had assigned to them, seeking instead to assist directly in realizing the major goals that will henceforth define public policies (environmental protection, full employment, right to housing,

etc.).¹ But these policies, particularly environment policy, are not devoid of rationality, which would constitute a complete rupture with modernity. On the contrary, we will see how the polluter-pays, prevention, and precautionary principles serve to re-establish the coherence of the legal system by specifying the purposes of environment law, in an extremely modern perspective.

First, the insertion of directing environmental principles into framework laws can help to clarify the purpose of the multitude of environmental laws. In displaying such principles, environment law should pursue a *sui generis* course. Decked out in its new finery, it could transform itself into a 'right to the environment' or a 'right for the environment'.² This choice is not an innocent one. Understood in terms of 'protection' rather than 'management', the rules that comprise environment law could no longer be analysed and interpreted in a neutral manner: the affirmation of prevention, precaution, and the responsibility of the polluter for pollution implies a commitment to protect the environment in order to meet the needs of present and future generations.

Some examples demonstrate how the use of directing principles can transform borrowings from relatively classical disciplines into instruments adapted to the pursuit of a new objective: protection of the environment. The enunciation of a principle of waste management without danger for health and the environment set out in Article 13 of the Waste Framework Directive (Waste FD) on waste, for example, provides an environmental objective for a whole series of provisions relating to the management of waste.³ The PP appears to be shifting the orientation of EIA regimes, which until now have been based more on formal obligations (through means of a genuine scientific assessment) than on substantive requirements (consideration of the ecological admissibility of a project).⁴ Environmental taxation strongly reflects the influence of the prevention and polluter-pays principles on a generation of environmental taxes. This is less a tax in the classic sense of the term than an innovative fiscal instrument intended to alter the behaviour of both producers and consumers.

The reparation of ecological damage, a central theme of environmental law, assumes a highly specific character when moulded by the preventive principle, to the extent that it breaks completely with the classical understanding of tort law. Fault is called upon to give way to risk, the certainty of causation is thrown into question

¹ R Dworkin opposes principles to policies. He calls a policy 'that kind of standard that sets out a goal to be reached, generally an improvement in some economic, political or social feature of the community'. Thus the standard that the incidence of car accidents is to be reduced is a policy. See *Taking Rights Seriously* (Harvard UP, 1978) 22.

² Reckoning upon English common law, the Indian Supreme Court (SCt) held that the 'inalienable common law right of [a] clean environment' is the source of the individual's 'right to fresh air, clean water and [a] pollution free environment' protected by the constitutional and statutory provisions. Against this background, the Court supported an expansive conception of the PPP. See *Vellore Citizens Welfare Forum v Union of India* (1996) 5 SCC 647, para 16.

³ Cases C-175/98 and C-177/98 *Paolo Lirussi* [1999] ECR I-6881, paras 51 and 53.

⁴ See the discussion in Chapter 3, Subsection 6.1.3.

in the name of presumptive evidence, and damage is presumed to be collective in character rather than individual and personal. Thus the directing principles help ensure the coherence of environmental law by enhancing the ideal of rationality.

2.2 Directing principles are indispensable to the codification of environmental law

Since the beginning of the 1970s when the Stockholm Declaration on the human environment was proclaimed and the first environment statutes adopted, considerable progress has been made in the field of environment law. The structures set in place at the international, regional, national, and local levels have contributed largely to the multiplication of normative texts intended to protect the environment. University teaching and a profusion of textbooks and articles dedicated to the subject attest to the growing interest of jurists in this field of law, as much for what is at stake as for the originality of the instruments deployed.

A success of this kind should indicate that environment law will henceforth display all the characteristics of a settled legal discipline. When we speak of a new branch of law this should necessarily imply that the legal rules comprising that branch be sufficiently structured around a common object. Environment law, however, has no defined object and concept that permit for a unitary systematization. It is of course oriented towards preservation of the natural basis of life, but this is a weak justification for recognizing a body of law as a separate discipline. In addition, some of the instruments intended to distinguish environmental law from other legal disciplines are not in any way original: the permits required to operate listed installations are essentially the same as other administrative authorizations; criminal offences relating to the environment are merely a special aspect of criminal law; procedural rights such as the right to participation, *locus standi*, or the right to information may also be found in other parts of the legal system such as administrative regulations;⁵ and strict liability is not specific to environment law.⁶

The proliferation of rules intended to protect the environment calls to mind the birth of labour law. Despite pressing requests from legal scholars for greater homogeneity, regulations continue to be adopted in isolation rather than as part of a comprehensive vision.⁷ Legal production snowballs as ecological problems increase. Yet while the volume of laws is increasing, their quality is declining: hence

⁵ See Treaty on the Functioning of the European Union (TFEU), Art 15(3).

⁶ See Directive 85/374/EEC concerning liability for defective products.

⁷ A lack of legal clarity and transparency, as well constant amendment of provisions, are particularly characteristic of the environmental field, both within the EU Member States and at EU level. See, e.g., C Demmke and J Hochgurtel, 'The Quality of EC Law: The Case of the Environment', in C Demmke (ed), *Managing European Environmental Policy: The Role of the Member States in the Policy Process* (EIPA, 1997) 192.

the chain of new rules being tacked on to out-of-date and unsuitable legal frameworks, rapidly obsolescent in turn. Owing to the diversity and fragility of its sources, international environment law (IEL) is even less cohesive than national laws. And EU environment law, splintered amongst a multitude of legal bases, is hardly a model of coherence.⁸ As we noted above, such fragmentation is particularly characteristic of post-modernity.⁹

Yet without a minimal degree of coherence environment law will in the long run be composed of many laws but little law. A reordering of environment law, at all political levels, is thus a priority of the first order. Codification has been put forward as one possible response and could become the favoured vehicle for the rationalization of law. It would allow environment law to regain coherence and would thus perpetuate a modern vision of the law. Yet such a code should not limit itself to reflecting the present state of law; it must go beyond simply compiling various provisions relating to a specific subject in a single text.¹⁰ By systematically and exhaustively assembling scattered rules into a common body, codification must not merely put an end to the dispersion of sources but must also order those sources along rational lines.

Legal principles represent precisely those lines that would make it possible to put some order into the current legal chaos. In conformity with their etymology (from the Latin *principium*) principles should act as a first cause, a matrix from which more precise rules naturally follow. On that basis principles play an essential role in the construction of legal systems; reflecting values and guiding concepts, they transcend the rules of positive law and provide them with a rational structure.¹¹ They thus represent one facet of a systematic process of rationalization which translates specifically into a logical systematization of the rules that make up the subject.

Directing principles of environmental law, such as the polluter-pays, prevention, and precautionary principles, should propel codification by providing a system to underpin any new code.¹² In this way, rather than being compiled and juxtaposed through the addition of purely formal modifications, rules could be set out in a

⁸ N de Sadeleer, 'Environmental Governance and the Legal Base Conundrum' 31 (2012) YEL 373–401.

⁹ See the discussion in Chapter 4, Subsection 4.1.2.

¹⁰ As regards the difficulty of distinguishing between 'consolidation', 'codification', and 'simplification' in EU environment law, see, e.g., A Guggenbühl, 'Codification and Simplification of European Environmental Law' in Demmke (ed), *Managing European Environmental Policy* (n 7) 221–50.

¹¹ 'General principles of international law may, as a *material* source of law, have an important persuasive force and formative function, in that they may influence the content of new rules of international law to be formed through international agreement or custom': JG Lammers, 'General Principles of Law Recognized by Civilized Nations', in F. Kaslhoven et al, *Essays on the Development of the International Order* (Panhuis) (Sijthaf & Noordhoff, 1980) 53–75, 69.

¹² It would be advisable to codify only those principles of real relevance, for example directing principles such as the polluter-pays, prevention, and precautionary principles. In any case these must be flagged by inclusion in general articles, for example, in order to indicate what the law-maker considers fundamental values. This is what the authors of the Single European Act (SEA) did when amending the Treaty of Rome, by placing principles immediately after the Treaty's purposes. That step

hierarchy according to a logical system. By removing contradictions, eliminating redundancy, and completing unfinished portions of the subject, principles should serve to guide the codifier in fully reworking the relevant normative texts. A long-term effort is required to arrest the current proliferation of compromise texts, which are both provisional and fragmented. Directing principles clearly guarantee the coherence—the main characteristic of modern law—at present lacking in environment law. They provide systematic unity for heterogeneous rules, thereby resolving contradictions and filling in gaps.

In addition to serving as a basis for codification, environmental directing principles clearly distinguish environmental law from other bodies of law and help it to become a specific branch of law. Environmental law is particular precisely because it is largely governed by directing principles, which do not exist in other areas of law. Moreover, environment policy is the only policy area for which the TFEU lays down a set of principles upon which to ‘base’ secondary legislation.¹³

The autonomy and coherence suitable for a new legal discipline thus go together with the affirmation of fitting directing principles. Imprinted with those principles, environment law may continue its rise and eventually achieve the same status as other branches of law. But that result can only be realized after serious reform. Given the current proliferation of rules intended to protect the environment, an in-depth renovation of the field’s legal structure is more necessary than ever. The mere existence of principles is not sufficient to turn environment law into a branch of law. Failing substantial reform, it is feared that this area of law will be condemned to follow in the wake of the fashion of the day.

3. Directing principles restrain the excesses of post-modern law

Even though they serve to restore coherence to the legal system, the polluter-pays, preventive, and precautionary principles are highly characteristic of post-modern law. First and foremost, by openly proclaiming new orientations these directing principles enrich the formulation and implementation of environment law by State authorities within a post-modern perspective. In other words, they can stimulate new public policies. In the following subsections, we consider how these three principles could guide law-makers and frame the discretionary power of administrations. Influencing legislative procedures, these directing principles connect environmental law with other disciplines (Subsection 3.1) and promote legislative

was subsequently followed by several law-makers in Europe (see the principles set out in the French Environmental Code, the Belgian regional codes, or the 1998 Swedish Environment Code (*Miljöbalk*)).

¹³ Few other directing principles have been foreseen for other EU policies.

reform and inspire environmental law to adapt to new challenges (Subsection 3.2). By more clearly defining the limits within which public administrations exercise their discretionary powers, they provide authorities with a more coherent orientation and consequently legitimize their actions (Subsection 3.3). Finally, we show that these principles will not necessarily jeopardize legal certainty (Subsection 3.4).

3.1 Directing principles as connecting vessels

Principles can be described as ‘connecting vessels’¹⁴ or ‘connecting glue’¹⁵ within fragmented, multilevel, and rapidly evolving legal systems. First, thanks to their open-ended nature, they have the ability to link environmental law with other disciplines situated outside the legal realm, such as science (with respect to the precautionary principle (PP)) or economics (with respect to the polluter-pays principle (PPP)).¹⁶ They enable the authorities to overcome problems of interdisciplinarity typical of environmental law.¹⁷ Secondly, these principles encourage the courts to broaden their perspective. Accordingly, some courts rule not only on the basis of their own laws, but also base their decisions on developments within other legal systems. There are therefore pathways of reciprocal influence, which enable individual legal systems to be decompartmentalized. A demonstration of this may be found in the following cases. In *Tătar*, the ECtHR drew on long-standing developments within international practice, basing its decision on a variety of EU texts in concluding that the PP applies in relation to the right to privacy.¹⁸ Although Turkey has not ratified the Aarhus Convention, in the *Taşkın* case the ECtHR reinforced its case law on Article 8 of the Convention.¹⁹ The judgment cites principle 10 of the Rio Declaration on Environment and Development, which acted as inspiration for the Aarhus Convention. This hybrid approach enables the obligations resulting from the European Convention on Human Rights (ECHR) to be interpreted with reference to soft law commitments. As a result, human rights formulated in relatively vague terms co-exist alongside State commitments formulated in more precise terms, even though the respective beneficiaries are not identified.²⁰ Along the same lines, in *Urgenda*, the *Hoge Raad* referred to treaty law (the United Nations Framework Convention on Climate Change (UNFCCC)), customary

¹⁴ L Krämer and E Orlando, ‘Introduction’, in L Krämer and E Orlando (eds) *Principles of Environmental Law* (E Elgar, 2018) 8.

¹⁵ B Milligan and R Macrory, ‘The History and Evolution of Legal Principles Concerning the Environment’ in Krämer and Orlando, *Principles of Environmental Law* (n 14) 26.

¹⁶ Krämer and Orlando, ‘Introduction’ in Krämer and Orlando, *Principles of Environment Law* (n 14) 3.

¹⁷ E Scotford, *Environmental Principles and the Evolution of Environmental Law* (Hart, 2016) 40.

¹⁸ ECHR, Art 8.

¹⁹ *Taşkın v Turkey*, 46117/99, 10 November 2004, paras 99 and 119.

²⁰ O De Schutter, ‘Changements climatiques et droits humains: l’affaire Urgenda’ 1 (2020) RTDH.

law (the no harm principle) and soft law (draft articles of the International Law Commission (ILC) on state responsibility) in order to determine the due diligence obligations placed on the Netherlands.²¹ These examples of legal reasoning highlight how principles can ‘act as powerful legal connectors through court judgment offering support for legal reasoning, even when . . . the issues are quite different in the specific cases involved.’²²

3.2 Directing principles guide the legislator

Principles are in the first instance meant to guide the legislator, who must breathe life into them by adopting specific implementing rules. At the national level the law-maker then implements the principles through sectoral legislation. For example, the general provisions of most fiscal legislation relating to the environment are firmly grounded in the PPP.²³ The PP, recognized in a number of German sectoral statutes, has decisively influenced the development of German environment law despite its vagueness, notably by setting ambitious objectives that in turn give rise to implementing mechanisms.²⁴ Adopted by the Swedish authorities, the PP has played a similarly important role in chemical products policy in that country.²⁵ The same is true for IEL, with implementing agreements (protocols) being guided by the basic principles set out in framework conventions. In EU law, a swathe of directives concerning EIA, industrial risks, and listed installations transpose the preventive principle set out in Article 191(2) of the TFEU, while directives and regulations related to biotechnology are beginning to bring the PP into play.²⁶

It is true that such sectoral controls might have come into being in the absence of directing principles, but it is highly likely that the dynamic character of those principles has propelled legislative advances. Thus, far from merely providing a sensible basis for ordering norms already in force, those principles help promote the reforms required to confront new challenges.

Their dynamic is indispensable to such reforms, in that the environmental measures to which they give rise must correspond to realities that are undergoing constant modifications, disappearances, and reappearances. Some of the principles we have considered are also likely to evolve on their own as the result of feedback from the reforms they have themselves set in train. The PPP, for example, originally

²¹ Case C-19/0035, *Urgenda* [2019] HR: 2019: 2006, paras 5.7.2 to 5.7.7.

²² E Scotford, ‘Environmental Principles across Jurisdictions’, in E Lees and J Viñuales (eds), *The Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 665.

²³ See the discussion in Chapter 1, Subsection 4.1.

²⁴ S Bolhmer-Christiaensen, ‘The Precautionary Principle in Germany: Enabling Government’, in T O’Riordan and J Cameron (eds), *Interpreting the Precautionary Principle* (Cameron May, 1994) 55.

²⁵ A Kronsell, ‘Sweden: Setting a Good Example’, in S Andersen (ed), *European Environmental Policy: The Pioneers* (Manchester UP, 1997) 53.

²⁶ See the discussion in Chapter 3, Subsection 3.6.3.

limited to considering the suppression of State aids, has evolved within two decades into a much more comprehensive internalization of pollution costs.²⁷

Yet, although set out in law, the directing principles nonetheless evidence a certain fragility. Even when they are recognized in framework conventions or legislations, they are never secure from the forces of circumstance, since nothing prevents the law-maker from renouncing their use. By way of illustration, the principle of sustainable use has not led to a halt in the over-consumption of natural resources. Similarly, they may at any time be contradicted by the protocols or the sectoral laws intended to put them into effect, because they occupy the same level in the legal hierarchy. If they are to play a significant role in guiding law-makers, it would be preferable to set them out at the highest level of the legal order: in the case of Continental legal regimes, in the Constitution.

In the EU legal order that was certainly the intention of the authors of the founding treaties, who inserted these principles among the highest rules of that legal order rather than, as earlier, among the rules of secondary legislation. The results of their choice are far from negligible: EU institutions are constrained to 'base' the directives, regulations, and recommendations adopted in the field of environment on, among others, the polluter-pays, preventive, and precautionary principles.²⁸

We should not forget, however, that principles are never sufficient in and of themselves. The law-maker cannot merely set out principles in the form of a wish-list without engaging in concrete legislative revisions. Rather, the law-maker must legislate—area by area, procedure by procedure—in order to breathe life into the principles set out in framework laws. Precaution, for example, must be translated into provisions that oblige administrations to call on expert opinion and allow them to reconsider decisions when a new risk emerges. Only a profound reform of administrative policies regarding environmental principles can provide a framework for public administrations and facilitate the task of courts, which will be more likely to review all procedural obligations in this context.

3.3 Directing principles delimit the discretionary power of administrations

When a law-maker proclaims environmental principles they are also addressing subordinate administrations: regulatory as well as individual decisions will henceforth be required to conform to the principles set out in the law. These directing principles will thus serve as guides and signals for the use of discretionary powers by administrative authorities. Taking this a step further, German doctrine

²⁷ See the discussion in Chapter 1, Subsection 4.3.

²⁸ See the discussion in Chapter 6.

considers that the PP derived from various sectoral laws constitutes a line of legal policy that constrains State agencies charged with the implementation of the law.²⁹

This effect of principles on administrative practice is fully justified. Public authorities increasingly require guidance as they find themselves daily having to balance interests that demand the use of wide discretionary powers. Balancing interests in the field of environment policy is so complex that it demands that impact assessments be carried out to draw up a detailed analysis of biotic and abiotic conditions and the environmental, economic, and social consequences of projects.³⁰ These preliminary analyses constitute a powerful means of rationalizing the balancing of interests, which should subsequently be carried out in the light of principles meant to ensure that discretionary powers are not used arbitrarily.

For instance, the central provision governing the issuance of environmental licences in the Netherlands simply stipulates that ‘a license may only be refused in the interest of protecting the environment’.³¹ Such a norm, which is open to varying interpretations, increases the discretionary power of the licensing authorities. Introducing directing principles into a framework of environment law would add content to this norm and thus render the administrative decision-making process more precise.³² The issuing and revision of licences and the formulation of general rules for individual industrial sectors might all have a sounder legal basis by reference to directing principles, which could clarify the grounds for administrative decisions for both citizens and the legal authorities. Other examples can be found in EU law. For instance, when authorizing a project with significant effects on a protected natural area, national authorities must balance the ‘imperative reasons of overriding public interest’ that justify the project against the obligation to prevent irreversible damage to biodiversity.³³ The implementation of the obligation to use the best available techniques under the Industrial Emission Directive (IED), related to the preventive principle, also leads to some balancing of environmental and economic interests.³⁴

Scholars recognize the guiding role played by certain principles of environmental law as regards subordinate powers in EU law. Article 11 of the TFEU specifies the principle of integration by which environmental protection requirements must be integrated into the definition and implementation of other EU policies, including the discretionary power of the European Commission to review

²⁹ B Bender et al, *Umweltrecht*, 3rd ed (C.F. Müller, 1995) 26.

³⁰ 1991 Espoo Convention on Environmental Impact Assessment in a Transboundary Context.

³¹ Netherlands Environmental Management Act, Art 8(10).

³² P Gilhuis, ‘Consequences of the Introduction of Environmental Law Principles in National Law’, in M Sheridan and L Lavrysen (eds), *Environmental Law Principles in Practice* (Bruylant, 2002) 45.

³³ Habitats Directive 92/43/EEC, Art 6(4). On the weighing of conflicting interests in projects affecting protected areas, see e.g. N de Sadeleer, ‘Assessment and Authorisation of Plans and Projects Having a Significant Impact on Natura 2000 Sites’, in B Vanheudesen et L Squintani (eds), *EU Environmental and Planning Law Aspects of Large-Scale Projects* (Intersentia, 2016) 281–320.

³⁴ IED Directive, Arts 3(10), 11 (b). See the discussion in Chapter 2, Subsection 4.2.

State aids proposals. Thus, for example, when the Commission must approve national requests for exemption from the prohibition of State aids, it must consider whether the PPP is sufficiently taken into consideration. If State aid is financed by revenue from charges paid by polluters, it should *a priori* be given favourable consideration.³⁵

At the level of international law, the reiteration of environmental principles in a soft-law instrument also means that UN organizations cannot ignore these principles in their decision-making processes.³⁶

3.4 Directing principles, interpretative function, and legal certainty

The polluter-pays, prevention, and precautionary principles play an interpretative function.³⁷ They often act as 'catalysts for legal innovation, offering a basis for new legal reasoning.'³⁸ As far as EU law is concerned, AG Kokott is of the view that the TFEU environmental principles 'are to be taken into account primarily in the interpretation of the relevant secondary legislation.'³⁹ As the following example shows, the preventive and precautionary principles preclude the national authorities to interpret restrictively the term 'discard', which is the linchpin around which the definition of waste revolves.

The introduction of these environmental principles into multilateral environment agreements (MEAs) or national framework laws has nevertheless been objected to on the grounds that they would jeopardize legal certainty.⁴⁰ Thus the general use of these principles in a wide number of international and national laws has revived the fear that the law-maker has created a series of time-bombs that will make it easier for judges to revolutionize environment law.⁴¹ As a result of these imprecise norms, courts rather than legislators will eventually be making law.⁴²

³⁵ N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014) 435–67; S Kingston, *Greening EU Competition Law and Policy* (CUP, 2011).

³⁶ F Maes, 'Environmental Law Principles ...' in Sheridan and Lavrysen, *Environmental Law Principles in Practice* (n 32) 73.

³⁷ Scotford, *Environmental Principles* (n 17) 147–159.

³⁸ E Scotford, 'Environmental Principles across Jurisdictions', in Lees and Viñuales, *Oxford Handbook* (n 22) 665.

³⁹ AG Kokott's Opinion in Case C-534/13, *Fipa Group and Others* [2014] C:2014:2393, para 66.

⁴⁰ C Sunstein, *Laws of Fears* (CUP, 2005).

⁴¹ Y Jegouzo, 'Les principes généraux du droit de l'environnement' (1996) 12:2 RFD Adm. 209.

⁴² In two cases the German Federal Constitutional Court (*Bundesverwaltungsgericht*) referred to the co-operation principle, based upon the idea that environmental protection should not be the exclusive responsibility of the State but also of industry, to declare local taxation regimes on one-way packaging and on industrial hazardous wastes unconstitutional (*BVerfG*, 2 BvR 1991 u. 2004/95, 7 May 1998 (*Packaging Waste Tax*) reprinted in (1998) UPR 261). According to the *BVerfG* those taxes came into conflict with the underlying co-operation principle of the Federal Waste Act and the Federal Emission Control Act. However, those statutes do not expressly prevent local authorities from using such taxes.

In addition, some legal analysis criticizes recourse to these directing principles in the name of legal certainty, above all when those principles allow courts to deviate from the straightforward course of established precedent. Commentators have thus reproached the CJEU for not having followed its own case law relating to the free circulation of goods when, in its *Wallonia Waste* decision, the Court invoked the principle of correction of environmental harm at source to determine whether the Wallonian restrictions were discriminatory.⁴³ Indeed, this was the first time the Court used the rule of reason to uphold trade restrictions which appeared to be discriminatory.

A priori, these concerns are far from devoid of any basis, to the extent that uncertainty about the scope of the polluters-pays, preventive, and precautionary principles is inversely proportional to the lack of precision in their formulation. As a result of their multiplicity of meanings—and hence their plurality of virtual meanings—application of these principles is often unpredictable. When faced with other principles they give rise to solutions that are all different to one another, because each new situation is different from all past situations.

While directing principles provide general discretion for making decisions, precise and complete rules can more easily be applied in individual cases since they do not allow the judge any choice about whether or not to apply them. Unlike principles, rules are all-or-nothing in character. The application of one rule automatically excludes another; consequently two contradictory rules cannot co-exist. Rules are static; they do not adapt themselves to specific situations as principles do.⁴⁴ They therefore produce homogeneity: the ability to deduce an infinite number of similar solutions from a single norm. As a result they generate foreseeability and legal certainty. Legal certainty in turn requires that courts be subservient to a text that is clear, precise, and complete and not to flexible norms such as the principles we have been considering.

Should the principles therefore be thrown open to criticism under the pretext of legal certainty? Such a reaction appears exaggerated, given that signs of legal pathology are currently multiplying everywhere under the influence of post-modern law. Lack of time and means, the complexity and changeability of the questions to be addressed, pressure from lobbies, lack of interest in legal questions: these difficulties are giving rise to a proliferation of specific rules adopted in haste and littered with gaps and contradictions, whose duration dwindles in direct proportion

This case law serves as a reminder of the interpretative pitfalls that lie ahead when deliberating on abstract principles that have been artificially severed from the specific legislative context in which they were first adopted. See, e.g., G Roller, 'Environmental Law Principles in the Jurisprudence of German Administrative Courts' 2 (1999) ELNI Newsletter 34.

⁴³ See the critical analyses of *Wallonia wastes* by D Geradin, *Trade and the Environment* (CUP, 1997) 19; L Hanscher and H Sevenster, comment on this decision (1993) CMLR 351.

⁴⁴ See the discussion in Chapter 6 about this distinction.

to their mediocrity.⁴⁵ Such is the result of an endless process of legislative patching-up engaged in by the public authorities in their attempts to satisfy a number of conflicting interests.

In addition, environmental law is experiencing a true flight forward: the ineffectiveness of its existing regulatory regimes is compelling law-makers to constantly adopt new statutes, which are superimposed on existing law without increasing its effectiveness. The need to adopt new legislation often rests on a permanent state of reluctance to apply existing legislation. Thus environmental regimes in most industrialized countries are teeming with laws whose effectiveness, owing to their precarious and confused nature, leaves a great deal to be desired. Jurists will find it difficult to discover the dogma of legal certainty in this jumble.

The resultant legal uncertainty is of course not specific to environment law; all branches of law are affected by this problem. It is not surprising that the major international courts are developing brakes and counterweights to this tendency, notably in the form of general principles (e.g. the principles of legitimate expectation, non-retroactivity, and legal certainty).

The directing principles of environmental law could similarly temper this increase in legal precariousness. Malleable and adaptable by nature, those principles function within a long-term perspective absent from more precise rules which must be formally modified every time circumstances change. Yet while specific rules are continually being modified to conform to changing situations, directing principles remain imperturbable. To remain in existence legal systems must have in hand directing principles authorizing change while at the same time avoiding inopportune legislative revisions. Thanks to their permanence, principles allow the legal system to rest on more stable axes than the shifting and chaotic regulations that characterize environment law do, which needs to rapidly acquire a modicum of stability. By acting to reduce uncertainty, directing principles may thus have the opposite effect to that claimed by their detractors.

To this we must add that principles do not in fact give courts *carte blanche* to settle disputes as they wish. If it is true that principles such as the PPP to some extent increase the freedom of interpretation enjoyed by the courts, the latter nonetheless remain bound to find solutions in harmony with the spirit of the legal system and must adhere to the values promoted by that system. Moreover, courts only have recourse to directing principles when they see the need to make one interpretation prevail over another. In addition, principles are always used in tandem with more precise rules and other general principles of law, which serves to reduce the threat of legal uncertainty even further.⁴⁶ We must therefore conclude that judicial discretion does not amount to arbitrary judgment. Courts may never

⁴⁵ See the discussion in Chapter 4, Section 4.

⁴⁶ Both the PP and the PPP interact, for instance, with the principle of proportionality. See Case C-293/9 *Standley* [1999] ECR I-2603; Case C-473/98 *Toolex* [2000] ECR I-5681.

act arbitrarily. Even when discretion is not limited courts are still legally bound to act according to the values of their legal order.⁴⁷ Moreover, it is always possible to reduce the margin of interpretation inherent in directing principles, since doctrine and case law will refine their scope over time.

Finally, we should note that in a post-modern vision of law, principles are elements that stabilize rather than perturb the legal system. Thanks to principles, very dissimilar laws securing conflicting interests manage to co-exist: the principles build bridges between these laws and make it possible, following a weighing of interests, to come to a solution that troubles the various interests concerned as little as possible.

Thus the flexible nature of principles does not put legal certainty into question; indeed, certainty has been ill served by a profusion of overly specific laws, revised at regular intervals.

4. Directing principles are linked to a human right to environmental protection

Human beings are the drivers as well as the victims of environmental change. Modern law places the individual at the centre of society. Individualism is the affirmation of an important degree of autonomy and freedom. Yet post-modern law is characterized by the ebbing of the concept of the 'individual' and the rise of 'welfare rights' or 'socio-economic rights' (*droits-créance*) which are no longer accorded to the individual as such but rather to the individual as a member of a specific group or social category (housing rights, social security rights, etc. which are of a collective character). In modern law public freedoms served to limit the State's prerogatives; in post-modern law, by contrast, welfare or socio-economic rights require intervention by the public authorities. As a logical corollary, post-modern law has resulted in the emergence of a new generation of human rights, including the human right to environmental protection. While not expressly recognized by binding international instruments, this right (to be distinguished from other environmental rights such as the right to life or the right to freedom from interference with one's home and property) is expressed in the constitutions of most European States (Subsection 4.1). Environmental directing principles, such as the polluter-pays, prevention, and precautionary principles, may strengthen constitutional provisions that recognize environmental protection by setting out markers for action by public authorities (Subsection 4.2). Conversely, the procedural principles guiding participation, information, and access to

⁴⁷ J Raz, *The Authority of Law* (Clarendon, 1979) 96.

justice that follow from a constitutional right to environmental protection could usefully complement the polluter-pays, preventive, and precautionary principles (Subsection 4.3).

As noted above, this interaction—to the point of entanglement—between constitutional rights, directing principles, and procedural rights is particularly symptomatic of post-modernity, where a complex alchemy of extremely general norms of varying legal status and functions replaces a uniform hierarchy of first- and second-level rules.

4.1 Recognition of a right to environmental protection

The proclamation of environmental law principles in basic legislation is often accompanied by the recognition of a right to environmental protection. However, under IEL the right to live in a clean environment is generally expressed through non-binding declarations adopted by international conferences rather than in legally binding international human rights covenants. This right has just been incorporated in two regional human rights conventions.⁴⁸ Moreover, no major human rights instruments enshrine a genuine right to environmental protection.

That said, as Judge Weeramantry wrote in his Separate Opinion for the International Court of Justice in the *Gabčíkovo-Nagymaros* case: ‘the protection of the environment is ... a vital part of contemporary human rights doctrine, for it is a *sine qua non* for numerous human rights such as the right to health and the right to life itself’.⁴⁹ Accordingly, the right to protection of the environment may be related to several first-generation human rights—namely, the right to health and to respect of private and family life.⁵⁰ Although there is no explicit right to a clean environment in the ECHR,⁵¹ the ECtHR has nevertheless ended up indirectly (*par ricochet*)⁵² guaranteeing a minimum level of environmental protection. In so doing, the Court broadened the scope of first generation rights (right to life, right to a fair trial, right to privacy, right to property) in order to condemn inappropriate measures allowing nuisance, risk, and pollution. As a result, a substantive environmental protection right may be derived from several provisions of the ECHR.⁵²

⁴⁸ African Charter on Human and Peoples’ Rights, Art 24; Protocol of San Salvador of the American Convention on Human Rights, Art 11.

⁴⁹ Separate Opinion of Judge Weeramantry, at 4.

⁵⁰ The Paris Agreement explicitly recognizes the link between human rights and the environment, calling upon States to respect, promote, and consider their respective human rights obligations when taking climate action.

⁵¹ *Kyrtatos v Greece*, 41666/98, 22 May 2003, para 52.

⁵² N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014) 114–22.

In contrast, the CJEU does not conceptualize the environmental issues in terms of human rights, except those based on EU acts related to the implementation of the Aarhus Convention.⁵³

Unlike IEL, where a right to environmental protection is generally expressed through non-legally binding resolutions and declarations, a significant number of constitutions expressly recognize such a right in one form or another.⁵⁴ In many constitutions, environmental protection is asserted as a constitutional objective or a general obligation⁵⁵ imposed on public authorities which does not give rise to an individual right.⁵⁶ Obligations are created where constitutional provisions include a statement of public policy: the State thereby commits itself to protecting its citizens against the dangers posed to them by environmental threats, just as it is obliged to guarantee them a safe environment. However, these constitutional provisions remain silent as regards the ways in which this objective must be achieved.

Other constitutional provisions recognize, either explicitly or implicitly, the right of citizens to be able to live in a ‘clean’, ‘healthy’, ‘balanced’, ‘safe’, ‘protected’, ‘sustainable’, etc. environment.⁵⁷ Coined as a ‘right’, environmental protection is nevertheless not self-executing. It follows that the constitutional right can be invoked where an individual right—the right to property, health etc.—has been violated. As we will see below, procedural rights follow from this fundamental constitutional right, particularly as regards information, participation, and access to justice.

As we will see later in our analysis, environmental law principles provide consistency to these two facets of the fundamental right to protection of the environment. Given the limited recognition of a substantive right to environmental protection in international and municipal law alike, the emphasis shifts to procedural rights.

⁵³ E Hey, ‘The Interaction between Human Rights and the Environment in the European Aarhus Space’, in A Grear and LJ Kotzé (eds), *Research Handbook on Human Rights and the Environment* (E Elgar, 2015) 367.

⁵⁴ D Boyd, ‘Constitutions, Human Rights and the Environment: National Approaches’ in Grear and Kotzé, *Research Handbook* (n 53) 170–200.

⁵⁵ CFR, Art 37 is typical of such statements of public policy. Winter considers that Art 37 is a rule rather than a principle on the grounds that ‘in building a bridge between different principles it is strictly to be followed. See G Winter, ‘The Legal Nature of Environmental Principles’, in R Macrory (ed), *Principles of European Environmental Law* (Europa Law, 2004) 12. See also A Sikora, *Constitutionalisation of Environmental Protection in EU Law* (Europa Law, 2020) 74–152.

⁵⁶ Pursuant to the French Constitutional Charter, Art 3, the constitutional right to a healthy environment and the duty to preserve the environment imply that everyone must comply with ‘a duty of vigilance to prevent environmental harms that could result from his activity’. See CC, 8 April 2011, no. 2011-116; CC, 10 November 2017, no. 2017-672.

⁵⁷ B Boer, ‘Environmental principles and the Right to a Quality Environment’ in Krämer and Orlando, *Principles of Environmental Law* (n 14) 52–75.

4.2 The interaction between directing principles and the right to environmental protection obliges public authorities to act

Public authorities do not generally serve as dependable and unconditional defenders of the environment. In the past they have been more likely to contribute to environmental degradation than to its protection. In future they will have to take ecological interests into consideration, but those interests are in practice always weighed against competing, if not conflicting, interests, such as economic growth, competitiveness, and employment security.

However, when a constitutional provision situated at the apex of the hierarchy of norms anticipates that the State should intervene to protect the environment, it imposes on the law-maker and subordinate authorities an obligation that they may not evade. Equivocation is no longer an option; were the public authorities to fail to take all possible measures to prevent environmental degradation, they would be disregarding their constitutional obligation.

Yet while action by the public authorities comprises the very heart of environmental protection, it is still unclear how authorities will act to guarantee that right. Both constitutional and legal provisions are silent on that point.

As we observed in our earlier analysis of the polluter-pays, preventive, and precautionary principles, public authorities have a considerable range of measures at their disposal. In order to give concrete form to a constitutional right to environmental protection, intervention by the public authorities must be framed and guided, even led, by the interaction between fundamental rights and the policy principles. Although first generation human rights were not conceived of in order to address environmental threats, according to innovative judicial interpretations they entail positive obligations of a preventive nature, as is clear from the following examples.

Thanks to a constructive and dynamic interpretation of Articles 2 (right to life) and 8 (right to respect for private and family life) of the ECHR, the ECtHR has been able to infer from these provisions a number of preventive obligations that afford potential victims a minimum level of environmental protection. Under these two provisions, the States have positive obligations of a preventive nature.

First, they are called on to take appropriate steps to safeguard the lives of those within their jurisdiction;⁵⁸ secondly, they must take the reasonable and appropriate measures to protect individuals against possible environmental damage. Positive obligations are intended to ensure that the authorities 'make every effort

⁵⁸ States are called on to provide for a normative framework 'designed to provide effective deterrence against threats to the right to life'. See *Taşkın v Turkey* (n 19); *Budayeva v Russia*, 15339/02, 21166/02, 20058/02, 11673/02, and 15343/02, 20 March 2008, para 158.

to prevent human rights from being compromised by third parties or external factors'.⁵⁹ Accordingly, these measures must be timely and effective for limiting the occurrence of environmental harm. In applying these provisions, courts must take into account broadly supported scientific insights and internationally accepted standards.⁶⁰

Moreover, the preventive nature of the positive obligations does not require any acute or immediate danger. Even though there is scientific uncertainty concerning the exact nature of the risks that any sea-level rise may have on the human population in the Netherlands over an extended period of time, the Dutch authorities are not relieved of their positive obligations to prevent such a risk from being realized. In order for an obligation to prevent the occurrence of an event to arise where its occurrence could entail a violation of international law, there is no need to prove that the adoption of preventive measures would necessarily have made it possible to avoid that event from occurring: it is sufficient to demonstrate that these measures could have reduced the likelihood of its occurrence.⁶¹ In addition, the fact that climate change is a global problem, which the Netherlands cannot solve on its own, does not release its authorities from their obligation to take preventive measures inside the country.⁶² As a result, the Dutch State bears a duty of care to apply a more far-reaching greenhouse gas (GHG) emission target than the target set for the State at EU level.

Other courts have endorsed the same legal reasoning. In *Onigoland*, the African Commission on Human and Peoples Rights held that Article 24 of the 1981 Charter imposes an obligation on the State to take reasonable measures 'to prevent pollution and ecological degradation' and to enable the communities exposed to hazardous activities to 'be heard and to participate' in the decision-making process.⁶³ By the same token, Indian courts have also invoked the right to life as a ground for contending with State inaction in their fight against pollution.⁶⁴ More recently, the Inter-American Court of Human Rights held that States must take measures to prevent significant environmental harm to individuals inside and outside their territory.⁶⁵

⁵⁹ Advisory opinion of the Procurator General FF Langemeijer and the Advocate General MH Wissink, in *Urgenda* (n 21) paras 2.53 and 4.216.

⁶⁰ *Urgenda* (n 21), paras 6.1–7.3.6

⁶¹ De Schutter, 'Urgenda' (n 20) 23.

⁶² Advisory opinion of the Procurator General FF Langemeijer and the AG MH Wissink in *Urgenda* (n 21), para 62.

⁶³ *Social and Economic Rights Action Center and the Center for Economic and Social Rights v Nigeria*, No. 155/96, 27 May 2002, paras 54, 69.

⁶⁴ *M.C. Mehta v Union of India; Indian Council for Enviro-legal Action & Others v Union of India* (1996) 3 SCC 212.

⁶⁵ The Environment and Human Rights (State Obligations in Relation to the Environment in the Context of the Protection and Guarantee of the Rights to Life and to Personal Integrity (Interpretation and Scope of Articles 4 (1) and 5 (1) of the American Convention on Human Rights), AO, OC-23/18, (Ser. A) No. 23, 15 November 2017.

In municipal law, the constitutional right to environmental protection and the main environmental principle of prevention and non-regressing, generally set out in laws that are hierarchically inferior to constitutional provisions, mutually reinforce one another through a dialectical relationship rather than acting in isolation. For instance, both the Federal Constitutional Court and the administrative courts have held that the German legislature is under a constitutional obligation to afford German citizens adequate procedural protection against the risks associated with the use of potentially very hazardous technologies such as nuclear energy or genetic engineering and biotechnology.⁶⁶ The presence of principles is so essential in this respect that German doctrine deduces the principles of precaution (*Risikovorsorgeprinzip*), prevention (*Gefahrenabwehr*), sustainable management of renewable resources (*Nachhaltigkeitsprinzip*), and careful management of non-renewable resources (*Sparsamkeitsprinzip*) from Article 20a of the Federal Constitution.⁶⁷

The Belgian literature and case law support the same analysis: although the Belgian constitutional right to the protection of a healthy environment⁶⁸ does not have direct effect, it is settled case law that this provision entails a stand-still obligation⁶⁹ and enshrines the PP.⁷⁰

To conclude, the recognition of an environmental constitutional right only has meaning if it is informed by principles whose function is precisely to guide the public authorities in taking action intended to protect the environment more effectively. The fact that the constitutional right does not have direct effect does not mean that it does imply any legal effects, in particular when linked up with the principles laid down by law-makers.

⁶⁶ The *BVerfG* derived this obligation from a reading of the Basic Law, Art 2 that views this provision's guarantee of 'life and bodily integrity' not only as a negative freedom to protect against straightforward State intrusion but also as a positive duty to provide at least minimal protection against the potentially devastating effects on the right to life and security of the person flowing from the use of hazardous technologies in industrial production processes or other activities undertaken by private third parties. *BVerfG*, Beschl. v. 8. 8. 1978, 2 BvL 8/77, (*Nuclear Power Plant Kalkar*), vol. 49, 89; *BVerfG*, Beschl. v. 20. 12. 1979, 1 BvR 385/77, (*Nuclear Power Plant Mülheim-Karlich*), vol. 53, 30. G Roller, 'Environmental Law Principles in the Jurisprudence of German Administrative Courts' in Sheridan and Lavrysen, *Environmental Law Principles in Practice* (n 32) 160–1.

⁶⁷ The mandate to protect the environment set out in the German Constitution, Art 20 reads as follows: 'The State, bearing responsibility also for future generations, protects the natural bases of life within the existing constitutional order through legislation and, pursuant to statute law and justice, through its executive power and the judiciary'. The precautionary and prevention principles are regarded as coming within the purview of this provision: see D Murswiek, 'Der Bund und die Länder Schutz der natürlichen Lebensgrundlagen', in M Sachs (ed), *Grundgesetz: Kommentar* (Beck'sche Verlagsbuchhandlung, 1996) 660–1; S Werner, 'Das Vorsorgeprinzip: Grundlagen, Maßstäbe und Begrenzungen' 21 (2001) *Umwelt- und Planungsrecht*, 336.

⁶⁸ Art 23.

⁶⁹ It is settled constitutional case law that this principle prohibits law-makers from significantly reducing the level of protection conferred under existing legislation. Bg CCT, 10 October 2019, B.7.1; CE Bg, 29 April 1999, no. 80.018, *Jacobs*.

⁷⁰ CE Bg, 20 August 1999, no. 82.130, *Venter*; no. 85.936, March 2000, *Daeten*.

4.3 The interaction between directing principles and the procedural rights that follow from the right to environmental protection

Whether identifying the best available technology or fixing emissions and environmental quality standards, administrations are keen to weigh up environmental risks against the economic costs of the standards envisioned. As a result, environmental administrative protection levels are far short of optimal. Given that 'the authorities are neither the owner of the environment nor the best placed to find the appropriate balance between environmental and other interests',⁷¹ the implementation of environment law should not be the sole prerogative of the public authorities and their experts. In addition to imposing obligations upon State organs, the right to environmental protection has given rise to calls for procedural rights, among them the right to information, participation, and access to justice that enhance 'the ability of citizens to hold public authorities into account'.⁷² What is more, that 'proceduralization' of rights proves to be all the more necessary as public authorities increasingly find themselves called upon to arbitrate among divergent interests. In effect, a right to a clean environment would be meaningless if it were not institutionalized through the recognition of individual rights of a procedural nature.

These procedural rights are highly intertwined: access to information is important for participation in the decision-making process, and without access to justice the authorities would not give consideration to the two other rights. In harnessing the discretion of public authorities, these three procedural rights buttress the rule of law. They also enhance democratic values which the law-maker tend to promote in the environmental policy realm.

Therefore, whether it be preventive or anticipatory in nature, environment policy must have as a corollary the dissemination of accurate information, a dynamic process of participation for interested parties, and a guarantee of effective recourse against public decisions. The effectiveness of environmental rules will be enhanced if various actors are accurately informed about the choices being considered as well as the reasons underpinning them and are allowed to participate in drawing up environmental regulations. Subjective procedural rights may in this way cause statutory law to evolve in a direction that favours environmental protection.⁷³

⁷¹ L Krämer and E Orlando (eds), 'Introduction', in Krämer and Orlando, *Principles of Environmental Law* (n 14) 8.

⁷² AG Sharpston's Opinion in Case C-204/09 *Flachglas Torgau* [2012] C:2012:71, para 30.

⁷³ The concept of 'subjective right' is well known to continental legal systems such as the German (*subjektive Rechte*) or the French (*droit subjectif*). It is generally opposed in Germany to *objektives Recht* and in France to the *droit objectif*.

International legal instruments regularly call for recourse to procedural rights. For instance, Principle 10 of the 1992 Rio Declaration on Environment and Development provides that:

Environmental issues are best handled with the participation of all concerned citizens at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities ... and the opportunity to participate in decision-making processes. Effective judicial and administrative proceedings, including redress and remedy, shall be provided.

The Aarhus Convention and the Escazú Agreement on Access to Information, Public Participation in the Decision-making Process, and Access to Justice in Environmental Matters are the most far-reaching expressions to date of Principle 10.

The emergence of these three categories of procedural rights goes hand in hand with the implementation of several directing principles that apply to public authorities.

4.3.1 The procedural right to information

The solitary exercise of power linked to the administrative tradition of secrecy has long been reflected in the considerable inertia that arises when it comes to disclosing information about technical choices relating to environmental issues. Yet information constitutes the core of the struggle to protect the environment, since ignorance renders rights to participation and access to justice ineffective. The right to information is therefore central among procedural rights.

That right is not limited to requiring public authorities to make information accessible when interested parties request it. For such a right to be fully realized, authorities must also make information public in a systematic manner so that any citizen may obtain information about the state of the environment in which they live without having to go through long and costly administrative procedures. The active dissemination of information by the public authorities is particularly important because degradation of the quality of environmental components directly threatens public health.

For that reason, recent regulations require that public authorities act to inform populations when they have been exposed to major technological risks,⁷⁴ when

⁷⁴ In *Guerra*, the ECtHR ruled that the failure by the Italian State to obtain essential information for the potential victims of industrial pollution, which would have allowed them to evaluate the risks they ran in residing near a dangerous industrial activity, constituted a violation of the ECHR, Art 8. The Court in this decision defended a novel and bold concept of the role of information in the full enjoyment of the right to respect for privacy and family life granted by the Convention (*Guerra v Italy*, 116/1996/735/932, 19 February 1998). It did not require an ecological catastrophe to have already occurred in order to press for a positive obligation for the public authorities to provide information. Residence in

specified thresholds for concentrations of atmospheric pollutants have been exceeded,⁷⁵ or when genetically modified organisms (GMOs) are released.⁷⁶ In the absence of such measures public authorities would be guilty of exposing populations to environmental risks the existence of which they were unaware.

The right to examine official documents held by administrations⁷⁷ or individuals⁷⁸ should thus be accompanied by active efforts on the part of public authorities to inform the populations concerned about the state of the environment.⁷⁹ This naturally implies that authorities must have the technical and scientific means to obtain such information. In conjunction with the requirement that public authorities disseminate information, this procedural right is thus no longer determined by purely subjective criteria.

Since it is not possible to foresee harm that is not known, any preventive policy must be based on the mastery of sufficient information to allow decision-makers to set out relevant choices in full knowledge of the facts. A rapid examination of preventive policies, moreover, makes clear the central role of information, given the constant need for inventories, assessment reports, inquiries, and supplementary studies whose object is to improve the state of current knowledge. As the culmination of the preventive principle, the EIA procedure focuses entirely on the information the operator must obtain and disseminate to all those involved in a project. That information, which will be used to assuage or corroborate concerns expressed by third parties concerning the project under evaluation, will allow the author of the EIA to carry out timely modifications. This process is intended to overcome any hesitations expressed by concerned parties and to require the competent authority to take a decision with all the facts to hand. A command of information thus constitutes the cornerstone of this preventive instrument.

As can be seen in the case law of the ECtHR, access to environmental information plays an important role as a procedural aspect of substantive rights. In *McGinley and Egan v UK* the ECtHR considered that there was a positive obligation according to Article 8 of the ECHR for national authorities to establish an effective and accessible procedure enabling persons taking part in hazardous activities, such as nuclear testing, to seek all relevant and appropriate information about the risks

a high-risk zone was considered sufficient to generate such information requirements. The duty to inform requires public authorities to collect and elaborate the information that would ensure the safety of those affected.

⁷⁵ Case C-723/17, *Craeynest* [2019] C:2019:533.

⁷⁶ Directive 2001/18/EC on the deliberate release of GMOs, Art 24 and 31(2).

⁷⁷ Case C-321/96 *Mecklenburg v Kreis Pinneberg* [1998] ECR I-3797.

⁷⁸ See the 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, not yet in force, Art. 16, which recognizes the right of a person who has suffered damage at any time to request the court to order an operator to provide them with specific information, insofar as this is necessary to establish the existence of a claim for compensation under the Convention.

⁷⁹ 1998 Aarhus Convention, Art 5.

to which they are exposed.⁸⁰ In *Tătar*, the ECtHR found that the PP required the authorities to inform the local residents about the risks stemming from the mining operations.⁸¹ The fact that the relevant information was not released contributed to the anxiety suffered by the applicants.

The CJEU has consistently held that that the EU Aarhus Regulation aims ‘to ensure a general principle of access to environmental information held by or for public authorities and ... to achieve the widest possible systematic availability and dissemination to the public of environmental information.’⁸² In fleshing out the principle of the widest possible access to environmental information, the presumption of the existence of an overriding interest in disclosure has an absolute nature. Any derogation based on public or private interest from that general principle must be interpreted and applied restrictively. It follows that whenever EU documents contain information relating to emissions into the environment, an EU institution cannot refuse access to this document on the grounds that the public interest in disclosure must be weighed with the exception regarding commercial interest, in including intellectual property.⁸³

The PP should also substantially enrich the right to information. First of all, it should profoundly transform the obligation that private entrepreneurs inform public authorities about the contents and impacts of their projects, by requiring them to carry out supplementary research on project aspects that were formerly neglected or that reflected a minority view within the scientific community. As guarantors of the general interest, the authorities must be correctly informed about the risks covered by the PP. In EU law, the principle of openness ‘enables the EU institutions ... to be more accountable to EU citizens ... , by allowing divergences between various points of view to be openly debated.’⁸⁴

In addition, the principle should enhance the duty put on companies placing hazardous substances on the market to thoroughly inform their contractors or their consumers, who should benefit from a right to professional information. In this connection, the CJEU case law on Registration, Evaluation, Authorization, and Restriction on Chemicals (REACH) is a case in point. A few examples will suffice. Producers and importers of items (‘articles’) containing substances of very high concern (SVHC) that are subject to a requirement of authorization⁸⁵ must notify the European Chemicals Agency (ECHA) if a substance is present in a concentration above 0.1 per cent by weight within any ‘article’ it produces or imports.⁸⁶ The

⁸⁰ *McGinley and Egan v UK*, 9 June 1998, Reports 1998-III, 1334, para 101.

⁸¹ *Tătar v Romania*, 67021/01, 27 January 2009, paras 118–25.

⁸² Case C-442/14, *Bayer CropScience and Stichting De Bijenstichting* [2016] C:2016:890, para 55.

⁸³ Case T-716/4, *Tweedale* [2019] T:2019:141, para 58; Case T-329/17, *Hautala* [2019] T:2019:142. However, ‘information [which] relates to emissions into the environment’ may not, in any event, include information containing any kind of link, even direct, to emissions into the environment. Case T-545/11, *Stichting Greenpeace Nederland and PAN RENV* [2016] EU:T:2018:817, para 58.

⁸⁴ Case T-329/17, *Hautala* [2019] T:2019:142, para 60.

⁸⁵ REACH, Annex XIV.

⁸⁶ *Ibid.*, Art 7(2) and 33.

question arose as to whether, in a case involving a product comprised of various components, the REACH obligations had to be interpreted as requiring the concentration threshold for an SVHC of 0.1 per cent w/w to be established with reference to the total weight of that product (a car) or only the component part in which it is present (break drum, antiknock agent, battery). Where the threshold should be applied to the 'complex product' as a whole, the duty to provide information would arise much less frequently. The Court followed a preventive approach in ruling that the concentration threshold applies to each individual item incorporated as a component into the 'complex product', rather than to the final product of which the item is a component.⁸⁷ Moreover, the duty to provide information on VHC substances⁸⁸ is imposed on successive operators all along the supply chain through to the final consumer. This duty is aimed indirectly at allowing those operators and consumers to make a supply choice in full knowledge of the properties of the products, including those of articles forming part of their composition.⁸⁹

In Dutch case law on danger creation, the duty of care requires not only that precautionary measures be taken if the possibility of damage exists, but also imposes a duty to investigate possible dangers whenever there is reason to question whether an activity is harmless.⁹⁰ The PP must therefore include a requirement that professionals extend and complete their information obligations: information should be provided to consumers on a regular basis. A requirement to closely observe the evolution of a risk would therefore be imposed on producers or distributors who place on the market products likely to pose a danger to health, safety, or the environment.⁹¹ Indeed, in the context of a precautionary approach, producers would normally be required to continue to supervise their products even after these have been placed on the market and to alert the public as soon as any risk becomes apparent. As the different food safety crises clearly demonstrated, labelling and product traceability are corollaries of transparency and constitute key elements of crisis resolution. By the same token, the PP has the effect of enhancing information requirements regarding radiations. Montpellier District Court (*tribunal d'instance*) held that, as a business operator, a mobile telephone operator must inform consumer contracting parties about the risks to human health associated with the installation of relay antennae.⁹²

Finally, the PP could have an impact on freedom of press, since journalists contribute significantly to the dissemination of information, including by calling attention to risks for which full scientific proof is lacking. The ECtHR ruled in *Hertel*

⁸⁷ Case C-106/14 *FCD and FMB* [2015] C:2015:576, paras 53–4.

⁸⁸ REACH, Art 33.

⁸⁹ Case C-106/14 *FCD ad FMB* (n 87), para 78.

⁹⁰ G Betlem, *Civil Liability for Transfrontier Pollution* (Graham & Trotman/Martinus Nijhoff, 1993) 454.

⁹¹ *Alva and Alberta Pilliod v Monsanto Co.* (Case No. RG17862702, JCCP No. 4953).

⁹² *Ti Montpellier*, 5 December 2000, 2660/2005, RG No.11–00–000 359.

that the order by a Swiss tribunal forbidding a journalist to assert that foods prepared in microwave ovens are dangerous to health and that their consumption gives rise to blood modifications of a pathological character constituted a restriction of the freedom of expression and thereby violated Article 10 of the ECHR.⁹³ In *Bladet Tromsø* the Court again took a position favourable to freedom of press in connection with the highly controversial subject of seal hunting in Norway. It ruled that Article 10 of the ECHR does not apply only to information or ideas that are favourably received or are considered inoffensive or neutral but also to those that offend, shock, or disturb the State or some portion of the population.⁹⁴

4.3.2 The procedural right to participation

Environmental protection cannot be left to governments alone but benefit from civic participation in public affairs.⁹⁵ Given the lack of agreement as to the scientifically sound substantive standards and the risk that expert assessment is permeated by value judgement, procedural rights are likely to enhance a reasonable decision regarding risk acceptability. This thesis was of paramount importance in the *Mülheim-Kärlich* case where the *Bundesverfassungsgericht* held that ‘considerations of all relevant concerns must be ensured through a process of communication between operators, endangered citizens and the authorities.’⁹⁶ Besides demanding to be better informed, the public today also insists on being more closely associated with discussions on known or potential risks. Ulrich Beck’s work on the risk society has widely promoted the idea of publicly debating decisions of a technical nature by creating an ecological public sphere in which individuals and groups would be represented on an equal footing.⁹⁷ Accordingly, many recent MEAs guarantee public participation.⁹⁸ Several international courts have held that it is either a general principle of international law⁹⁹ or a customary principle with regional scope.¹⁰⁰

Although there is no formula for public participation, the principle of participation takes its place next to the polluter-pays, prevention, and precautionary principles.

⁹³ *Hertel v Switzerland*, 25 August 1998, Reports 1998–IV.

⁹⁴ *Bladet Tromsø and Stensaas v Norway*, 20 May 1999, Reports 1999–III.

⁹⁵ P Birnie et al (eds), *International Law & the Environment*, 3rd ed (OUP, 2009) 288

⁹⁶ *Mülheim-Kärlich*, 53 BVerfGE 30 (1979) 53,030, at 77. See G Winter, ‘Theoretical Foundations of Public Participation in Administrative Decision-Making’, in G Bandi (ed), *Environmental Democracy and Law* (Europa Law, 2014) 28.

⁹⁷ U Beck, *Risk Society: Towards a New Modernity* (Sage, 1992) 183.

⁹⁸ Birnie et al, *International Law* (n 95), 291; J Ebbesson, ‘Principle 10: Public Participation’, in J Viñuales (ed), *The Rio Declaration on Environment and Development* (OUP, 2015) 287–309.

⁹⁹ Inter-American Commission on Human Rights, *Yakye Indigenous Community v Paraguay*, 10 January 2000 (Case 12.313). See E Tisoumani, ‘Public Participation in Environmental Decision-Making’, in Krämer and Orlando, *Principles of Environmental Law* (n 14) 375.

¹⁰⁰ African Commission on Human and Peoples’ Rights *Centre for Minority Rights and Minority Rights Group and Minority Rights Group International on behalf of Endorois Welfare Council v Kenya*, 276/2003, 2010.

In the framework of a preventive policy, in both international law and national legal regimes, public inquiries constitute the best means for realizing the right to participation.¹⁰¹ These go beyond merely guaranteeing that project information gathered during consultations will be disseminated; they also invite interested parties to set out their points of view directly. Inversely, public participation constitutes a useful source of information for those charged with taking decisions. Public participation is likely to improve 'the quality of environmental decisions by bringing knowledge, insights, and subjective perceptions into the procedure, which would otherwise risk being ignored'.¹⁰² Under pressure from demands by interest groups, the classic decision-making procedure has had to cede ground to a wider co-operation, which is no longer limited to experts.

The PP seems even better placed than the preventive principle to further the right to participation. The uncertainty inherent in the former makes it difficult to adopt decisions that do not give rise to at least some degree of spirited controversy. As long as the scientific premises justifying decisions have not been fully proved, controversy concerning their justification will continue to rage. Specifically intended to apply in situations of scientific uncertainty, the PP distances decision-making from the notion that risk assessment should almost automatically determine what decision will be adopted. Under conditions of uncertainty, decisions concerning risk management will increasingly be the result of arbitration and value judgments; they are thus vulnerable to challenge, making public justification and debate especially important.

Precaution thus provides greater transparency in determining risk management and closer involvement of the public in discussing the various risk management options.¹⁰³ In the perspective of the PP, risk management results in a new social contract between those giving rise to and managing risks and those likely to be exposed to them: a contract that implies a new type of decision-making.

The tensions that characterize decisions taken in a context of uncertainty could also to some extent be alleviated if experts representing interested parties could highlight the lingering uncertainties. For that to happen, it is essential that the public authorities widen debate by requiring an innovative approach: minority scientific hypotheses must be compared to mainstream theory, thereby making it possible to exclude one-sided expertise.

One must not forget, however, that participation has limits. These limits generally relate to the late stage at which it occurs, the manipulation it may produce, and the significant human and technical resources needed for its implementation. A show of discussion also often hides the fact that a decision has already been taken

¹⁰¹ Aarhus Convention, Arts 6(4) and 8. Regarding EU secondary law, see Directive 2001/18/EC on the deliberate release of GMOs, Art 24; Directive 2011/92/EU on EIA, Art 6.

¹⁰² J Ebbesson, *Compatibility of International and National Environmental Law* (Kluwer, 1996) 68, 95.

¹⁰³ Communication from the Commission on the PP (COM(2000)1), para 6.2.

in the corridors of political power, with citizen participation merely serving to confirm what has been decided.

4.3.3 The right to access to justice

Access to justice is the logical culmination of the right to information and participation. The right to consultation would remain a dead letter if its beneficiaries were deprived of the right to challenge a final decision taken by an administration. More fundamentally, if every individual is granted the right to live in a protected environment, that person must be able to contest decisions that impair his exercise of that right through all the means provided by the legal system. The CJEU thus ruled, in connection with the provisions used to transpose an air quality directive, that 'whenever the exceeding of the limit values could endanger human health, the persons concerned must be in a position to rely on mandatory rules in order to be able to assert their rights'.¹⁰⁴ As this decision held that the Directive must be implemented in such a way that plaintiffs can compel public authorities to comply with their obligations, the CJEU implicitly recognizes that the Directive creates an enforceable right to clean air.

The recognition of a fundamental right to environmental protection necessarily has implications for determination of standing in this area. Where a fundamental right is at stake any holder of that right has an interest in ensuring that it is not violated. Restrictions may be applied to standing in order to ensure that the legal system runs smoothly; for all that, they may not render such a right devoid of substance. Yet standing remains the most serious stumbling block for applicants hoping to act on behalf of environmental protection, and in some cases it may even serve to obscure the substance of the challenge. For litigation involving regulatory issues, standing to contest regulatory or administrative rulings is seen primarily in terms of the fear of popular action and the floodgate effect that detractors warn is likely to ensue. EU jurisdictions, for instance, apply conditions that are so strict that their practical effect is to block any possibility of standing in the field of environmental law, be it nuclear testing,¹⁰⁵ atmospheric pollution,¹⁰⁶ or climate change,¹⁰⁷ for example. The result of this restrictive interpretation of access to justice is to ensure that the violation of preventive measures may not be challenged in any way by those intended to benefit from them.¹⁰⁸ The existence

¹⁰⁴ Case C-361/88 *Commission v Germany* [1991] ECR I-2567, para 16.

¹⁰⁵ Case T-219/95 *Danielson* [1995] ECR II-305.

¹⁰⁶ Case T-585/93 *Greenpeace International* [1995] ECR II-2209; Case C-321/95 *Greenpeace* [1998] ECR I-1651.

¹⁰⁷ Case T-330/18 *Carvalho* [2019] T:2019:324.

¹⁰⁸ In contrast, in other jurisdictions the test for standing to bring a judicial review application is more liberal. By way of illustration, pursuant to Art 24.6(2) of the Agreement between the USA, Mexico, and Canada (not yet in force) 'persons with a recognized interest' have appropriate access to administrative, quasi-judicial, or judicial proceedings for the enforcement of the Party's environmental laws, and the right to seek appropriate remedies or sanctions for violations of those laws.'

of pockets of illegality within positive law is consequently tolerated, although in principle violations of substantive legal rules should not be allowed. In addition, the lack of standing before the EU courts for litigants defending collective interests is at odds with the standing of a producer of a chemical substance to contend the refusal of his application.

The fact that environmental protection is not encompassed within the scope of a specific subjective right is a major impediment to the enforcement of protective rules. As AG Kokott stressed:

recognition of the public interest in environmental protection is especially important, since there may be many cases where the legally-protected interests of particular individuals are not affected or are affected only peripherally. However, the environment cannot defend itself before a court but needs to be represented, for example by active citizens or NGOs.¹⁰⁹

Taking into account that the objective of ensuring wide access to justice constitutes a general objective of the Aarhus Convention,¹¹⁰ the CJEU has been recently much more assertive regarding the standing of natural and legal persons before their domestic courts. In particular, given that environmental non-governmental organizations (NGOs) 'give expression to the general interest',¹¹¹ the limitations placed on their standing must be narrowly interpreted.¹¹² In *Janecek*, the CJEU went further in recognizing that a citizen who was 'directly concerned by a risk that the limit values may be exceeded' was entitled to challenge the absence of an air quality management plan, notwithstanding the fact that German administrative law did not provide for such standing.¹¹³ This seems to be paradoxical in that the CJEU has on the one hand held that access to justice before the domestic courts must be broad, whilst on the other hand endorsing a strict interpretation of the standing requirements under Article 263(4) TFEU.¹¹⁴

That said, the PP combined with a basic constitutional right to environmental protection should encourage administrative courts to alleviate the burden on applicants to prove serious damage when seeking for interlocutory relief in relation to a disputed administrative act. In Germany, for instance, an individual can assert

¹⁰⁹ Case C-260/11 *Edwards* [2012] C:2013:221, para 42.

¹¹⁰ Art 9(2). See Opinion of AG Kokott in Case C-260/11 *Edwards* (n 109) para 48.

¹¹¹ Opinion of AG Sharpston in Case C-263/08 *Djurgården-Lilla Värtans Miljöskyddsförening* [2009] ECR I-9967, para 61.

¹¹² Case C-240/09 *Lesoochranárske zoskupenie* [2011] C:2011:125, paras 45–52. Regarding the role played by environmental NGOs emphasized by the ECtHR with respect to ECHR, Art 6(1), see Case *Collectif national d'information et d'opposition à l'usine Melox v France*, 75218/01, 28 March 2006.

¹¹³ Case C-237/07 *Janecek* [2008] C:2008:447, para 39.

¹¹⁴ H Schoukens, 'Access to Justice in Environmental Cases: Kafka Revisited?' 31:8 (2015) *Utrecht Journal of International and European Law* 46–67.

under the Nuclear Energy Act that the authorities have not taken all measures necessary to ensure optimum prevention and precaution.¹¹⁵ As we saw earlier, the responsible authorities should consider not only hazards that have a certain probability of occurring but also those risks for which no cause-and-effect relationship has yet been empirically shown to exist or the uncertainty of which makes the formulation of reliable prognoses impossible.¹¹⁶ Nevertheless, an individual cannot challenge an administrative authorization on the grounds that 'residual risks' (e.g. the hypothetical crash of a jet liner into a nuclear power station) have not been assessed by the administration.¹¹⁷

As far as individual rights are concerned, the conditions that must be met in order to obtain compensation have also been interpreted narrowly: the victim must establish that an individual right or their right has been violated. Accordingly, they must prove direct financial loss or personal or psychological injury. Consequently a victim may not obtain compensation for damage caused to environmental goods, which cannot depend on personal interest since they belong to everyone.¹¹⁸ Only the authorities could, if necessary, obtain indemnification for costs they have had to assume in order to halt damage, but this solution does not make it possible to cover all ecological damage.

The PPP should, rather, encourage the law-maker and the courts to widen standing in order to guarantee full reparation of environmental damage. Opening up the right to obtain damages for loss of environmental goods to persons or groups of persons who have suffered particular damage, such as environmental NGOs, would also conform more closely to the spirit of a principle which seeks to ensure that the polluter pays for pollution.¹¹⁹

To conclude, the conditions applying to standing should also be made more flexible in order to ensure that recognition of the right to protection of the environment and the guiding principles that follow from that right do not become a dead letter.

¹¹⁵ Traditionally, however, the Federal Administrative Court has refused to grant standing to individual plaintiffs. See e.g. G Roller 'Environmental Principles' in Sheridan and Lavrysen, *Environmental Law Principles in Practice* (n 32) 163–5, 167.

¹¹⁶ *BVerwG*, Urt. v. 19. 12.1985, 7 C 65. 82, (*Nuclear Power Plant Wyhl*), vol. 72, 300. See Chapter 3, Subsection 3.7.

¹¹⁷ *BVerwG*, Urt. v. 22.12.1980, 7 C 84/78 (*Nuclear Power Plant Stade*), vol. 61, 256.

¹¹⁸ Environmental Liability Directive (hereinafter ELD), Art 3(3).

¹¹⁹ 1993 Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, not yet in force, Art 18, provides for a right of action to be conferred upon associations or foundations whose statutes aim at protection of the environment to bring legal proceedings in order to obtain a judgment requiring an operator responsible for ecological damage to take measures of reinstatement. Under ELD, Art 12, environmental NGOs are entitled to request the competent authority to take preventive action in instances of environmental damage. Under the 1993 North American Agreement on Environmental Cooperation, persons with legally recognized interests are vested with the right to initiate proceedings to enforce domestic environmental regulations.

5. Directing principles, hard cases, and the weighing of conflicting interests in post-modern law

From the perspective of modern law, both national and international courts fulfil an important role by elaborating general principles of law to fill gaps in the legal system.¹²⁰ While that role does not disappear in post-modern law, courts are certainly not able to use this method to the same extent. In effect the principles they will have to apply will be those set out in legal texts such as framework conventions or framework laws (directing principles) rather than principles derived from case law (general principles of law). The role of the court will thus shift from judge-made principles to the implementation of principles recognized by the legislator.¹²¹ Nevertheless, the discretion of the court will not disappear; indeed, in a post-modern perspective it will be supported by the weighing of interests.

Long relegated to a background role, the directing principles of environmental law such as the polluter-pays, prevention, and precautionary principles should receive far greater attention from the courts. Indeed, these principles play a determinant role in the transition from modern to post-modern law. Enriching the arsenal of interpretative methods, these principles could encourage courts to break free of their status as servants of the law. In a post-modern context they make it possible to resolve hard cases (Subsection 5.1) and bear heavily on the weighing of interests (Subsection 5.2).

5.1 Resolving hard cases in the light of directing principles

When antagonistic principles enter into conflict (e.g. the free movement of goods versus the protection of the environment) the courts enjoy wide discretion in determining the respective weight of such principles.¹²² In theory principles make it possible to tip the scale in either direction. In practice the use of directing principles as a means of interpretation may prove extremely useful to courts in settling 'hard cases', that is, borderline cases where, *a priori*, it is not possible to settle an argument except by validating certain values.¹²³ As we saw in the *Greenpeace GM Bt Maize* case, the PP implies that the directives relating to GMOs should be interpreted in a way that gives full weight to environmental protection requirements.¹²⁴

¹²⁰ See the discussion in Chapter 4, Section 2.

¹²¹ F Moderne, 'Légitimité des principes généraux et théorie du droit' (1995) 15:4 RFD Adm. 722–2, 742.

¹²² de Sadeleer, *EU Environmental Law* (n 52) 284–320.

¹²³ M Koskenniemi, *From Apology to Utopia: The Structure of International Legal Argument* (Lakimiesliiton Kustannus, 1989) 27; J Bengoetxea, *The Legal Reasoning of the European Court of Justice* (Clarendon, 1993) 218–70.

¹²⁴ Case C-6/99, *Greenpeace v France* [2000] ECR I-1676. See the discussion in Chapter 3, Subsection 3.6.4.

EU courts use the environmental directing principles set out in Art 191(2) of the TFEU to resolve particularly difficult cases. Thus the CJEU appealed directly to the principle of integration in a number of cases in order to confirm the interpretation that Article 192 of the Treaty specific to environment policy does not alter Community competences under other provisions of the TFEU, even if the measures taken under the latter also pursue an environmental protection goal.¹²⁵ Article 191(2) principles clearly have an interpretative value that enables them to resolve hard cases in the field of determining the legal basis for EU regulations. The CJEU issued an Opinion relating to the choice of the most appropriate legal basis for a proposed decision concluding the Cartagena Protocol on Biosafety (CPB). The Court held that the Protocol must be founded on a single legal basis specific to environmental policy. In reaching that conclusion the Court stressed that:

as regards the Protocol's purpose, it is clear beyond doubt from Article 1 of the Protocol, which refers to Principle 15 of the Rio Declaration on Environment and Development, that the Protocol pursues an environmental objective, highlighted by mention of the precautionary principle, a fundamental principle of environmental protection referred to in Article [191(2) TFEU].¹²⁶

In its decision in the *Wallonia Waste* case, the CJEU referred to the principle that environmental damage should as a priority be rectified at source to decide whether an obstacle to the free circulation of waste was discriminatory. It concluded that protection of the environment in this case constituted a 'mandatory requirement' that justified the contested regulation.¹²⁷ Subsequently, the Court referred to this principle in order to favour environmental protection over considerations linked to the internal market.¹²⁸ This clearly shows that environmental principles can influence or even determine the outcome of cases.¹²⁹

A further example is the differentiation between waste and product, which has been the subject of much heated academic debate as well as litigation in EU and domestic law. It is settled case law that the concept of waste must be interpreted in light of the aim of the Waste FD, which is to protect human health and the environment against harmful effects caused by waste. If in doubt, the qualification of waste must prevail in light of the PP and the preventive principle.¹³⁰ It follows that the concept of waste cannot be interpreted restrictively. This case law shows again how

¹²⁵ de Sadeleer, *EU Environmental Law* (n 52) 157–71.

¹²⁶ Opinion, 6 December 2001, para 29 (emphasis added).

¹²⁷ Case C-2/90 *Commission v Belgium* [1992] ECR I-4431, paras 34–6.

¹²⁸ Case C-155/91 *Commission v Council* [1993] ECR I-971, para 13; Case C-187/93 *Parliament v Council* [1994] ECR I-2857, para 22; Case C-422/92 *Commission v Germany* [1995] ECR I-1097, para 34. For comment on those decisions, see de Sadeleer, *EU Environmental Law* (n 52) 297–300.

¹²⁹ This seems to be particularly clear in Case C-2/90 on Wallonia waste.

¹³⁰ Cases C-418/97 and C-419/97 *ARCO Chemie Nederland* [2000] ECR I-4512, para 39. See N de Sadeleer, *Droit des déchets de l'UE* (Larcier, 2016) 124–45.

the principles embodied in Article 191(2) can play a determinant role in resolving hard cases.

5.2 Impact of directing principles on the constitutive elements of the proportionality principle

5.2.1 Background

Decisions taken by the public authorities to protect the environment may have favourable or unfavourable repercussions on interests unrelated to their actual objectives. In practice, environmental decisions may entail the use of coercive mechanisms that restrict economic freedoms, limit property rights, impose conditions on freedom of movement in protected areas, or threaten the right to work as the result of the closure of polluting installations. On the other hand, certain fundamental rights may profit from environmental protection measures. For instance, neighbours of listed installations or airports may demand measures to limit nuisances affecting their right to respect for private and family life according to Article 8 of the ECHR.¹³¹ Environmental measures are thus at the centre of a broad range of conflicts of interest.

Many different categories of interests have to be considered legitimate subjects of public policy, whether they belong to economic operators or to individuals entitled to environmental protection. In the perspective of post-modern law, a fundamental right and an opposing public interest may well co-exist if their main elements of contention can be smoothed over. When a dispute opposes norms that are very general in character, for example the free movement of goods against the PP, the court may apply these norms concomitantly. On the other hand, if a court is settling a dispute between two legal rules whose provisions are more precise, it excludes the rule that does not apply to the case before it.¹³²

In order to guarantee the co-existence of conflicting general norms, courts try to balance the interests involved. In particular they are keen to determine, in the light of the proportionality principle, whether the advantages of a contested measure exceed the disadvantages it will cause to the interests or freedoms of third parties. There are numerous examples in the case law. The case law of the Italian Court of cassation provides the most striking evidence of the weighing of antagonistic values:

The Italian Constitution, like other democratic and pluralist contemporary constitutions, requires a continuous and mutual balance between principles and

¹³¹ N de Sadeleer, 'Enforcing EUCHR Principles and Fundamental Rights in Environmental Cases' 81 (2012) *N J of Int'l L* 39–74.

¹³² See the discussion in Chapter 6, Subsection 2.1.

fundamental rights, without that of one of them will prevail over the other. The fact that the values of environment and health protection have been qualified as 'primary' therefore means that such values cannot be sacrificed to the benefit of other interests, should these be constitutionally protected but it does not mean that these values are placed at the top of an absolute hierarchical order. The point of equilibrium, precisely because it is dynamic and not pre-established in advance, must be assessed—by the lawmaker enacting statutes and by the courts reviewing the statutes—according to criteria of proportionality and reasonableness, such as not to allow a sacrifice of their essential core.¹³³

Where this is disproportionate the measure must be nullified in order to protect the interest affected; where the opposite is the case the measure should be confirmed and the resultant limitations on rights and freedoms will have to be tolerated.¹³⁴

The proportionality principle thus allows conflicting interests to co-exist by curbing their potentially extreme elements, should this prove necessary. If a measure appears disproportionate the law-maker may adopt a measure that achieves the same end through less restrictive means. The principle of proportionality is thus specifically intended to arbitrate and settle conflicts by weighing the pursuit of a public objective against the private interests that may be threatened in the process.

Even though the concept of proportionality is not specifically mentioned in the EU Treaties or the ECHR and its Protocols, it has become a general principle of law in those two legal orders. The principle of proportionality is applied widely by the ECtHR and CJEU to assess the validity of limitations imposed by national authorities on basic human rights (as under the ECHR) and fundamental economic freedoms (as under the TFEU).¹³⁵ Furthermore, in some countries (Germany, Belgium) the principle has acquired constitutional status, in that it is applied to control legislative measures; it also plays an important role in administrative law (e.g. *la théorie du bilan* in French administrative law). Finally, it is acquiring a similar status at the international level within the WTO.

While the function of the proportionality principle is easily understood, its modes of application are less clear. As the constitutive elements of the principle are not laid down in statutory provisions their application by various courts is flexible and varies over time. For instance, in the *Shrimp/Turtle* case the WTO Appellate Body (AB) stated that the 'equilibrium' between the commercial interests

¹³³ Cass. it., No. 85, 9 May 2013.

¹³⁴ In Italy, in accordance with the principle of proportionality, precautionary measures interfering with the constitutional freedom of enterprise require a strong objective justification. See S Grassi, 'The Environmental Principles of the EC Treaty as a Legal Basis for Judicial Decisions in the Italian Case Law' in Macrory, *Principles of European Environmental Law* (n 55) 120–1.

¹³⁵ N Emiliou, *The Principle of Proportionality in European Law* (Kluwer Law Int'l, 1996).

of the plaintiffs and the legitimate right of a Member to invoke an exception under Article XX 'is not fixed and unchanging; the line moves as the kind and the shape of the measure at stake vary and as the facts making up specific cases differ'.¹³⁶ The proportionality principle may therefore be applied differently in different contexts. Consequently its content is not easy to categorize for any court system.

It is nevertheless possible to identify three essential stages for its application in the case law of both the ECtHR and the CJEU: suitability, necessity, and the absence of disproportionate character of the measure under review (proportionality *stricto sensu*). A good illustration of this three-pronged approach is found in *Fedesa*, where the Court of justice stated:

The principle of proportionality ... requires that the prohibitory measures are appropriate and necessary in order to attain the objectives legitimately pursued by the legislation in question; when there is a choice between several appropriate measures recourse must be had to the least onerous, and the disadvantages caused must not be *disproportionate* to the aims pursued.¹³⁷

In the following subsections, we consider how each of these tests could evolve under the impetus of the polluter-pays, prevention, and precautionary principles.

5.2.2 First test: suitability of the measure under review

A measure affecting a protected interest (personal freedom, economic freedom) must first demonstrate a causal link to the purpose being pursued, in that it is capable of achieving that object (appropriateness test). So for example the prohibition of hormones in beef in response to scientific uncertainty about their effects must be able to achieve the health protection goals of EU law. A policy measure that would in no way avert the risk it is intended to combat must be considered inadmissible. Thus an export prohibition for a species which is not at risk would not satisfy this first test.¹³⁸

The principles of environment law may clarify the choices made by the lawmaker. Thus the suitability of prohibitive or restrictive measures applying to waste imports and exports must be reviewed against the principle that environmental damage should be rectified at source; according to the case law of the CJEU, this implies that 'it is for each region, commune or other local entity to take appropriate measures to receive, process and dispose of its own wastes'.¹³⁹ In the light of that principle, a prohibition on the import of wastes intended for disposal seems

¹³⁶ *United States—Prohibition of Shrimp and Certain Shrimp Products*, WTO Doc. WT/DS58/AB/R (12 October 1998), para 159.

¹³⁷ Case C-331/88 *Fedesa* [1990] ECR I-4023, para 13.

¹³⁸ Case C-169/89 *Gourmetterie Van den Burg* [1990] ECR I-2143.

¹³⁹ Case C-2/90 *Commission v Belgium* [1992] ECR I-1, para 34.

suitable to achieve the desired objective; this would not necessarily be the case for other goals.

5.2.3. Second test: necessity of the measure under review

In a second stage, the measure affecting a protected interest must prove to be indispensable in achieving the purpose being pursued (necessity test). If it appears that an alternative measure would make it possible to achieve the same goal in a less restrictive manner, the contested measure is not necessary and may thus be challenged. In that case the authority must refrain from action, or replace the contested measure with an alternative measure.

At this stage the proportionality principle involves comparing measures likely to achieve a desired result and accepting the one that gives rise to the fewest disadvantages. This second stage is based on the idea that the least harmful measure should be preferred if it offers the same basic degree of protection. This equates to requiring a demonstration that the measure being challenged cannot be avoided or replaced. As is clear from the following examples, this test is of particular relevance in the GATT/WTO dispute settlement procedure.¹⁴⁰

In the *Gasoline* case, the WTO AB found that an Environmental Protection Agency (EPA) rule to implement the Clean Air Act (CAA) constituted 'unjustifiable discrimination' between national gasoline producers and countries exporting gasoline to the United States and 'a disguised restriction on international trade', because the US had not adequately considered alternative, less trade-restrictive approaches that would have accomplished similar ends.¹⁴¹

There was more than one alternative course of action available to the United States in promulgating regulations implementing the CAA. These included the imposition of statutory baselines without differentiation between domestic and imported gasoline. This approach, if properly implemented, could have avoided any discrimination at all. Among other options open to the United States was to make individual baselines available to foreign refiners as well as domestic refiners.

A national measure can therefore only be considered 'necessary' within the meaning of Article XX(b) of the General Agreement on Tariffs and Trade (GATT) if there were no alternative measures reasonably available that could achieve the aim sought with less impact on international trade.¹⁴²

¹⁴⁰ M Montini, 'The Necessity Principle as an Instrument to Balance Trade and the Protection of the Environment', in F Francioni (ed), *Environment, Human Rights and International Trade* (Hart, 2001) 136–55.

¹⁴¹ *United States—Standards for Reformulated and Conventional Gasoline*, WTO Doc. WT/DS2/AB/R (20 May 1996), 620.

¹⁴² The necessity test is applied to review the exception of GATT, Art XX(b) which refers to national measures 'necessary to protect human, animal or plant life or health'. However, the exception of Art XX(g) relating to the 'conservation of exhaustible natural resources' does not mention a necessity requirement.

In an environmental case involving Article XX(g) of the GATT, the AB found that the US measure protecting sea turtles was valid under the exception set out in paragraph (g): this measure was not disproportionately wide in its scope and reach in relation to the policy objective of protection and conservation of sea turtle species.¹⁴³ The AB rejected the existence of any reasonable alternatives to the Brazilian ban to import used tyres. Accordingly, the ban was deemed to be ‘necessary’ within the meaning of Article XX(b) of the GATT.¹⁴⁴

When considering the Sanitary and Phytosanitary Agreement (SPS Agreement) in the *Japan—Varietals* case, the AB ruled that the complainant must demonstrate that an alternative measure exists: a panel may not merely posit an alternative based on expert advice.¹⁴⁵

In the *Asbestos* case, the AB considered that a French ban on chrysolite asbestos was a necessary high level of protection as ‘controlled use’ of this substance, which consists in taking precautionary measures to avoid the release of fibres, was not a ‘reasonably available alternative’ since its efficacy had not yet been demonstrated.¹⁴⁶ In the earlier *Gasoline* case, ‘necessary’ basically meant ‘the least trade restrictive measure’, while in the more recent case law of the AB the least restrictive test gives way to a sort of reasonableness test.¹⁴⁷

At the US level, *Corrosion Proof Fittings v EPA* is a case in point. The US Court of Appeal for the Fifth Circuit held that by banning asbestos the EPA had failed to adequately consider less burdensome ways to reduce the risk of asbestos exposure, such as labelling products that contain the mineral.¹⁴⁸

At the EU level, the CJEU also favours measures that are the least trade-restrictive. The Court has ruled, for instance, that protection of native crayfish in Germany is better achieved by administrative rules forbidding the release of exotic crayfish into the aquatic environment and the enactment of programmes to save native crayfish populations, rather than by an embargo on all imports of foreign crayfish.¹⁴⁹

While the necessity test occupies a central role in determining proportionality, particularly in the CJEU’s case law, its use is questionable. In some cases the CJEU

¹⁴³ *United States—Shrimp* (n 136), para 141.

¹⁴⁴ *Brazil—Measures Affecting Imports of Retreaded Tyres*, WTO Doc. WT/DS/332/AB/R (17 December 2007).

¹⁴⁵ *Japan—Varietals*, paras 126 and 130.

¹⁴⁶ *EC—Measures Affecting Asbestos and Asbestos-Containing Products*, WTO Doc. WT/D135/AB/R (18 September 2000), para 174.

¹⁴⁷ Montini, ‘The Necessity Principle’ (n 140) 154.

¹⁴⁸ *Corrosion Proof Fittings v EPA*, 947 F.2d 1201, 1224–5 (5th Cir. 1991).

¹⁴⁹ Case C-131/93, *Commission v Germany* [1994] ECR I-3303. Inversely, in a rather similar case (*Maine v Taylor*) the US SCt upheld a state regulation banning the importation of baitfish, which the State of Maine argued threatened native species (477 US 131 (1986)). In this case Maine offered unrefuted evidence that no adequate scientific testing procedures existed to inspect live baitfish before they entered the state (at 147). According to the US SCt, Maine was not required to ‘sit idly by and wait until potentially irreversible environmental damage had occurred or until the scientific community agrees on what disease organisms are or are not dangerous before it acts to avoid such consequences’.

has considered as comparable measures that are not equally useful in protecting the environment.¹⁵⁰ However, the Court did not take into consideration the fact that national authorities had justified their choices by the greater efficiency of the contested measures. One is thus led to wonder whether the CJEU is really qualified to compare widely divergent methods with respect to a desired result when it does not necessarily possess the relevant technical information.

By focusing on the trade hindrance arising from a contested measure, the CJEU effectively favours measures that present less of a hindrance to commercial activities. Weighing the disadvantages of the contested measure against all other possible measures is thus likely to ensure that the most moderate measure will always have an advantage over the most rigorous, to the detriment of the intended goal. This method runs counter to the principle of a high level of environmental protection set out in EU primary law, as well as in a number of national laws. Nonetheless, CJEU case law has been evolving on this point. Thus, in the case of a Swedish ban on trichlorethylene, the CJEU did not carry out a comparative assessment of alternative measures (ecolabels, use limitations, warnings, etc.). It was satisfied with the fact that the Swedish Chemical Inspectorate was pursuing a legitimate interest in phasing out a harmful substance.¹⁵¹

To conclude, the use of the necessity test by courts should be limited to cases where measures exhibit a similar degree of effectiveness. This would make it possible to avoid subjective assessments. Therefore, comparative tests between an environmental measure and a less restrictive measure should clearly be made subject to specific conditions, in order to prevent the court replacing the law-maker.¹⁵²

5.2.4 Third test: absence of disproportionate character of the measure under review

The third stage in establishing proportionality is the requirement that the disadvantages to which a contested measure gives rise do not exceed its advantages *in globo*, despite the fact that a less restrictive measure does not exist. The contested measure is not compared to other measures in this test, but analysed in its own right. At this stage courts are carrying out a balancing test (known as the proportionality test *stricto sensu*) weighing a legitimate public freedom against a specific measure (internal market versus health or environmental protection; free speech versus national security; human rights versus free trade).

¹⁵⁰ de Sadeleer, *EU Environmental Law* (n 52) 313–4.

¹⁵¹ Case C-473/98, *Toolex Alpha AB* (n 46), para 45.

¹⁵² Interestingly, some international conventions already provide a set of specific conditions for correctly comparing various available measures. For instance, under of SPS Agreement, Art 5(6) (footnote 3), a measure must be considered more trade-restrictive than required if there is another SPS measure which (i) is reasonably available, taking into account technical and economic feasibility; (ii) achieves the Member's appropriate level of protection; and (iii) is significantly less restrictive to trade than the SPS measure contested. Thus a contested national measure can be nullified only if an alternative measure fulfils all these requirements.

Needless to say, this last test is the most controversial of the three. Assessment of the proportionate or disproportionate character of a measure may, at this final stage, take on a subjective character. Consequently, by clarifying the elements involved in conflicts of interest, the proportionality principle transforms the court into a true arbitrator with a considerable margin of discretion to decide between the interest underlying the restraining measure and the rights and freedoms affected by that measure. In this way the proportionality principle could have an extremely serious impact on environmental policy.

The third test plays an important role in verifying the conformity of national measures under GATT provisions. Although the US measure protecting sea turtles served a legitimate interest under Article XX(g) of the GATT, the AB must still submit it to a proportionality test *stricto sensu*. According to the *chapeau* of Article XX, the environmental measure cannot be applied ‘in a manner which would constitute a means of arbitrary or unjustifiable discrimination ... or a disguised restriction on international trade’. In the AB’s view, the task of applying the *chapeau* is essentially:

a delicate one of locating and marking out a line of equilibrium between the right of a Member to invoke an exception under Article XX and the right of the other Members under varying substantive provisions of the GATT 1994, so that neither of the competing rights will cancel out the other and thereby distort and nullify or impair the balance of rights and obligations constructed by the Members themselves in that Agreement.¹⁵³

In other words, an ‘equilibrium’ must be found between conflicting interests. In the *Shrimp/Turtle* case, the AB concluded that the US measure was unjustifiable because an alternative course of action was reasonably open to it. The measure would have been more acceptable had it been agreed on multilaterally, and not resulted from unilateral measures to ban shrimp imports (e.g. ‘the heaviest weapon of a Member’s armoury of trade measures’).¹⁵⁴ In other words, the measure is disproportionate even if unilateral trade measures represent the most effective practical means to protect a global resource (sea turtles) and to remove the incentive of access to a large market for those States that fail to protect that resource.¹⁵⁵

This test, which is little used by the CJEU, is important in the case law of the ECtHR, as well as in the case law of several national courts.¹⁵⁶ Examples are varied, in the context of basic rights as well as that of fundamental economic freedoms.

¹⁵³ United States—*Shrimp* (n 136), para 159.

¹⁵⁴ *Ibid*, para 171. See, however, the more nuanced appreciation of the AB in its Report of 22 October 2001, WT/DS558/AB/RW, para 134.

¹⁵⁵ J Cameron, ‘Dispute Settlement and Conflicting Trade and Environment Regimes’, in P Demaret et al (ed), *Trade and the Environment: Bridging the Gap* (Cameron May, 1998) 22.

¹⁵⁶ While the tripartite test has received some support in the Opinions of AG Van Gerven, in practice the CJEU does not distinguish between the second and third tests. See T Tridimas, ‘Proportionality in

For instance, the injunction that prevented a Swiss journalist from making statements about the dangers of microwave ovens—a highly controversial subject from a scientific point of view—was deemed unacceptable by the ECtHR because it affected the very essence of freedom of speech.¹⁵⁷ In that case, contributing to the public debate about the possible hazards of a new technology weighed more heavily than the economic interests of the companies producing the technology, especially as there was no evidence that the sale of microwave ovens had been affected by the journalist's criticisms.

Mere reference to the economic benefits of the measure should not be sufficient to outweigh fundamental rights such as the right to respect for private and family lives. For instance, in the case of *Hatton and Others v the United Kingdom* the ECtHR judged that, 'despite the margin of appreciation' left to the British authorities, the State had failed to strike a fair balance between the UK's economic wellbeing (night flights at Heathrow Airport) and the applicants' effective enjoyment of their right to respect for their homes and their private and family lives; 'mere reference to the economic well-being of the country is not sufficient to outweigh the rights of others'. In weighing the competing interests, the State must approach the environmental problem with due diligence and give consideration to all the competing interests. The onus is on the State 'to justify, using detailed and rigorous data, a situation in which certain individuals bear a heavy burden on behalf of the rest of the community'.¹⁵⁸

According to a narrow proportionality approach, the State's margin of appreciation will be more limited where any standards or policies that have been adopted by the State have not been properly applied. In the *Cordella* judgment of 24 January 2019, the failure by local authorities to act when confronted with concerns associated with the impact of production by the company Ilva on the Italian city of Taranto was relied on by the Court.¹⁵⁹ It held that 'the Italian authorities have not been able to strike a suitable balance between the applicants' interest in ensuring that serious harm to the environment that could affect their wellbeing and private life do not occur and the interest of the company overall'.¹⁶⁰

Similar balancing of interests may be found in challenges concerning economic freedoms, particularly as regards the application of Article 36 of the TFEU. For instance, AG Van Gerven considered that the Dutch law prohibiting trade in Scottish grouse, which may legally be shot in the United Kingdom, was disproportionate

Community Law: Searching for the Appropriate Standard of Scrutiny', in E Ellis (ed), *The Principle of Proportionality in the Laws of Europe* (Hart, 1999) 66. On the other hand, the ECtHR directly tackles the third test.

¹⁵⁷ *Hertel v Switzerland*, 25 August 1998, Reports 1998-IV.

¹⁵⁸ *Fadeyeva v Russia*, 55723/00, 9 June 2005, para 126.

¹⁵⁹ *Cordella v Italy*, 54414/13 and 54264/15, 24 January 2019, para 172.

¹⁶⁰ *Ibid*, paras 173–4.

given the measure's minimal contribution to achieving the objective of conserving a species of bird in no danger of extinction.¹⁶¹ In that case, marketing of the species overrode the benefits of the Dutch trade prohibition. In the *Danish Bottles* case, AG Gordon Slynn clearly endorsed the third test: 'There has to be a balancing of interests between the free movement of goods and environmental protection, even if in achieving the balance the high standard of the protection sought has to be reduced. The level of protection sought must be a reasonable level ...'¹⁶² In the majority of food safety and chemical cases, the plaintiffs argue that the prohibition in question entails considerable financial losses on their part in relation to the alleged benefits accruing to the general interest.¹⁶³ However, it is settled case law that the precautionary approach, taken to protect human health, weighs more heavily than the traders' economic interests. Indeed, the health and life of humans 'rank foremost among the assets and interests protected by the Treaty'¹⁶⁴ and public health protection 'must take precedence over economic considerations.'¹⁶⁵ This case law must be endorsed. While it is possible to calculate the financial losses that economic operators will suffer as a result of an environmental protection measure, since these losses are expressed in monetary terms, it is much more difficult to evaluate the benefits resulting from such a measure. What economic value can be assigned to the conservation of natural resources, the health of the environment, or the quality of life?

A number of lessons can be drawn from these different cases. First, in order to avoid too great a degree of subjectivity on the part of the courts, the interests that are to be weighed against each other should be inventoried. In other words, the court should clearly identify the interests that are in conflict, determine whether they are legitimate, and establish a hierarchy among them according to the legislative options available and the public policy principles at stake.¹⁶⁶ This is clearly the path followed by the Swiss Federal Tribunal.¹⁶⁷

Secondly, the fact that a mathematical weighing cannot be carried out does not mean that the legal system may not indicate its preferences through directing principles set out in framework legislation however.¹⁶⁸ For instance, the directing principles of environmental law may express an abstract preference in favour of greater environmental protection. Thus, Swiss law shows a marked abstract preference favouring forests against conflicting interests: for a road to be allowed to

¹⁶¹ Case C-169/89 *Gourmetterie Van den Burg* [1990] ECR I-2143.

¹⁶² AG G Slynn Opinion of 24 May 1988, Case 302/86, *Commission v Denmark* [1988] ECR I-46.

¹⁶³ Case C-331/88 *Fedesa* [1990] ECR I-4023.

¹⁶⁴ Case C-108/09 *Ker-Optika* [2010] ECR I-12213, para 58.

¹⁶⁵ Case C-183/95 *Affish* [1997] ECR I-4315, paras 43 and 57.

¹⁶⁶ W Van Gerven, 'The Effect of Proportionality on the Actions of Member States of the European Community: National Viewpoint from Continental Europe' in Ellis, *The Principle of Proportionality in the Laws of Europe* (n 156), 37.58.

¹⁶⁷ Ch-A Morand, 'Pesée des intérêts et décisions complexes' in Ch-A Morand (ed), *La pesée globale des intérêts* (Helbing and Lichtenhahn, 1996) 41.

¹⁶⁸ *Ibid.*, 68–9.

pass through a forest, a particularly strong interest must justify carrying out the project.¹⁶⁹ Various arguments favour according greater importance to environmental protection or public health when weighing interests by bringing directing principles into play. First, in some cases directing principles may be considered to represent an irreducible core of values that leads the court to exclude the weighing of interests. Such is the case when a measure intended to protect extremely rare ecosystems or endangered species comes into conflict with other interests. In the decision in *TVA v Hill*, the US SCt judged that a principle of conservation provided no basis upon which to compare the worth of an endemic species of incalculable value with the economic loss that would result from halting the construction of a dam, since Congress had recognized the intrinsic value of endangered species.¹⁷⁰ Similarly, in the *Leybucht* case the CJEU ruled that only a prevailing public interest, such as the protection of persons against floods, can override the nature protection interest in a special protection area for water birds.¹⁷¹

Thirdly, a further fundamental value is represented by the PP when public health is in question: an interest closely related to environmental protection. Many environmental protection measures aim to protect 'public health'¹⁷² and can be justified on the basis of that objective. Thus the EU's courts rule that restrictive food safety measures must inevitably take precedence over the economic interests of the traders.¹⁷³ US case law takes a slightly more nuanced view of public health protection requirements. In the 1987 *Vinyl* case the Federal Court of Appeal for the District of Columbia judged that emission standards for hazardous air pollutants should reduce the risk of death or serious irreversible illness to a minimum; any further reduction of risks, however, would be subject to risk-benefit analysis.¹⁷⁴

Fourthly, the needs of future generations, represented by the PP, should carry as much weight as the immediate present when balancing interests. The Belgian Constitutional Court decision in a case involving the closure of gravel works underlines how a constitutional court may weigh specific legal measures against injurious activities even in the absence of irrefutable scientific proof concerning the effects of the activities in question on the aquatic environment. It is always possible to reconsider a closure if it eventually becomes clear that such a measure is excessive, while maintaining high-risk activities could lead to irreversible damage in the long term.¹⁷⁵

¹⁶⁹ Swiss Federal Forest Code, Art 5.

¹⁷⁰ *Tennessee Valley Authority v Hill* 437 US 153 (DC Cir. 1978). See Chapter 3, Subsection 3.4.5.

¹⁷¹ Case C-56/90 *Leybucht* [1996] ECR I-883, para 22.

¹⁷² By way of illustration, taking regulatory actions to minimize the adverse effects of waste tyres aims at improving public health. See Brazil—*Retreaded Tyres* (n 144).

¹⁷³ Case C-180/96 *UK v Commission* [1996] ECR I-3903, para 90; Case T-76/96P, *N.F.U.* [1996] ECR II-815, paras 103 and 104.

¹⁷⁴ *NRDC v US EPA*, 824 F.2d (DC Cir. 1987), 1163. See the discussion in Chapter 3, Subsection 5.3.3.4.

¹⁷⁵ Bg CCt, 25 April 1995, no. 35/95.

Last but not least, one may argue that at the international level environmental interests should weigh more heavily than they usually do. In effect, environmental concerns relate to a core of public policy values pursued by the international community as a whole, and encompassing not only fundamental human rights but also the protection of global environmental resources that constitute a common concern for humankind.

5.2.5 Critical assessment

In conclusion, directing principles of environmental law such as the polluter-pays, prevention, and precautionary principles, should draw attention to the suitability, necessity, and proportionality *stricto sensu* of an environmental protection measure whose validity is contested.

First, the relevance of the measure should be assessed in the light of its underlying principles rather than merely in relation to the disadvantages that third parties will suffer. Secondly, the weight of the interest—or proportionality *stricto sensu*—demands rigour and method: all relevant conflicting interests should be set out, balanced, and weighed. Failing a method that makes it possible to correctly assess and weigh the relevant interests, courts should turn to abstract preferences drawn from principles. Furthermore, the environmental protection goal or health standard chosen by a party should not itself come under scrutiny.

By shedding new light on an environmental measure when it comes into conflict with intersecting interests, the environmental principles that we have analysed may serve to tilt the scales more strongly in the direction of environmental protection.

6. Concluding observations

We may ask ourselves whether there is any point establishing principles in normative texts, since environment law already suffers from chronic non-compliance. By legislating through principles rather than binding norms, is the law-maker not merely admitting that they are incapable of tackling ecological challenges? Would it not be better to consider reinforcing the effectiveness of existing laws rather than proclaiming principles that we then take care not to apply?

In response to these questions we have emphasized the multiple functions that principles can assume within environmental law. We demonstrated in Part I that three principles—the polluter-pays, prevention, and precautionary principles—have given rise to significant transformations in whole areas of environmental law; furthermore, we have explained in this chapter that their role is not confined to triggering timely reforms on very precise points of law. Beyond their influence on certain institutions (liability, taxation, etc.) or mechanisms (RA, EIA, etc.) directing principles of environmental law are able to affect the functioning of environmental law as a whole.

In Section 2 of this chapter we saw how those principles play an essential role in fashioning the internal structure and organization of environment law when applied to institutional actors. They gather fragmented rules into a coherent whole, renew institutions, and refine legal techniques. They thereby give solidity to a legal discipline that is still seeking an identity. The momentum they provide will add the dimension needed to develop a fully fledged branch of law. This aspiration to greater coherence is very much a modern law concern.

In Section 3 of this chapter we identified the functions that most strongly characterize post-modern law. First, in regulating the functioning of environment law, these principles have a reforming rather than a stabilizing effect. Their influence over the various powers of the State is immediate: they guide the conceptual work of the law-maker and the enforcement function of subordinate authorities in a dynamic fashion. Their inclusion in normative texts may lead, by the interposition of flexible concepts, to a more supple application of a law that is often criticized as too rigid. By legislating through such indeterminate norms, the law-maker grants the executive and the administration wide powers to evaluate the respective weights of conflicting interests. As they are not adaptable, in the words of Dworkin, to an 'all or nothing' form of application, these guiding principles provide direction in determining dominant values. They are sufficiently flexible to adapt to changing circumstances and to render overly rigid rules more tractable. Principles allow the legislator to achieve economies of means, thus replacing a pointillist regulatory technique that finds expression through a multitude of detailed rules. Such flexibility has the added advantage of making it easier to adapt rules to changing circumstances, ensuring for the principles the type of sustained use that more precise and complete rules no longer enjoy; being malleable, principles do not need to be formally modified when circumstances change.

In Section 4 of this chapter we saw that if these principles are to stimulate public policies, they should be co-ordinated with another norm whose substance is not yet clearly defined: that is, the constitutional right to protection of the environment, which also requires public authorities to act to protect the environment. It is not merely the obligations of the public authorities under such law that are clarified by the polluter-pays, prevention, and precautionary directing principles; these also serve as a source of inspiration for the procedural rights granted in the areas of information, participation, and access to justice.

In Section 5 we saw that the polluter-pays, preventive, and precautionary principles may play a determining role in balancing interests—an activity which plays an important part in post-modern law—by helping courts to understand the specific value of environmental protection measures in the context of proportionality testing; this will increase the importance of such measures when conflicting interests are being balanced.

As shown by the perspectives considered above, the transformations brought about by these three directing principles of environmental law are not timely and

local but also continuous and global. These principles are not abstract and isolated; they serve to integrate a series of normative processes that are in their present form necessary but insufficient. By promoting reforms, calling for change, and freeing courts from the constraint of an overly literal interpretation of texts they set environment law in motion. In this way they symbolize the subtle transition from modern to post-modern law.

The Legal Status of the Directing Principles of Environmental Law: From Political Slogans to Normative Principles

1. Introductory remarks

Like most legal disciplines, environmental law produces principles in order to affirm its specificity. Indeed, there is such an abundance of principles in this discipline that one is forced to wonder whether, given the relative lack of rigour of the approach, the law-makers and doctrine will end up misusing them.

Despite the success of the polluter-pays, prevention, and precautionary principles in international and European Union (EU) law as well as national environmental laws, neither doctrine nor case law has succeeded in clearing up the mystery of their legal status. How should we class these three principles? Do they display the characteristics that typify normative principles? Are we dealing with complete rules? Are they sufficiently precise to allow legal effects to be deduced? Do they call for the adoption of more precise rules? Are principles merging with rules? These questions do not permit clear-cut answers. Whether it is a matter of their origin, their formulation, or their place in the hierarchy of norms, the directing principles of environmental law constitute a theoretical challenge to any effort at classification. On one hand their normative character is likely to vary as a function of the legal system in which they are being applied. On the other hand the heterogeneity of the functions these principles are supposed to fulfil—described in the preceding chapter—only add to the confusion: inspiring the law-maker and guiding positive law, filling gaps, resolving conflicts for some, and operating as a standard of judicial review for others.

Our attempt to elucidate the legal nature of the directing principles of environmental law consists first in recalling, at the level of legal theory, what distinguishes a principle from other rules (Section 2). We must then verify, this time at the level of the international, EU, and national legal orders, under what conditions these three principles are apt to assume an autonomous normative value (Section 3) in order to analyse their potential in administrative, civil, and criminal proceedings (Section 4).

Notwithstanding the theoretical character of this approach, inevitable given the diversity of legal systems considered in this work, we put forward the practical effects of each choice of classification proposed.

2. Principles and rules of indeterminate content

2.1 The polysemous notion of principle

Despite its long-standing popularity with jurists, the term ‘principle’ remains controversial as a result of its multiple meanings. Indeed, the concept of principle is polysemous and its meaning is likely to vary according to the legal culture. The concept evokes different meanings depending on the legal system in which it is placed. By turn used to indicate the essential characteristics of legal institutions (descriptive principles), to designate fundamental legal norms (basic principles), or to fill gaps in positive law by assigning a constitutional or legal value to rules which are not yet formally set out in written sources of law although they are considered essential (general principles of law), the notion of principle is closely linked to the classification of legal sources. Several factors obscure their nature and legal effect, however. First, the term ‘principle’ serves as a rubric for both high-level rules that set out the foundations or main objectives of the rule of law (e.g. the principles of equality and of legal certainty) and rules of legal technique (e.g. the principle of proportionality). An additional problem is that principles have extremely diverse origins. They are sometimes expressly stated in fundamental legal texts (constitutions and basic laws), and can also be hidden in more concrete rules, losing their abstractness. They may also be the product of a purely judicial construction (as is the case for the principles set out by the Court of Justice of the European Union (CJEU) and the European Court of Human Rights (ECtHR), constitutional courts, and administrative supreme courts). The latter situation gives rise to some confusion about the role of judges, who do not have the power in continental legal systems to create legal norms.¹ Their main function is confined to settling disputes by applying the constitutional, legislative, and regulatory norms at their disposal, not to produce legal rules.

In Part I of this book, we illustrated how environmental principles have been enunciated and implemented from legal systems belonging to both the common law and civil law families. In a nutshell, States from the civil law family adhere largely to statute law whilst States from the common law family also recognize judge-made law as binding. This distinction has significant consequences for the concept of principles in both families. Common law lawyers do not generally take

¹ See French C. civ., Art 5.

legal principles as their starting point, but proceed by reference to specific cases. Conversely, lawyers from the civil law family tend to start with principles before focusing on the specific circumstances of the individual case.

Nevertheless, legal principles have been shaped by courts through an inductive process in both legal families. However, a fundamental distinction must be drawn. Within the civil law family, general principles of law are created first by councils of state, secondly by the supreme courts (such as courts of cassation), and thirdly by constitutional courts when reviewing legislative, regulatory, and administrative measures impinging on the rights of legal subjects. The two key European international courts, the CJEU and the ECtHR, have followed that trend in proclaiming similar general principles of law. As a result, authorities are bound by general principles such as legal certainty, legitimate expectations, sound administration, equality and non-discrimination, and proportionality. Often, these principles are not embodied in statute law. Any regulatory measure that breaches one of these principles can be annulled.

Under the common law, courts also create principles through an inductive process. Instead of a cluster of general principles of law, three categories of principles have been emerging: principles of equity (various maxims of equity, such as 'Equity will not assist a volunteer' or 'He who comes to equity must have clean hands'), principles of statutory interpretation (for example, the principle of legality), and principles of common law. The latter type can be either substantive (estoppel, good faith, or abuse of rights; the effect of error; the obligation to make reparation for wrongs) or procedural (natural justice; *audi alteram partem*; *nemo iudex in causa sua*). Many of these principles are akin to maxims from the civil law family. With the exception of the principle of legality, most of these principles are not binding on secondary legislators or administrative authorities but serve the purpose of improving justice.

However, this distinction between civil and common law principles is somewhat blurred. Under the influence of EU law and the European Convention on Human Rights (ECHR), some common law jurisdictions (such as the United Kingdom and Ireland) have borrowed general principles of law, such as the principles of legitimate expectations and proportionality, from international jurisdictions.

It is also necessary to highlight other singular features. Having proclaimed several dozen general principles since the 1960s, courts from the civil law family have attempted to fill statutory gaps in order to provide coherence to their domestic legal order. This motivation does not operate within the common law family, which is focused on statutory interpretation, and can indeed operate without statutes. Therefore, there is no propensity to enhance coherence within the common law. Another core difference is that, in common law systems, statutes can override precedent and the principles they embody (with the exception of the principle of legality which, as a common law principle of interpretation, is meant to protect traditional rights and freedoms against statutory encroachment) whilst general

principles of law in the civil law family are often above statute law. Accordingly, legislation may be struck down by a constitutional court on the grounds that it is disproportionate or violates the principle of legal certainty.

By recourse to the teachings of the general theory of law, we attempt to clarify the status of environmental law principles. We first set out what distinguishes these principles from legal rules (Subsection 2.1) in order to put forward a new concept: that of rules of indeterminate content (Subsection 2.2). These are abstract models, which will become more nuanced through practical application (Subsection 2.3).

2.2 Theoretical distinction between principles and rules

The distinction between principles and rules has given rise to an important discussion within the general theory of law, whose main lines may constitute early signposts for resolving the problem of the legal status of environmental law principles.² We first recall the analyses carried out by Dworkin,³ who used principles to counter certain positivist theories, in particular those developed by Hart.⁴

According to Dworkin, a rule sets out a precise solution for specific facts. Once its conditions of application have been fulfilled it leads directly to a legal solution. By contrast, a principle is a legal proposal which does not necessarily exist in written form and which provides the general orientation and direction to which positive law must conform. The direction it points at is a desirable direction because of ‘justice, fairness or some other dimension of morality.’⁵ It is not applicable in an all-or-nothing fashion, but is limited to providing the court with a reason that argues in favour of a particular solution, but without constituting a binding norm.⁶ Thus, exaggerating somewhat, we may qualify the rules as ‘little dictators’ while principles are merely ‘counsellors’ since they do not produce immediate legal consequences.

As a result, principles allow a great deal more discretion to their interpreters than rules do, which are naturally less subject to interpretation. Principles are therefore ‘flexible instruments of action’, which can be adapted and manipulated to suit the specific situations to which they are being applied, while rules are a great deal more rigid. This first distinction, according to Dworkin, implies a second. Principles have a dimension absent in rules of positive law: they have variable weight, which rules do not have.⁷ They can therefore withstand contradictions, whereas rules

² For a standard definition of what should properly be called ‘legal rule’, see LA Hart, *The Concept of Law* (Clarendon, 1961) 8–12, 27–32, 38–4, 97 *et seq.*

³ R Dworkin, *Taking Rights Seriously* (Harvard UP, 1977) 35.

⁴ Hart, *The Concept of Law* (n 2) 89–96.

⁵ Dworkin, *Taking Rights Seriously* (n 3) 22.

⁶ *Ibid.*, 24.

⁷ *Ibid.*, 26.

offer no possibility of compromise. When several principles are in conflict a judge allows themselves to be guided by the one they believe to have the greatest weight. Such balancing is not possible among rules, which either apply or do not apply in a specific case.

This thesis has been the subject of many critiques, among them by Raz, who observed that competing legal rules are likely to apply to a single situation and that conflicts may consequently break out among rules of positive law.⁸ Raz believes, moreover, that while principles may be characterized by weight, the same may be said of rules, since some of these (e.g. those relating to public policy) are likely to carry more weight than others. Raz concludes from this that principles could more clearly be identified by recourse to the degree of abstraction of a norm. In that regard, he notes that principles give rise to indeterminate actions while rules determine specific actions. The distinction would thus be one of degree rather than nature. Moreover, according to Raz, principles are able to incorporate a number of values into the legal system that rules of law may not recognize as such. The sharp distinction between principles and rules that looms so large in the work of Dworkin should thus be strongly nuanced. That being said, these controversies do not obliterate the fact that legal principles have to be considered as norms of a higher moral character than rules.⁹

2.3 Nuancing the distinction between principles and legal rules: the emergence of rules of indeterminate content

Many scholars have relied on Dworkin's dichotomy to address the legal status of the environmental principles.¹⁰ We may ask whether these authors are not exaggerating the difference between principles and rules. Is it in fact reasonable to want to distinguish directing principles of environmental law from other rules at all costs? The distinction developed by Dworkin in any case does not take into account one of the main characteristics of post-modern law: the declaration of legal principles in public policy. As policies become more targeted an intermediate category has arisen: that of rules of an indeterminate nature, which may be set against rules of complete and precise content.¹¹ The polluter-pays, prevention, and precautionary principles of environment law illustrate the emergence of such rules, which weaken the dichotomy put forward by Dworkin.

⁸ J Raz, 'Legal Principles and the Limits of the Law' (1972) Yale LJ 823.

⁹ J Verschuuren, *Principles of Environmental Law* (Nomos, 2003) 15, 34. According to this author, their high moral value stems from underlying ideals.

¹⁰ For a summary of the literature, see E Scotford, *Environmental Principles and the Evolution of Environmental Law* (Hart, 2017) 76–7.

¹¹ We note, however, that this distinction is rather abstract, for a legal rule is in fact never intended to be completely final; each of its applications makes it more precise, polishes it, provides shades of meaning, and indeed transforms it.

Rules of determinate content are endowed with unequivocal meaning owing to their degree of precision. The cases they regulate are precisely determined, thanks to the rigour of legal terms, which makes it possible to narrow down the multiple meanings of ordinary language.¹² Their degree of precision allows them to regulate, prohibit, or authorize types of behaviour by reducing the risk of interpretation, and thence of contention, as regards their application. By giving rise to predictability—that is the ability to deduce an infinite number of similar solutions from a single norm—they guarantee legal certainty. Environmental law is essentially composed of rules formulated with a high degree of precision. Product and emission standards all strictly establish the thresholds that producers or operators must respect under the pain of criminal or administrative sanction; none of these rules allows those to whom they are addressed any choice other than full compliance.

Rules of determinate content constrain because they permit no latitude concerning their application; those of indeterminate content are more flexible. Their degree of abstraction is so great that it is not possible to deduce obligations from them with the same degree of certainty that can be assumed when considering rules of determinate content. Consequently, they cannot constrain those to whom they are addressed to adopt or avoid one or another type of behaviour in the same way as rules of determinate content. They always retain a wide margin of interpretation to ensure their implementation. International law, for instance, is loaded with expressions that are of indeterminate content.¹³

Having been conceived in order to regulate situations that are both complex and heterogeneous, most guiding principles of environmental law are far more general and abstract than other rules. Thus, for example, one might refer to the 'principle' of preventing transboundary harm, but to the 'obligation' or the 'rule' that requires an Environmental Impact Assessment (EIA) to be carried out for a project that has been listed or that exceeds specific thresholds. The analysis in Part I of this book has highlighted that particular feature. It soon becomes apparent that the PPP is able to encompass legal regimes as different as those governing State aid for enterprises, eco-taxation, and strict liability for damages caused by pollution. Similarly, the preventive principle does not determine the degree of constraint imposed by a policy measure or the time when it should enter into force, and also does not specify its addressees. All such questions are left to the discretion of the public authorities. Indeed, it is in the nature of these principles to leave a broad margin of manoeuvre to the bodies charged with implementing them.¹⁴ The directing principles could not in any case be confined within a complete and final definition: this

¹² A Jeammaud, 'La règle de droit comme modèle' 28 (1990) D. 207.

¹³ M Koskenniemi, *From Apology to Utopia: The Structure of International Legal Argument* (Lakimiestliiton Kustannus, 1989) 22–3.

¹⁴ Case C-379/92 *Peralta* [1994] ECR I-3453, para 58.

would have the effect of imposing limits on their meaning and preventing them from evolving in order to address new contingencies.

In every legal order there is indeed a tension between certainty and flexibility. The virtues associated with rules of determinate content are certainty and uniformity; they thus provide legal certainty. However, given their rigidity they may not be able to adjust to new developments. The virtues of rules of indeterminate content, such as a principle, are their open-endedness and flexibility allowing them to evolve across different normative contexts.¹⁵ However, their vagueness and indeterminacy undermine their legal effects.¹⁶ As a result, the contours of legal principles as indeterminate rules of law are by and large contingent upon a broader regulatory context.¹⁷

Under environmental law the distinction between general or directing principles of environmental law and rules with determinate content may be illustrated by the following example. When a measure requires importers of waste to deliver it to duly authorized installations for treatment, it is laying down a categorical instruction. The administration will be obliged to verify whether the waste comprising each imported batch has in fact been issued to an authorized enterprise; it will not enjoy any discretion. The situation is quite different when a measure provides that imports and exports of household waste should be governed by the principles of self-sufficiency and proximity.¹⁸ These two principles are only weakly specific; they do not stipulate the minimum distance between the site where waste was produced and the disposal installation, or set a capacity threshold for installations that receive shipments of waste. The lack of precision within the terms 'self-sufficiency' and 'proximity' leaves administrative authorities considerable discretion in determining what transfers may be authorized, thereby allowing them to apply the two principles in different ways depending on the specific individual circumstances. Nonetheless, administrative authorities must abide by these principles and cannot fail to check whether waste transfers are covering too great a distance, thus threatening to overwhelm available treatment capacity.

In the same way, authorities are not required to prohibit an activity in the name of the precautionary principle (PP) if such a measure would prove to be disproportionate. They may decide not to apply a principle in a specific individual case by clearly setting out the reasons for that choice. By contrast, more specific provisions on soil or water pollution provide for the automatic cessation of polluting activities

¹⁵ Scottford, *Environmental Principles* (n 10) 78.

¹⁶ See P Schalg, 'Rules and Standards' (1985) *UCLA Law Review* 379–430.

¹⁷ O Pedersen, 'From Abundance to Indeterminacy: The Precautionary Principle and its Two Camps of Custom' (2014) *TEL* 3.

¹⁸ Basel Convention, Preamble; Waste FD, Art 16; Regulation 1013/2006 on shipments of waste, Art 11(1)(a) and (g). See Moritz Reese, 'The Proximity Principle', in L Krämer and E Orlando (eds), *Principles of Environmental Law* (E Elgar, 2018) 219.

once discharge standards have been exceeded. The authorities do not have any discretion not to apply such provisions.

2.4 Nuancing the distinction between rules of indeterminate content and those of determinate content

An overly clear distinction between the polluter-pays, prevention, and precautionary principles and the other rules that make up environment law risks disturbing the often subtle relationship that unites the two. The connection between them should be understood less in terms of opposition than of gradation, in that each of these principles presents varying degrees of precision and thereby more closely resembles or further differs from the model of a rule of determinate content.

A great number of rules show a level of abstraction similar to those of the principles. In so doing, they leave the administration and the courts much room for manoeuvre. This is the case in particular under the law on listed installations, where statutes refer to standards such as best available technologies (BAT).¹⁹

In this way a constitutional right formulated in very general terms (the right to a healthy environment) may take on a more specific form through a gradual series of modifications, each being more precise than the last. It may be applied first as a principle set out in framework legislation (the preventive principle), and then subsequently as a subsidiary principle laid down in sectoral legislation (the principle requiring the use of BAT), and finally reappear in an individual decision in the form of a legal rule that is complete and precise (the licensing requirement to use a specified technology under certain specific circumstances). These successive steps gradually make a principle more normative: the more precisely and completely a legal norm is drafted, the more easily it can be applied to a particular case. That said, the general nature of principles implies that subsidiary principles, followed also by even more precise rules, render their use more concrete.

3. The autonomous normative value of environmental law principles

3.1 The centrality of autonomy

For some authors the principles of environmental law are nothing more than political principles intended to guide legislative and regulatory action.²⁰ Thus, absent

¹⁹ G Martin, 'Principles and Rules' in Krämer and Orlando, *Principles of Environmental Law* (n 18) 17.

²⁰ L Krämer, 'General Principles of Community Environmental Law and their Translation into Secondary Law' 3:4 (1999) L & EA 361, according to whom 'General principles constitute rather

any specific legal or regulatory application providing support for them, principles lack any immediate and autonomous applicability. If the law-maker decides to ignore them, litigants cannot invoke them. However, that interpretation does not take account of the fact that the term 'principle' is often associated with the term 'rule.' This is of course a redundant distinction where a general principle has normative status. The question then arises as to whether, in the context of international, EU, and national legal systems, environmental law principles such as the polluter-pays, prevention, and precautionary principles can be applied directly in the absence of specific regulations, or whether they merely constitute interpretive rules for such regulations. In other words, are those principles directly applicable or do they need additional action to be taken by the legislator in order to render them operative through more specific rules? If they are true and self-standing normative principles, they may be directly invoked by State authorities or by individuals before the courts. Everything hinges on the answer to this question.

At present in many legal orders neither legal texts, doctrine, nor court practice is able to supply a definitive response to the questions raised above.²¹ It is nevertheless possible to fix a certain number of markers to guide our interpretation of the legal status of these principles. There can be no legal norm, and hence no normative principle, when language is purely descriptive or amounts to a narrative. An optimal degree of precision is indispensable if a legal provision is to fulfil its function. Whether it proscribes, prohibits, enjoins, permits, or provides, a legal provision exists in order to dictate particular behaviour in a sufficiently precise and unequivocal manner.

Environment law is particularly vulnerable to this 'optimal degree of precision'. The field is constantly veering between extremely vaguely formulated provisions and provisions of excessive stringency: at times rules are set out in exaggerated detail and are thus always under threat of being outpaced by changes in the context of their application as set out in regulations; at other times rules are so vague that it is difficult to know where they could be applicable.

The prevention, precautionary, and polluter-pays principles are *directing principles*: principles that guide and constrain the actions of public authorities. They attempt to cope with this twofold risk by giving rise to a quantity of more precise and binding rules.²² In order to assume an autonomous character and to bind those to whom they are addressed, they must fulfil two conditions: first, they must

leitmotivs, guiding principles, than legal provisions'. Other critics have argued that principles such as the PP are too elusive to be binding. See, e.g., L Gundling, 'The Status in International Law of the Precautionary Principle' 23 (1990) *Int'l J Estuarine & Coastal L* 25.

²¹ However, in several European civil law countries constitutional review (in France) or a review of the legality of a principle, such as the PP, is not controversial. Indeed, constitutional and administrative courts review laws and regulations with reference to this principle. See Subsections 3.4.2.2. and 4.1.

²² See the discussion in Chapter 4.

appear in a normative text (formal approach); and secondly, they must be formulated in a sufficiently prescriptive manner (substantive approach). The former approach confers upon the principle an obligatory character whilst the later deals with the essence of the obligation stemming from the principle. Using this twofold approach, we attempt to verify the autonomous character of these three principles in three distinct legal spheres.

3.2 International law

Specific features of international environmental law (IEL) make this discipline a particularly fertile ground for the development of principles. In effect, general principles may be crystallized into customary rules, enunciated in soft-law instruments, codified in framework conventions, and incorporated into the Article 38(1) category of general principles.²³ As the *Iron Rhine* arbitral tribunal recognized, ‘there is considerable debate as to what, within the field of environmental law, constitutes “rules or “principles”; what is “soft law”; and which environmental treaty law or principles have contributed to of customary international law’.²⁴ As a result, the precise legal status of these principles is the object of considerable uncertainty and disagreement.²⁵

There are three aspects to the question of the legal value of the principles of environmental law we have analysed. First, we must consider their status when they are set out in soft-law texts (Subsection 3.2.1). Secondly, we must verify that they can be regarded as part of so-called hard law, which imposes mandatory obligations on States, when they are affirmed by multilateral environmental agreements (MEAs) (Subsection 3.2.2).²⁶ Finally, we must ask whether the PP may not be accorded the status of customary law, based on its constant reiteration in normative texts and its subsequent practical implementation (Subsection 3.2.3). We are aware that our systematization of sources may appear too narrow with respect to the diversity of sources of IEL in a divided and multicultural world.²⁷

²³ In imposing a duty of care on the Dutch authorities under ECHR, Arts 2 (right to life) and 8 (right to privacy and family life) for the inadequacy of measures to reduce GHG emissions in the Netherlands, the Dutch *Hoge Raad* relied not only on ECtHR case law but also on the UNFCCC, the customary principle of no harm, as well as non-binding international and EU climate policy instruments. See *Urgenda*, 19/00135 [2019] HR: 2019: 2006

²⁴ *Iron Rhine Railway (Belgium v Netherlands)* PCA [2005] 27 RIAA, para 58.

²⁵ L Paradell-Trius, ‘Principles of International Environmental Law: An Overview’ 9:2 (2000) RECIEL 93.

²⁶ The dividing line between binding and soft-law instruments can be blurred. For instance, the Convention on the Conservation of Migratory Species of Wild Animals (CMS) has been reckoning upon binding agreements and Memorandum of Understandings (MOUs) to protect migratory species.

²⁷ C Redgwell, ‘Sources of Environmental Law’, in S Besson et al (ed), *The Oxford Handbook on the Sources of International Law* (OUP, 2017) 943.

3.2.1 Soft-law instruments

Abounding in declarations, recommendations, resolutions, guidelines, and declarations by heads of states or ministers at international conferences, IEL is a favoured discipline for the use of soft-law instruments.²⁸ The 1972 Stockholm Declaration on the Human Environment identified twenty-six principles; the 1982 World Charter for Nature proclaimed five general principles; the 1992 Rio de Janeiro Declaration on Environment and Development proclaimed twenty-seven principles. Agenda 21, intended to clarify the scope of the UN Declaration, contains an impressive string of principles in its own right. As we saw in Part I of this book, the polluter-pays, prevention, and precautionary principles are set out in most of these instruments. As a result, they have acquired a universal significance.²⁹ Furthermore, the Inter-American Court of Human Rights has acknowledged the universal dimension to the right to a healthy environment combined with the principles of prevention that is encapsulated in different soft-law instruments.³⁰ As core principles of international law, these different principles cannot be dismissed as the work of one segment of international society.³¹

Soft-law climate policy instruments combined with the preventive principle can serve as trailblazers for determining the substance of the duty of care incumbent upon States authorities pursuant to Articles 2 (right to life) and 8 (right to privacy and family life) of the ECHR in relation to climate change mitigation measures.³² In this connection, domestic courts may take into consideration Conference of Parties (COP) decisions as well as International panel on climate change (IPCC) reports.³³ In *Urgenda*, the IPCC ARC 4 report of 2007 played a pivotal role in enabling the *Hoge Raad* to ascertain the content of the due diligence required from the Netherlands in abating greenhouse gas (GHG) emissions.³⁴

Soft-law instruments such as recommendations and guidelines, do not fit neatly into any of the traditional categories of international legal sources.³⁵ Although they

²⁸ See the various studies on non-binding norms in environmental law published in D Shelton (ed), *Commitment and Compliance* (OUP, 2000) 121–242.

²⁹ *Contra* Scotford, *Environmental Principles* (n 10) 263.

³⁰ AO OC-23/18 of 15 November 2017.

³¹ A Boyle and D Freestone (eds), *International Law and Sustainable Development* (OUP, 1999) 4.

³² *Urgenda* (n 23).

³³ Procurator General's Opinion in *Urgenda* (n 23), para 4.104.

³⁴ See *Urgenda* (n 23), paras 7.2.1–7.2.9.

³⁵ P Weil, 'Towards Relative Normativity in International Law' 77 (1983) AJIL 413; T Gruchalla-Wesierki, 'A Framework for Understanding "Soft law"' 30 (1984) McGill LJ 37–88; CM Chinkin, 'The Challenge of Soft Law: Development and Change in International Law' 38 (1989) ICLQ 85–6; P-M Dupuy, 'Soft Law and the International Law on the Environment' 12 (1991) Mich J Int'l L 420; A Boyle, 'Some Reflections on the Relationship of Treaties and Soft Law' 48 (1999) ICLQ 901; O Elias and C Lim, "'General Principles of Law', 'Soft Law' and the Identification of International Law' 28:3 (1997) NYIL 45; CM Chinkin, 'Normative Development in the International Legal System', in D Shelton (ed), *Commitment and Compliance: The Role of Non-Binding Norms in the International Legal System* (OUP, 2003) 21–42; J d'Apremont, 'Towards a New Theory of Sources in International Law' in Besson, *The Oxford Handbook on the Sources of International Law* (n 27) 559.

are much more than simple desiderata of individual States or organizations,³⁶ the provisions entitled ‘principles’ set out in these texts are devoid of binding effect.³⁷

First, soft-law instruments may not be put in the same category as normative principles, since soft law is not legally binding *per se*.³⁸ Secondly, owing to their imprecise formulation, they cannot be likened to normative principles on the substantive level. For example, the fact that Principle 21 of the Rio Declaration on Environment and Development encourages mobilization of the ‘creativity, ideals and courage of the youth of the world ... to forge a global partnership in order to achieve sustainable development and ensure a better future for all’ is obviously of no legal consequence for either the youth of the world or the international community.

Thus, despite their laudable intentions, soft-law ‘principles’ are—owing to their characteristics—invariably not recognized as normative principles. Nevertheless, the commitments made by States should be understood, *inter alia*, in the light of the principles set out in this type of instrument; when incorporated into soft-law provisions, they take on a purely interpretative value. In addition, directing principles of environmental law can be used as a precursor to hard law; they may thus serve as forerunners of treaty law.³⁹ They can also play a catalytic role in the customary international law-making process, operating as magnetic poles that attract and channel State practice. The hardening of soft law is therefore important for the development of hard law and can be a good indication of a principle of law in *status nascendi*. Indeed, the recall, repetition, and reiteration of the same principles in various non-binding instruments can gradually contribute to the development and establishment of true normative principles. Consequently, reference to soft law can be used as evidence of State practice that might support the existence of a rule of customary law.⁴⁰ Accordingly, these principles could be referred to as principles of emerging law or proto-legal principles.⁴¹

3.2.2 Hard-law instruments

MEAs are the dominant sources of IEL. In order to be accorded the status of normative principles, the polluters-pays, preventive, and precautionary principles

³⁶ A Cassese, *International Law* (OUP, 2001) 383.

³⁷ That being said, although an MOU is not a binding instrument, it cannot be regarded ‘as being without legal relevance’. See *Iron Rhine Railway* (n 24) paras 156–7.

³⁸ By way of illustration, the 2007 Forest Instrument ‘Principles’ are non-binding.

³⁹ D Shelton, ‘Law Non-Law and the Problem of “Soft Law”’ and A Kiss ‘Commentary and Conclusions’ in Shelton, *Commitment and Compliance* (n 28) 10 and 229. See also CM Chinkin, ‘Normative Development in the International Legal System’ in Shelton, *Commitment and Compliance* (n 28) 31–4.

⁴⁰ F Maes, ‘Environmental Law Principles and the Legislator: The Law of the Sea’, in M Sheridan and L Lavrysen (eds), *Environmental Law Principles* (Bruylant, 2002) 17–18.

⁴¹ G Winter, ‘International Principles of Marine Environmental Protection’, in M Salomon and T Markus (ed), *Handbook on Marine Environment Protection* (Springer, 2018) 585–605.

must first be set out in the operative provisions of a convention (formal approach) and their wording must render them binding upon Parties (substantive approach).

3.2.2.1 *Formal approach*

At a formal level, some treaties set out those directing principles expressly whilst others do embody the spirit but not the letter of these principles. In such a case, the principle should have the normative value that attaches to that instrument. In national legal regimes where international treaties have a value superior to that of national law, recognition of the directing principle should then be imperative for the national law-maker, at least in monist legal systems.

Neither the form nor the type of instrument, however, determines the legal status of the directing principle which is enunciated.⁴² Thus, the fact that a directing principle is taken up in an international agreement does not necessarily indicate that it is a normative principle. In fact, the three principles examined in Part I of this book do not always occupy the same position in treaties: some occur in preambles,⁴³ while others are found in the operative provisions of conventions, either in the form of general obligations⁴⁴ or specific provisions.⁴⁵ Obviously a distinction should be drawn between the principles found in the preambular sections of treaties and those elaborated in the operational parts. A principle can be normative only to the extent that it is affirmed by an operative provision of a convention. When it is merely mentioned in the preamble its role is simply to inform the more precise legal norms contained in the convention's operative paragraphs.

3.2.2.2 *Substantive approach*

The issue of the legal status of the principles set out in MEAs becomes more complicated when we turn our attention to their wording. The way in which the polluters-pays, preventive action, and precautionary principles are expressed in international treaties appreciably weakens their effect, as they are not always presented as normative principles that are directly binding on States and which courts must take into account in their decisions. When a convention expressly provides for the adoption of implementing norms, these principles are likely to be devoid of autonomous character. This argument is supported by the structure of IEL as well as by a literal interpretation of certain legal provisions setting out the principles.

⁴² Chinkin, 'Normative Development' (n 39) 37.

⁴³ This is the case for the PP in the 1992 CBD and in the 1994 Oslo Protocol to the CLRTAP. This is also the case for the PPP found in the preambular sections of the 1996 Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources (amendments not yet in force); the 1990 London International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC); the 1992 Helsinki Convention on the Transboundary Effects of Industrial Accidents; and the 2000 London Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances.

⁴⁴ For the PP, see UNFCCC, Art 3(3).

⁴⁵ For the PP, see the 1991 Bamako Convention on the Transboundary Movement of Hazardous Wastes Within Africa (hereinafter 1991 Bamako Convention), Art 4.

First, we note that these three principles generally feature within framework MEAs that provide for the elaboration and adoption of protocols that are likely to refine their scope in laying down specific obligations. Although this technique, which is widely used in IEL, makes it possible to attract the support of a large number of States, it is merely a first step in the elaboration of normative principles.⁴⁶ For that to occur these directing principles must be rendered operational through protocols adopted to implement the framework conventions. One example of this is the 1979 Convention on Long-Range Transboundary Air Pollution (CLRATP).

Secondly, in a number of MEAs these three principles are worded in such a way that they are deprived of all immediate and autonomous applicability. Use of terms such as 'form a basis for',⁴⁷ 'strive',⁴⁸ 'inspire', 'guide',⁴⁹ and 'endeavour' imply that they are merely intended to prepare States to implement their international obligations. At the same time, however, other MEAs are recognizing principles as being directly binding on States Parties.⁵⁰

Lastly, these directing principles are rarely set out in a precise manner and most MEAs do not bother to define them or to spell out their implications. By merely referring to a 'precautionary principle' without providing a minimal amount of content through more substantive provisions, States will not be bound to any great extent. In order to develop the PP beyond the stage of mere intentions, treaty drafters should be more explicit about the binding precautionary arrangements that could be deduced from the principle (procedural requirements set out in the annexes, institutional arrangements, etc.).⁵¹

To sum up, one must therefore consider on a case-by-case basis whether the terms used to describe the PPP or the PP are sufficiently prescriptive, in order to determine whether they could be considered to directly apply to States without in turn being laid down in implementing norms such as protocols.

3.2.2.3 *Added value in proclaiming environmental principles in MEAs*

Is it always necessary to lay down environmental principles within treaties when evolutionary changes within existing law may come about through interpretation? In effect, treaty provisions are not intended to operate independently of general international law.⁵² The tendency in international case law to interpret concepts

⁴⁶ G Palmer, 'New Ways to Make International Environmental Law' 86:2 (1992) AJIL 259; T Gehring, 'International Environmental Regimes: Dynamic Sectoral Legal Systems' 1 (1990) YbIEL 35.

⁴⁷ 1994 Danube Convention, Art 2(4).

⁴⁸ 1991 Bamako Convention, Art 4(3)(f).

⁴⁹ 1992 Helsinki Water Convention, Art 2(5); 1998 Rhine Convention, Art 4.

⁵⁰ For instance, the 1992 OSPAR Convention requires that Parties 'shall apply' the PP.

⁵¹ To avoid a mere statement of intentions, some authors propose that the PP should be submitted to several criteria. See, e.g., JE Hickley and VR Walker, 'Refining the Precautionary Principle in International Environmental Law' 14:3 (1995) Va Env't LJ 453-4.

⁵² *Oil Platforms* (Islamic Republic of Iran v US) [2003] Judgment ICJ Rep 161, paras 40-1.

and terms in treaties in the light of international legal developments allows new environmental concerns to penetrate into the older terminology of earlier treaties.⁵³ Against this background, Alan Boyle takes the view that the status of the PP as a general principle of law is more than sufficient to allow international courts to interpret treaties from which that principle is absent in the light of current general international legal developments regarding uncertainty.⁵⁴ For this purpose, it is not necessary to turn the PP into a rule of customary international law or to enshrine it in treaty law. We do not share that point of view. The discretion left to international courts to endorse an evolutionary interpretation is far less certain than the express recognition of the PP as a binding rule under either treaty or customary law. Indeed, whilst treaties and custom are principal sources of international law, general principles of law are merely subsidiary sources.

3.2.3 General principles of international law

In international law, the inability of customary and treaty law to provide a solution results in the emergence of general principles which constitute a separate source of law for that legal order. In addition, the proliferation of sectoral regulations has enabled the courts to infer new general principles, which are subsequently applied within areas that do not fall under the actual regulations concerned. It is this method of expansive induction that justifies the emergence of general principles of law.

These principles are distinct from yet share common features with customary rules. On the one hand, they differ from customary rules in terms of the general manner of their formulation. On the other hand, they originate from the same progressive sedimentation of soft law and State practice, supported by doctrinal works and consolidated by international case law.⁵⁵ We are inclined to take the view that the three principles discussed in Part I have obtained the status of general principles of environmental law.⁵⁶

3.2.4 Customary rules

3.2.4.1 *What is at stake?*

Although in Part I we discussed the status and role of the three principles in a number of MEAs, customary law is still of major importance for the following reasons. Many treaties in force are the outcome of a cumbersome and lengthy

⁵³ US—*Import Prohibition of Certain Shrimp and Shrimp Products*, WTO Doc. WT/DS58/AB/R (12 October 1998), paras 130–1; *Gabčíkovo-Nagymaros* (Hungary v Slovakia) [1997] ICJ Rep, para 140.

⁵⁴ A Boyle, 'Relationship between International Environmental Law and Other Branches of Law', in Lees and P Viñuales (ed), *Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 128–32.

⁵⁵ P-M Dupuy, 'Formation of Customary International Law and General Principles', in D Bodansky et al (eds), *The Oxford Handbook of International Environmental Law* (OUP, 2006) 461.

⁵⁶ Several authors are sceptical as to the added value of qualifying environmental principles as general principles. See A Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (Kluwer Law Int'l, 2002) 45.

negotiation process. Whilst some MEAs laying down loose obligations (the Convention on biological diversity (CDB), the United Nations Framework Convention on Climate Change (UNFCCC), etc.) have been ratified by a majority of States, the picture is somewhat different regarding the most stringent agreements, which have been ratified by fewer States. To make matters more complicated, when they enter into force, they are at best left partially implemented, and at worst not implemented at all.

The fact that treaties are binding only on those States that are parties to them does not preclude the possibility that a customary rule may be binding on States that are not parties to the agreements providing for such a rule.⁵⁷ There is a constant cross-fertilization between these customary rules and treaty rules. On the one hand, new developments in treaty law attest to State practice; on the other hand, custom complements treaty rules.⁵⁸

The difficulty in determining the legal status of some directing principles of environmental law becomes more acute when we consider whether they have acquired functional autonomy by becoming rules of customary international law. While the no harm principle⁵⁹ and the principle of prevention⁶⁰ have already obtained that status, the procedure appears to be a great deal more delicate in relation to the PP.⁶¹ The question as to whether the PP must be considered as a principle of customary international law is an important one: while treaties create law between parties, the recognition of the PP as an international custom will make it applicable to all States, regardless of whether they were indifferent to it.

3.2.4.2 *Doctrinal and judicial controversies*

Probably no other principle has generated as much controversy as the PP. Several authors argue that the PP has not yet achieved the status of a principle of customary

⁵⁷ *Military and Paramilitary Activities in and Against Nicaragua* (Nicaragua v USA), ICJ Rep [1986] 111, 93–4.

⁵⁸ S Maljean-Dubois, 'The Making of International Law Challenging Environmental Protection', in Y Kerbrat and S Maljean-Dubois (eds), *The Transformation of International Environmental Law* (Pedone & Hart, 2010) 43.

⁵⁹ *Legality of the Threat or Use of Nuclear Weapons* [1996] ICJ Rep 226, AO, 241–2. See the discussion in Chapter 2, Section 2.

⁶⁰ In its advisory opinion in *Nuclear Weapons* (n 59) the ICJ held that the general obligation of no harm has become part of the corpus of international law relating to the environment (para 29). Nevertheless, balanced against principles of international law, the ICJ was of the opinion that this general obligation was not intended to be an obligation of total restraint during a military conflict. See also *Gabčíkovo Nagymaros* (n 53) paras 53, 87, and 140.

⁶¹ The customary nature of other environmental principles is fraught with controversy. For instance, the requirement that all natural resources be used sustainably is described as an emerging rule of general customary international law, for which particular normative precision is needed. See International Law Association (ILA), Committee on International Law on Sustainable Development, Sofia 75th session, 2012, para 3. Although the PPP is not enshrined in any constitutional provisions, it has been 'accepted as part of the law of the land' by the Indian Supreme Court which referred to customary international law. The Court held that any customary international legal rule not in conflict with municipal law must be considered to be incorporated in the latter and to be binding on the courts. *Vellore Citizens Welfare Forum v Union of India* (28 August 1996) 5 SCR 241 1996 AIR 2715, para 15.

international law, or at least consider this to be doubtful⁶² because, among other reasons, the principle is still subject to a wide range of interpretations.⁶³ However, most authors believe today that sufficient *opinio juris* currently exists to support the view that the PP should be considered a principle of customary international law.⁶⁴ However, the mere support of legal scholars in favour of the recognition of the PP as a customary rule is insufficient. The *opinio juris* must be supported by State practice.⁶⁵ The question is thus from what point the PP may be considered to have met these two conditions.

Outside Europe, domestic courts are quite divided on this issue.⁶⁶ Thus far, the argument that the PP has customary status has come up against a refusal by various international courts to rule in favour of this status. The principle has been put forward twice before the International Court of Justice (ICJ), which refused to take a decision on those grounds. In the 1992 French nuclear testing case, the ICJ used a procedural argument to avoid a decision on the complaint put forward by New Zealand based on the PP.⁶⁷ In *Gabčíkovo-Nagyramos*, the ICJ again managed to avoid a direct ruling on the application of the principle, which had been advanced by Hungary to justify its failure to meet its commitments.⁶⁸

In *EC—Hormones*, the World Trade Organization Appellate Body (WTO AB) was rather cautious on the normative value of the principle in international law because it was the subject of ‘debate among academics, law practitioners, regulators and judges.’⁶⁹ Consequently, the AB found that it was ‘unnecessary, and probably imprudent ... to take a position on this important, but abstract, question.’ On the basis of this statement the AB concluded that the disputes caused by the desire of some WTO contracting parties to oppose the import of products coming from

⁶² D Bodansky, ‘Customary (and not so Customary) International Environmental Law’ 3:1 (1995) *Indiana Journal of Global Studies* 105; Dupuy, ‘Formation of Customary International Law’ (n 55) 451, 462.

⁶³ See, e.g., Gündling, ‘The Status of International Law’ (n 20) 30; Birnie et al, *International Law and the Environment*, 3rd ed (OUP, 2009) 119–20. It should be noted, however, that those authors who do not consider the PP as a principle of customary law were writing before 1992; thereafter, the principle made important advances in international law.

⁶⁴ See, e.g., H Hohmann, *Precautionary Legal Duties and Principles of Modern International Environmental Law* (Graham and Trotman, 1994) 184; Trouwboost, *Evolution and Status of the Precautionary Principle* (n 56); O McIntyre, *Environmental Protection of International Watercourses under International Law* (Routledge, 2007) 272–3; A Sirinskiene, ‘The Status of Precautionary Principle: Moving towards a rule of Customary Law’ 4 (2009) *Jurisprudence* 354–60; P Sands and J Peel, *Principles of International Environmental Law*, 4th ed (CUP, 2012) 124.

⁶⁵ *Nicaragua* (n 57) para 184.

⁶⁶ Australian courts have held that the PP was relevant even when it is not included in a legislative framework because it is a ‘customary norm of international law’. The Indian SCt held that the PPP and the PP are part of customary international law. See *Vellore Citizens Welfare Forum v Union of India* (n 61), para 15. In contrast, US courts have been dismissing claims that the PP could be a principle of customary international law (*Beanal v Freeport-McMoran Inc*, 197 F.3d 161, 167 (5th Cir. 1999) and *Flores v Southern Peru Copper Co*, 343 F.3d 140, 158–61 (2nd Cir. 2003)).

⁶⁷ *Nuclear Tests* (New Zealand v France) [1992] Judgment ICJ Rep para 288.

⁶⁸ *Gabčíkovo-Nagyramos* (n 53) para 56.

⁶⁹ *EC—Measures Concerning Meat and Meat Products (Hormones)*, WTO Doc. WT/DS 26 & 48/AB/R (18 August 1997), para 123. See the discussion in Chapter 7.

other States on health grounds would have to be settled by strictly applying WTO Agreements. In other SPS disputes the AB did not rule on the customary value of the principle.⁷⁰

However, in a more recent advisory opinion, the Seabed Disputes Chamber of the International Tribunal on the Law of the Sea (ITLOS) held that the Nodules and the Sulphides Regulations transform the non-binding statement of the precautionary approach encapsulated in Article 15 of the Rio Declaration into a binding obligation. In particular, the Chamber considered the PP as an integral part of the due diligence of sponsoring states which is applicable even outside the scope of the regulations at issue. Most significantly, it recognized a trend towards making this approach part of customary international law.⁷¹ In *Pulp Mills* the ICJ implicitly accepted that a precautionary approach (PA) 'may be relevant in the interpretation and application' of the provisions of the disputed treaty.⁷²

3.2.4.3 Requirements

Proving the existence of a customary international law principle requires sufficient support in both State practice (*usus*) and *opinio iuris*.⁷³ State practice must be uniform, extensive, and representative in character. In this respect, the ICJ has addressed the link between treaty law and customary international law by setting out some criteria to be fulfilled for a customary rule to emerge as a result of a treaty:

It would be in the first place necessary that the provision concerned should, at all events potentially, be a fundamental norm-creating character such as could be regarded as forming the basis of a general rule... With respect to the other element usually regarded as necessary before a conventional rule can be considered to have become a general rule of international law, it might be that, even without the passage of any considerable period of time, a very widespread and representative participation in the convention might suffice of itself, provided it included that of states whose interests were specially affected.... An indispensable requirement would be that within the period in question, short though it might be, state practice, including that of states whose interests are specially affected, should

⁷⁰ *Japan—Measures Affecting Agricultural Products*, WTO Doc. WT/DS76/AB/R (22 February 1999).

⁷¹ *Responsibilities and Obligations of States Sponsoring Persons and Entities with respect to Activities in the Area (Request for Advisory Opinion submitted to the Seabed Disputes Chamber)* [2011] ITLOS Rep 17, AO 1, para 131.

⁷² *Pulp Mills on the River Uruguay (Argentina v Uruguay)* [2010] Judgment ICJ Rep, para 164.

⁷³ Both case law and doctrinal analyses support this view. *North Sea Continental Shelf* [1969] Judgment ICJ Rep 44; para 77, see also 42, para 71; *Continental Shelf (Libya v Malta)* [1985] Judgment ICJ Rep 29–30, para 27; *Nicaragua* (n 57) paras 183–4, 108–9, 207. See further I Brownlie, *Principles of Public International Law*, 5th ed (OUP, 1998) 4–11; A D'Amato, *The Concept of Custom in International Law* (Cornell, 1971) 74–87; H Thirlway, *International Customary Law and Codification* (Sijhoff, 1972) 145–6; GJH van Hoof, *Rethinking the Sources of International Law* (Kluwer, 1983) 87; Hoggenmacher, 'La doctrine des deux éléments du droit coutumier dans la pratique de la Cour Internationale' 90:5 (1986) RGDIP 114; M Bos, 'The identification of Custom in International Law' 25 (1982) GYbIL 22.

have been both extensive and virtually uniform in the sense of the provision invoked; and should moreover have occurred in such a way as to show a general recognition that a rule of law or legal obligation is involved.⁷⁴

We will verify whether these conditions are sufficiently fulfilled.

3.2.4.3.1 Extensive and uniform application First, the PP must be accepted and implemented extensively and in a uniform manner by States, and must be more than a mere formal requirement enunciated in treaty-law. An important question is what constitutes State practice. Policy statements, commentaries by governments on draft treaties, legislation, decisions of national courts and executive authorities, pleadings before international tribunals, statements made within international organizations,⁷⁵ and the resolutions adopted by those bodies are all examples of State practice, which should be taken into account when considering the PP as a principle of customary international law.⁷⁶ However, can all of these declarations be taken at face value? We must therefore ask whether the widespread invocation of the PP is sufficient. Some scholars have argued that the legal analyses carried out so far merely amount to ‘precaution spotting’.⁷⁷

We do not share this view. First, it is not necessary to achieve ‘absolutely rigorous conformity with the rule’.⁷⁸ Secondly, a question then arises as to whether a thorough empirical examination of the manner in which a precaution is stated, applied, and enforced is necessary. Moreover, one must also consider which areas to investigate: for instance hazardous products, fisheries, listed installations, conservation of natural resources. It would of course be too laborious an investigation to extract a genuine PA from the myriad of sources constituting State practice.⁷⁹ For instance, the ICJ did not verify whether a majority of States effectively applied EIAs in a transboundary context that was such as to elevate that obligation to the status of customary law.⁸⁰ Given the wide gap between law in books and law in action, the ICJ would never have been reaching such a conclusion if it had to investigate the relevant State practice. In our view the key issue is that the practice should be representative. In other words, the legally binding custom depends more on its acceptance by a majority of States than the opposition it arouses. Given that some States are more influential than others in the creation of customary rules, Western

⁷⁴ *North Sea Continental Shelf* (n 73), paras 41–3.

⁷⁵ These institutions can be instrumental in the creation of customary rules.

⁷⁶ Brownlie, *Principles of Public International Law* (n 73) 5.

⁷⁷ E Fisher, ‘Precaution, Precaution Everywhere: Developing a Common Understanding of the Precautionary Principle’ 9:1 (2002) MJE&CL 7–28.

⁷⁸ *Nicaragua* (n 57), para 186.

⁷⁹ Trouwbot, *Evolution and Status of the Precautionary Principle* (n 56) 46–8.

⁸⁰ *Pulp Mills* (n 72), para 204. To reach that conclusion, the ICJ did not undertake the examination of state practice. See Sands and Peel, *Principles of International Environmental Law* (n 64) 121; L-A Duvic-Paoli, *The Prevention Principle in International Environmental Law* (CUP, 2018) 93.

European States that endorse a strong PA are likely to make a larger contribution to the recognition of the PP as a new rule.

3.2.4.3.2 Conviction Secondly, once the State practice has been established, it is necessary to assess how States view their practice as ‘evidence of a belief that this practice is rendered obligatory by the existence of a rule of law requiring it’.⁸¹ Our own analysis of the evolution of the principle in international and EU law and in a number of national legal systems provides firm evidence to substantiate that conclusion.⁸² The possible instances of poor implementation of the PP do not mean that it has not achieved such a status.⁸³

3.2.4.3.3 Territorial scope While State practice must be both extensive and representative, it does need to be either universal or absolutely uniform. Therefore, customary rules may emerge through different processes at different points in time.⁸⁴ Much will depend on the degree of representativeness of the practice.⁸⁵

The development of customary law at regional level is significant in the environmental domain, ‘where regional regimes have played a pivotal role alongside global ones, and in respect of which some regions are particularly well developed’.⁸⁶ It goes without saying that the PP has received widespread support from European regional organizations (the United Nations Economic Commission for Europe (UNECE), the Council of Europe, the Baltic Marine Environment Protection Commission (HELCOM)) and has been embedded into a swath of recent regional MEAs. The principle was also highlighted by the ECtHR in *Tătar*. Moreover, States’ municipal statutes do in fact complement international practice. Although our case analyses highlight the fact that, whilst the implementation of a PA or the PP is not always consistent at a global level,⁸⁷ its implementation by the EU Member States appears nevertheless to be more consistent than in other regions of the world. This can be explained by the fact that, since 1992, Member States have been bound by a large body of EU rules that encapsulate the PP or contemplate a PA. Suffice it to say that a majority of the EU Member States act in relation to uncertainty in a manner that is sufficiently consistent to crystallize precaution into a customary rule. Likewise, it would be easy to demonstrate the practical existence of effective and uniform state practice with respect to fisheries where Regional Fisheries Management Organizations (RFMOs) act in accordance

⁸¹ *Nicaragua* (n 57), para 207.

⁸² See the discussion in Chapter 3, Subsections 3.3 to 3.6.

⁸³ *Nicaragua* (n 57), para 73.

⁸⁴ Pedersen, ‘From Abundance to Indeterminacy’ (n 17) 14.

⁸⁵ In the words of the ICJ in the *North Sea Continental Shelf*, the practice must ‘include that of States whose interests are specially affected’.

⁸⁶ Sands and Peel, *Principles of International Environmental Law* (n 64) 124.

⁸⁷ See Section 2 above.

with the 1995 UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA) PA.⁸⁸

3.2.4.3.4 Duration Does the fact that the origin of the PP is so recent prevent it from becoming such a principle, however? Although normally a certain amount of time elapses before there is sufficient practice to satisfy the criteria referred to above, no specific time requirement exists.⁸⁹ In fact, some customary principles have sprung up quite quickly (e.g. the *régime* of the continental shelf) because there was a substantive and representative quantity of State practice. In the environmental field, the rules have developed quickly.

3.2.4.3.5 Concluding remarks Whether the PP is classified as a 'general principle' or a 'custom' it will derive its binding status from a gradual transformative process as a result of its acceptance by States and its consistent implementation. For that reason, it is difficult to pinpoint the precise moment in time when the PP crystallizes into a customary rule. In fact, some regional entities have been much more active than others. Although some international courts have not always been favourable to the direct and autonomous application of the PP, we take the view that there has been repeated and widespread state practice accompanied by an *opinio juris* in order to crystallize precaution into a customary norm,⁹⁰ at least from a European perspective. In effect, the number of international and domestic legal instruments encapsulating the PP, the number of States that have signed and ratified these instruments,⁹¹ the number of sectors encompassed by the PP, and the number of cases before domestic courts where it has been invoked as a general principle of law constitute strong evidence of customary law at a regional level.

3.2.5 Vagueness of the principles and their binding effects

The legal status of environmental principles has been sparking controversy ever since their conception. There are diametrically opposing views concerning the issue as to whether their indeterminacy prevents them from having any legal effects. Several authors argue that these principles cannot be binding on the grounds that they are highly indeterminate and consequently do not provide ready answers to disputes within a context of scientific uncertainty. This interpretation cannot

⁸⁸ See Chapter 3, section 3.3.

⁸⁹ *Nicaragua* (n 57), para 74.

⁹⁰ This is in line with the dissenting opinions of Judges Weeramantry, Korma, and Palmer in *Request for an Examination of the Situation in Accordance with the Court's Judgment in the Nuclear Test Case (New Zealand v France)* [1995] ICJ Rep 288; Dissenting Opinion of Judge Palmer in *Gabčíkovo-Nagymaros* (n 53); ECtHR, *Tătar v Romania*, 67021/0, 27 January 2009.

⁹¹ Multilateral treaties can provide the inspiration for the adoption of new customary rules. See, e.g., *North Sea Continental Shelf* (n 73), para 71. In other words, the numerous MEAs recognizing the PP can constitute the source of a new customary rule. Nevertheless, the normal conditions for the formation of a customary rule must be fulfilled.

prevail. We should now examine the customary principles of no harm, equitable utilization of shared waters, the requirement for an EIA, and the preventive principle in relation to activities that are likely to cause transboundary harm. In spite of their vagueness, these four customary principles are binding on States.

The no harm principle does not determine what level of 'significant risk' triggers action, select which risk deserves priority, or indicate how early the preventive measure must be adopted. By the same token, in contrast to the principle of combatting pollution at source, the principle of prevention does not suggest by which means and where the relevant action should be taken.⁹² These are questions that have to be answered; they must be resolved in light of more precise conventional obligations, technical guidelines, State practice, etc. What is more, although international law does not determine, for instance, the manner in which 'significance' must be assessed, this determination is deemed to be objective. Likewise, the difficulty in interpreting the rather murky concept of 'harm' and stating what the no harm principle actually requires States to do is not a stumbling block. First, in light of State practice and case law, the concept of 'harm' can be interpreted as a flexible standard lying between the most serious and irreparable harm and some trivial interference.⁹³ Secondly, the flexible concept of due diligence that must be exercised by the source State must be interpreted in light of generally accepted minimum standards. In particular, State practice on the ways in which transboundary effects can be prevented (e.g. BAT) can substantiate the requirement of due diligence.

By the same token, the substantive and procedural rules on the allocation and protection of shared water resources put flesh on the bones of the principle of equitable utilization.

Along the same lines, the specific content of the EIA is left to the discretion of States, although this discretion is not unfettered. The 'nature and magnitude of the proposed development' as well as the diligence that is required do in fact determine the manner in which the EIA must be conducted.⁹⁴

Finally, the multifaceted nature of prevention is justified by the specificity of each environmental sector, which calls for a tailored legal response to the diversity of risks falling under the scope of the principle.⁹⁵ The proliferation of conventional definitions for this principle does not negate its binding status as a customary rule.

Accordingly, the indeterminacy of these four different customary principles does not render nugatory their binding effect.⁹⁶ In fact, it is inherent within the

⁹² L Krämer, 'Principle of Fighting Pollution at Source' in Krämer and Orlando, *Principles of Environmental Law* (n 18) 188.

⁹³ O McIntyre, *Environmental Protection of International Watercourses under International Law* (Routledge, 2007) 97.

⁹⁴ *Pulp Mills* (n 72), para 205.

⁹⁵ Duvic-Paoli, *The Prevention Principle* (n 80) 96.

⁹⁶ Pedersen, 'From Abundance to Indeterminacy' (n 17) 16.

nature of a general principle that some uncertainties as to its core components and scope should remain.⁹⁷

Regarding the status of the PP, much progress has been made with respect to its components. Reasoning by analogy with the status of the previous customary rules, the technical rules contained in the annexes to MEAs that implement the PP provide guidelines for its interpretation. By way of illustration, the rather vague PA obligations encapsulated in the 1995 UNFSA have to be interpreted in light of Annex 2 of that agreement as well as the 1995 FAO Code of Conduct for Responsible Fisheries.⁹⁸ In conclusion, as a matter of positive law, principles have normative status and the PP is not more indeterminate than other general principles of environmental law. The fact that the PP applies differently depending on the particular statute at issue does not preclude its binding character.⁹⁹

3.2.5.1 *Universal or regional character of customary rules and general principles*

When a principle reflects a rule of customary law (e.g. prevention) or is embedded in a universal multilateral environment agreement (MEA) (such as the PP in the CDB and UNFCCC), it typically expresses the recognition of its prevalence by a majority of States.¹⁰⁰ It goes without saying that such a principle has universal scope.¹⁰¹ Indeed, generality refers to their applicability to all members of the international community. By contrast, when a principle is enshrined in a regional MEA (such as the UNECE Water Convention) it is likely to be deprived of any universal character. However, as stressed as above, universality is not required in order to crystallize state practice into a customary rule.¹⁰²

3.3 EU law

For EU law, as for public international law, one must distinguish between the directing principles set out in soft-law instruments (Subsection 3.3.1) and those put forward in texts with normative effect, that is, in the EU Treaties and secondary law (Subsection 3.3.2)

⁹⁷ J Cameron, 'The Status of the Precautionary Principle in International Law', in T O'Riordan and J Cameron (eds), *Interpreting the Precautionary Principle* (Cameron May, 1994) 266; A Epiney and M Scheyli, *Strukturprinzipien des Umweltvölkerrechts* (Nomos, 1998) 108.

⁹⁸ See below Chapter 3, section 3.3.

⁹⁹ D Hanschel, 'Progress and the Precautionary Principle in Administrative Law', in M Pâques (ed), *Precautionary Principle and Administrative Law* (Bruylant, 2007) 103.

¹⁰⁰ Trouwbot, *Evolution and Status of the Precautionary Principle* (n 56) 34.

¹⁰¹ See Inter-American Court of Human Rights, AO OC-23/18, 15 November 2017. Contra Scotford, *Environmental Principles* (n 10) 263. This author claims that some principles cannot be claimed to be universal because comparative analysis highlights that they are 'contingent on the history, jurisdiction and constitutional roles of the different courts'.

¹⁰² MN Shaw, *International Law*, 7th ed (CUP, 2014) 57.

3.3.1 Soft-law instruments

Hardly any policy programmes, political statements, strategy documents, or White or Green Papers related to the environmental policy do not refer to one or more principles. For instance, the EU's Environmental Action Programmes have always referred to different environmental principles, which are meant subsequently to be defined more clearly through specific measures. Nonetheless, such soft-law principles do not require the EU institutions to act in a strictly determined manner, even though statements of principles set out in earlier Action Programmes were regularly transformed into binding requirements. According to CJEU case law, these Action Programmes are 'basically' or 'primarily' expressions of political will.¹⁰³ Such a programme is 'designed to provide a framework for defining and implementing EU environment policy, but does not lay down rules of a mandatory nature'.¹⁰⁴ If soft-law principles cannot be binding, they can nevertheless be interpretive in nature when taken up in recommendations.¹⁰⁵ National courts are thus obliged to take them into account when resolving conflicts, particularly when such recommendations clarify the interpretation of national provisions intended to transpose these principles or when their objective is to complete EU provisions of a binding nature.¹⁰⁶

3.3.2 Hard-law instruments

3.3.2.1 Formal approach

Directing principles of environmental law appeared in secondary EU law throughout the 1970s but they have only been expressed in EU primary law since 1987 with the adoption of the Single European Act (SEA). Subsequently, four environmental law principles received full recognition in the Maastricht Treaty thanks to the insertion of Article 130r(2) (new Article 191(2)), which states that: 'Union policy on the environment ... shall be based on the PP and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay'. Besides, other directing principles—integration,¹⁰⁷ high level of protection¹⁰⁸—are explicitly laid down in

¹⁰³ Case C-142/94 P *Rovigo* [1996] ECR I-6669, para 32.

¹⁰⁴ Case C-9/73 *Schlüter* [1973] ECR I-1135, para 40; Case C-59/75 *Manghera* [1976] ECR I-91, para 21.

¹⁰⁵ The PPP and PP have been made clear in recommendations or communications. Regarding the PPP, see Recommendation 75/436 of 3 March 1975. Regarding the PP, see the Commission's Communication on the PP, which is not a recommendation. Thus, State obligations must be understood in the light of the principles set out therein. In this perspective, soft law can be regarded as a useful tool in interpreting EU hard-law obligations.

¹⁰⁶ Case C-322/88 *Grimaldi* [1989] ECR I-6669, para 32.

¹⁰⁷ TFEU, Art 11. Although a general principle of integration, such as that set out in TFEU, Art. 11, is missing from major MEAs (with the exceptions of the 1985 ASEAN Agreement on the Conservation of Nature and Natural Resources, Art 2(1); CBD, Art 6(b) and 10(a); and the Paris Convention to Combat Desertification, Art 4(2)), the need to incorporate environmental protection and economic development considerations was regarded by the ICJ as one of the decisive elements of the *ikovo-Nagymaros* case.

¹⁰⁸ TEU, Art 3; TFEU, Art 114(3) and 191(2); CFR, Art 37.

the founding Treaties. It is striking that for no other field do the EU Treaties set out so many directing principles to serve as the basis for public policy.

The EU institutions are obliged to take these directing principles into consideration in the course of the normative process; in this way, all acts of secondary law have to be subordinated to those principles.¹⁰⁹ In addition, in our previous developments we stressed the extent to which the CJEU ensures respect for these principles in the cases it is called upon to settle.¹¹⁰

3.3.2.2 *Substantive approach*

3.3.2.2.1 Mandatory language The EU Treaty provisions setting out the directing principles of environment law are drafted in such a way that the institutions are obliged to apply them when carrying out action in the environment field.¹¹¹ The use of the indicative rather than the conditional confirms that such provisions are obligations: ‘must be integrated’ (Art. 11), ‘shall aim’ (Article 114(3)), ‘shall be based’ (Article 191(2)).¹¹² This binding formulation is striking when one compares the first three paragraphs of Article 191 which define successively the objectives, principles, and factors of the EU’s environment policy. Thus, the *principles* embodied in paragraph 2 of Article 191 involve language (‘Union policy... shall be based’) whose effect is more mandatory than that used to describe the *objectives* contained in paragraph 1 (‘Union policy ... shall contribute ...’), whilst the *factors* in paragraph 3 need merely to be taken into consideration (‘the EU shall take account of ...’). In contrast, in weighing environmental, economic, and social concerns, sustainable development has been coined in treaty law as an ‘objective’¹¹³ that is lacking the determinable content characterizing principles.

3.3.2.2.2 A degree of discretion The requirements that action by the EU relating to the environment shall aim at fleshing out several principles, and that other policies must integrate environmental protection requirements do not, however, prevent the EU institutions from exercising a wide degree of discretion in shaping the

¹⁰⁹ L Krämer, ‘The Polluter Pays Principle in Community Law: The Interpretation of Art130r of the EEC Treaty’ in L Krämer (ed), *Focus on European Law*, 2nd ed (Graham and Trotman, 1997) 244.

¹¹⁰ Case C-284/95 *Safety Hi-Tech* [1998] ECR I-4301; Case C-341/95 *Bettati* [1998] ECR I-4358; Case C-293/97 *Standley* [1999] ECR I-2603, paras 51–2.

¹¹¹ A majority of academics regard Art 192 TFEU principles as binding: G Winter, ‘Constitutionalizing Environmental Protection in the EU’ (2002)2 *YbEEL* 76 and G Winter, ‘The legal nature of environmental principles in international, EC and German law’, in R Macrory (ed), *Principles of European Environmental Law* (Europa Law Publishing, 2004) 19–22; A Epiney, ‘Environmental Principles’ in Macrory (n 111) 21; C Hilon, ‘Rights and Principles in EU Law: A Distinction without Foundation’ 15 (2008) *MJE&CL* 209.

¹¹² The conditional is sometimes appropriate for certain principles. While most official versions of the TFEU state that the ‘polluter shall pay’, the English version states that the ‘polluter should pay’.

¹¹³ TEU, Art 3. The literature is divided on whether to classify sustainable development as a concept or a principle. For instance, Verschuuren qualifies it as an ‘ideal’ (Verschuuren, *Principles* (n 9) 24) whilst other authors qualify it a ‘principle’ (see V Barral, ‘The Principle of Sustainable Development, in Krämer and Orlando, *Principles of Environmental Law* (n 18) 103).

EU's environmental policy. For example, according to Article 11 of the Treaty on the Functioning of the European Union (TFEU), the obligation to aim at a high level of environmental protection must take into account 'the diversity of situations in the various regions of the EU'.

This is reinforced by the need for the EU institutions to weigh the Article 191(2) principles against each other and against other policy objectives. In his conclusions on the status of these principles, AG Léger indicated that the enunciation of these principles in treaty law results in a process which 'consists in weighing the respective merits and drawbacks of any given action'.¹¹⁴

Thus, in contrast to rules of determinate content, the EU environmental principles always admit the possibility of accommodation. In other words, the EU institutions may depart from these principles under particular circumstances. This interpretation is corroborated by case law such as the *Peralta* case, where the CJEU ruled that former Article 130r 'confines itself to defining the general objectives of the Community in environmental matters'¹¹⁵ and that the Council was responsible for deciding what action was to be taken in this respect. Ludwig Krämer deduces from this that: '... since, by nature, any principle allows for exemptions or derogations, it is not possible to consider them as of legally binding nature'.¹¹⁶ Similarly, Verschuuren also takes the view that environmental principles are not enforceable per se; they are 'a necessary medium for ideals to find their way into concrete rules'.¹¹⁷ Accordingly, they have solely an interpretative function.

We do not agree with these arguments. First, there is nothing surprising in the fact that legal provisions should allow for exemptions or derogations implicitly rather than explicitly. EU law has for a long time contained norms of indeterminate content which are implicitly subject to derogation. One need only think of the principle of equality—a cornerstone of the rule of law—which allows for a certain degree of flexibility, as has been demonstrated by the case law of the CJEU and constitutional courts alike. Secondly, the case law of EU courts clearly demonstrates that secondary law can be reviewed in light of Article 191(2) principles. A distinction must however be drawn between review of a failure to act and review of the content of EU secondary legislation.

3.3.2.2.3 Review of the omission to act according to the Article 191(2) principles Due to their indeterminacy, Article 191(2) principles do not require the EU to legislate on a particular subject in a specific and detailed manner. Thus, for

¹¹⁴ Opinion in Cases C-341/95 *Bettati* (n 110) and C-284/95 *Safety Hi-Tech* (n 110), para 73.

¹¹⁵ Case C-379/92 *Peralta* [1994] ECR I-3453, para 58.

¹¹⁶ Krämer, 'General Principles' (n 20) 357. Other authors are still claiming that in the absence of implementing measures, principles are not binding. M Gehring et al, 'The EU', in E Lees and JE Viñuales, *The Oxford Handbook of Comparative Environmental Law* (OUP, 2019) 155.

¹¹⁷ Nonetheless, this author acknowledges that they can be applied with more concrete rules. See Verschuuren, *Principles* (n 9) 25, 26.

example, it would be difficult to conceive of an Article 265 action (review due to an omission to act on behalf of the EU institutions¹¹⁸) being successful on the basis of the polluters-pays, preventive action, and precautionary principles.¹¹⁹ Reasoning by analogy, the Charter of Fundamental Rights (CFR) principles, among them the principle to achieve a high level of environmental protection,¹²⁰ cannot act as a sword for obliging the authorities to achieve policy goals.¹²¹

3.3.2.2.4 Review of the legality of EU secondary law It is not in the context of a failure to act but in relation to the review of the legality of EU secondary law that the three principles play a role as normative principles. Indeed, in several cases the CJEU has reviewed whether secondary legislation was in breach of Article 191(2) principles. In contrast to the ICJ and WTO DSB, the EU courts have made the PP a true normative principle. In particular, with respect to hazardous substances, the EU courts regularly review EU measures in light of the PP. Accordingly, annulment actions may be brought on the basis of the PP in order to challenge an EU act that is deemed to be overly restrictive.¹²² The breach of one of the requirements stemming from the PP could result in the annulment of the contested decision. On the other hand, both the CJEU and the General Court (GCt) have used the principle to confirm the validity of food restrictions placed on chemical substances, safety measures,¹²³ and the protection of marine resources.¹²⁴ At times the PP is implicit in these decisions;¹²⁵ at other times, it is expressly set out in the operative words of a judgment.¹²⁶ The importance of these decisions is twofold: first, the EU courts have explicitly put forward the PP to justify measures that frustrate the principle of the free movement of goods within the EU internal market¹²⁷ or the principle of freedom of trade and industry;¹²⁸ and secondly, they do not limit the principle to environment policy but also use it to validate health protection measures, although

¹¹⁸ Regarding the abstention of the Commission to spell out criteria to identify EDCs, see Case T-521/14 *Sweden v Commission* [2015] T:2015:976.

¹¹⁹ M Doherty, 'The Status of the Principles of EC Environmental Law' 2 (1999) JEL 379.

¹²⁰ Art 37.

¹²¹ EU network of independent experts on fundamental rights, Commentary of the charter of fundamental rights of the European Union (June 2006) 407. With respect to Arts 26, regarding the integration of persons with disabilities, and 27, related to the 'Workers' right to information and consultation', the CJEU held that these CFR provisions did not require the EU legislature to adopt any specific measures. See Case C-176/12 *AMS* [2014] C:2014:2, para 45; Case C-356/12 *Glatzel* [2014] C:2014:350, para 78.

¹²² See, *inter alia*, Case C-333/08 *Gowan* [2010] C:2010:803; and C-558/07 *S.P.C.M.* [2009] ECR I-5783. In the GCt, see Case T-75/06 *Bayer CropScience* [2008] ECR II-2081. See also Chapter 3, Subsection 3.5.3.

¹²³ Case C-331/88 *Fedesa* [1990] ECR I-4023, para 9; Case C-180/96 R *UK v Commission* [1996] ECR I-3903, para 93; Case T-76/96P *NFU* [1996] ECR II-815, para 88.

¹²⁴ Case C-405/92 *Armand Mondiet* [1993] ECR I-6176, paras 31–6.

¹²⁵ Case C-355/90 *Commission v Spain* [1993] ECR I-6159, para 28; Case C-435/92 *Association pour la protection des animaux sauvages* [1994] ECR I-67, para 21.

¹²⁶ Case T-79/99P *Alpharma* [1999] ECR II-2027.

¹²⁷ Case C-331/88 *Fedesa* (n 123), para 9; Case C-180/96 R, *UK v Commission* (n 123), para 93.

¹²⁸ Case C-405/92 *Armand Mondiet* (n 124), paras 31–6; Case T-76/96P *NFU* (n 123), para 88.

health is an independent policy area whose links to environment policy remain ambiguous.¹²⁹

Likewise, were the Commission to authorize a national authority to grant State aid to a polluting plant for clean-up costs and that State aid did not comply with the conditions required for Article 104 of the TFEU to apply, then the Commission's decision could be subject to judicial review on the basis of that treaty provision and interpreted in the light of the requirements of the PPP.¹³⁰

That being said, the above cases make it clear that the CJEU reviews the validity of EU measures in a marginal manner. Only in cases where the institutions have made a manifest error of appraisal, misused their powers, or exceeded the limits of their discretion will the EU courts declare the contested measure invalid.¹³¹ *Blaise*, a case related to glyphosate, is a case in point. All of the questions referred by the French criminal court enquire as to the conformity of the EU pesticides Regulation with the PP. In answering these questions, the CJEU stressed that there is 'an obligation'¹³² on the EU legislature, when it adopts rules governing the placing on the market of pesticides, to comply with the PP in order to ensure, in particular, a high level of protection of human health.¹³³ As a result, the Court ruled on the validity of Regulation 1107/2009 concerning the placing of plant protection products on the market (PPPR) in the light of PP. However, 'in view of the need to strike a balance between several objectives and principles, and of the complexity of the application of the relevant criteria', judicial review was limited to whether the EU legislature, in adopting the PPPR, committed a manifest error of appraisal.¹³⁴ As a result of the rather limited scope of review, Article 191(2) grants a wide discretion as to the measures that can be taken by the EU institutions.

Reviewing the legality of the obligation to achieve a 'high level of environmental protection'¹³⁵ appears to be even more problematic as this obligation is particularly vague, since determining any degree of protection depends on numerous elements more likely to arise from subjective assessment than from objective analysis.¹³⁶ The

¹²⁹ Case C-331/88 *Fedesa* (n 123), para 9.

¹³⁰ Krämer, 'The Polluter Pays Principle in Community law ...' (n 109) 252.

¹³¹ WT Douma, 'The European Union and the Precautionary Principle' 2 (2000) RECIEL 132.

¹³² Case C-616/17 *Blaise* [2019] C:2019:800, para 42.

¹³³ CFR, Art 35 and TFEU, Arts 9 and 168(1).

¹³⁴ Case C-616/17 *Blaise* (n 132) para 50.

¹³⁵ TFEU, Arts 114(3) and 191(2); CFR, Art 37. This principle can be fleshed out within sectoral legislation through more precise obligations, such as the obligation to achieve a 'good status' for inland and marine waters (Water FD, Art 6; Directive on marine waters, Art 1) or a favourable conservation status for endangered wildlife species (Habitats Directive, Art 2(2)).

¹³⁶ This principle may be frustrated by a no gold-plating policy that requires legislation transposing EU measures into national law to be based on the minimum requirement of EU legislation. However, such a policy approach is likely to run counter to the obligation to achieve a high level of protection. In many instances, specific local conditions should require more stringent domestic standards in order to achieve an acceptable level of protection in the Member State. Moreover, any downgrading of existing national standards to the lower EU ones would breach the stand-still principle. See JH Jans and L Squintani, 'Gold plating of EU Measures' 6:4 (2009) JEEPL 417–35.

indeterminacy of this obligation does not, however, imply that EU institutions have total discretion as to how the obligation to achieve a 'high level of environmental protection' is to be applied. An EU institution, a Member State, even an individual, provided that they have standing, may always seek the nullification before one of the EU courts an EU act whose level of protection is clearly below what might be expected in a given case. In *Safety Hi-Tech* and *Bettati*, the CJEU ruled that while the level of protection need not necessarily be the highest level possible,¹³⁷ a level of protection that is non-existent, weak, or even intermediate in nature must be considered contrary to the obligation. If the court, after weighing various parameters, determines that the level of protection is too weak and that no valid justification has been put forward for not having satisfied the obligation in question, it may annul the disputed act. However, the Court held that the review was necessarily limited to the question of whether the Council, by adopting the contested Regulation, committed a manifest error of appraisal 'in view of the need to strike a balance between certain of the objectives and principles mentioned in Article [191(2)] of the Treaty and the complexity of the implementation of those criteria'.¹³⁸

Furthermore, a strict application of the principle of legality may combine with the obligation 'to aim at a high level of environmental protection'. For instance, the Council of Ministers had adopted a directive aimed at implementing some technical aspects of the directive concerning the placing on the market of plant protection products. That implementing Directive excluded groundwater from its field of application, although the framework Directive required impact assessment for both drinking water and groundwater. This partial execution of the obligations in the framework Directive had the effect of lowering the level of environmental protection, since the required assessment of the environmental impacts of plant protection products would only apply to groundwaters intended for the production of drinking water. Based on a teleological reading of the recitals of the framework Directive, the CJEU annulled the implementing Directive on the grounds that its overly restrictive field of application modified an essential obligation, that of protecting groundwaters not intended for use as drinking water. The CJEU supported its reasoning by recalling that the basic Directive's recitals stated that the Directive aimed to ensure a 'high level of environmental protection' in order to avoid pesticides having any unacceptable influence on the environment and health.¹³⁹

3.3.2.2.5 The normativity of Article 191(2) principles for Member State authorities The fact that the EU environmental policy has given rise to a large number of directives prompts the question whether Article 191(2) principles apply at national level. Several hypotheses could be advanced by way of answer but the following

¹³⁷ Case C-284/95 *Safety Hi-Tech* (n 110), para 47; and Case C-341/95 *Bettati* (n 110).

¹³⁸ Case C-284/95 *Safety Hi-Tech* (n 110) para 37 and Case C-341/95 *Bettati* (n 137), para 35.

¹³⁹ Case C-303/94 *EP v Council* [1996] ECR I-2943, para 31.

distinctions should be made. A distinction must be drawn between areas covered by secondary law and those which are not. Furthermore, a second distinction should be drawn between principles that are explicit in EU secondary legislation and those that are implicit.

First, we shall address the issue of the impact of the directing principles of the TFEU in areas that have not been harmonized. In *Peralta* the CJEU held that these principles do not apply directly to national authorities; they are addressed to EU institutions.¹⁴⁰ As a result, they cannot constrain national authorities and are therefore devoid of direct effect. Accordingly, Member State actions may not, in principle, be reviewed on the basis of these principles if they have not been fleshed out expressly or implicitly in secondary law. Even though they may conflict with the treaty principles, these national measures cannot be put aside or declared inapplicable.¹⁴¹

Second, it should be borne in mind that few areas of national law fall outside the scope of EU obligations. In effect, Member States are bound by a swathe of directives and regulations aiming at protecting the environment, many of which embody one or several principles.¹⁴² The question arises whether the Member State authorities could eschew the treaty principles in implementing environmental directives. The answer is straightforward: in areas that have been harmonized, the Treaty's environmental principles may apply both directly and indirectly to Member States through secondary legislation. Hence, two hypotheses can be distinguished.

On the one hand, the principles may apply in an autonomous manner to national authorities if they are obliged to implement EU environmental acts that recognize one or more of the principles contained in Article 191(2) of the TFEU.¹⁴³ There

¹⁴⁰ Case C-379/92 *Peralta* [1994] ECR I-3453, para 58. This case concerned a preliminary question relating to criminal offences. No EU secondary law concerning the environment was being directly considered, since the Italian legislation transposed an international convention to which the EU was not party. In this case the CJEU ruled that Art 130R [new TFEU, Art 191] did not contravene the Italian legislation being considered. This provision 'confines itself to defining the general objectives of the Community in environmental matters. The responsibility for deciding upon the action to be taken is entrusted to the Council by Article 130S [new TFEU, Art 192].'

¹⁴¹ Case C-378/08 *ERG* [2010] ECR I-1919, para 46. In *Duddridge*, a case involving a decision to lay an underground high-voltage electrical cable close to a school, the applicants argued that the Secretary of State was under a duty imposed by the EC Treaty to apply the PP. The High Court declined to interpret English law with reference to the EU principle. The PP was deemed to be merely a 'principle', and not a 'rule' or a binding treaty obligation. Attention must be drawn to the fact that it was not disputed that the EIA Directive should apply to the installation of the power cable ([2011] OJ L 26/1). Likewise, in the French *Superphoenix* case involving the closure of a nuclear power plant, the CE refused to consider the PP embodied in the EC Treaty as a self-executing norm. See CE fr., 28 February 1997, *WWF Geneva and Others*. According to the RvSt of the Netherlands, the fact that the PP has not been codified in the Environmental Management Act renders it inapplicable. See RvS, 12 May 2000, M en R 2000/9, 93. Lastly, the District Court of The Hague dismissed an appeal regarding a breach of the PP enshrined in TFEU, Art 191 on the grounds that this provision is not directed at Member States. See Rb Den Haag, 24 November 1999, M en R (2000/3), 24.

¹⁴² N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014) 175–224.

¹⁴³ The CJEU held that individuals may rely on the PPP in TFEU, Art 191(2) against Member States only where EU legislation has been adopted on the basis of the environmental provisions of the EU Treaty (TFEU, Art 192). Where the question of compatibility of a national measure with a non-environmental directive (an energy directive) is raised, the PPP cannot be relied upon to mount an

are relevant examples to illustrate such a scenario. One must bear in mind that the PP has a broader scope than the PPP. The General Food Law Regulation (GFL) expressly states that the PP applies to food safety measures adopted at national level.¹⁴⁴ Likewise, the PP is explicitly mentioned in both Directive 2001/18/EC on the deliberate release of genetically modified organisms (GMOs) and Regulation 1107/2009 on the placing on the market of plant protection products.¹⁴⁵ Under these acts, national authorities are required to carry out risk assessments (RAs) of GMOs and pesticides with the aim of eradicating any lingering uncertainties. By the same token, with respect to waste management the Member States ‘shall take into account’ a cluster of principles, including ‘the general environmental protection principles of precaution and sustainability ...’¹⁴⁶

Other general provisions of EU secondary legislation also function as directing principles. For instance, the waste hierarchy laid down in Article 4 of the Waste Framework Directive (Waste FD) focuses on prevention,¹⁴⁷ whilst Article 13 aims to put the principles of precaution and preventive action into practice as regards waste management.¹⁴⁸ The general nature of the latter provision marks the boundaries within which State waste treatment activities should take place, even if it does not actually require specific measures to be adopted.¹⁴⁹ Despite the provision’s general nature and the resulting lack of direct effect, the Commission may launch proceedings before the CJEU against any Member State that has not ensured the proper management of waste within its territory due to the failure to comply with that broad obligation.¹⁵⁰ Furthermore, in applying the criterion of the degree of seriousness of the breaches of EU waste legislation in order to ensure that penalty payments have coercive force and that EU waste law is correctly applied, the CJEU has ruled that ‘failure to comply with the obligation resulting from [Article 13] could, by the very nature of that obligation, endanger human health directly and harm the environment and must, in the light of the other obligations, be regarded as particularly serious.’ Therefore a high penalty payment is the means best suited to the circumstances.¹⁵¹

argument against that Member State (Case C-534/13 *Fipa Group* [2015] C:2015:140, paras 39–41). Moreover, in an area covered by environmental policy for which there is no EU environmental legislation that specifically covers the situation in question and in the absence of any national legal requirement, the competent environmental authorities cannot rely on the TFEU principle for the purposes of imposing preventive and remedial measures (Joined Cases C-80/18 to C-83/18 *UNESA* [2019] C:2019:934). See S Kingston, ‘The Polluter Pays Principle in EU Climate Law: An Effective Tool Before the Courts?’ 1 (2020) *Climate Law* 8.

¹⁴⁴ GFL, Recital 16.

¹⁴⁵ Directive 2001/18/EC on the deliberate release of GMOs [2001] OJ L 106/1, Recital 8 and Art 1; Regulation 1107/2009 concerning the placing of plant production product [2009] OJ L 309/1, Art 1(4).

¹⁴⁶ Waste FD, Art 4(2).

¹⁴⁷ The judicial review is highly deferential. See Case C-305/18 *Verdi Ambiente* [1999] C:2019:384.

¹⁴⁸ Cases C-175/98 and C-177/98 *Paolo Lirussi and Francesca Bizzaro* [1999] ECR I-6881, para 51.

¹⁴⁹ Case C-236/92 *Comitato di coordinamento per la difesa della cava* [1994] ECR I-483, para 14.

¹⁵⁰ Case C-365/97 *Commission v Italy* [1999] ECR I-7773, paras 60–1.

¹⁵¹ Case C-387/97 *Commission v Greece* [2000] ECR I-5092, para 94.

On the other hand, the Article 191(2) TFEU principles can implicitly underpin the whole regulatory framework contemplated by EU law-makers. In effect, even if a principle enshrined in that provision is not explicitly set out either in operative provisions or in the preamble to a directive or a regulation, it may still apply to Member States. Article 4(3) of the Treaty on European Union (TEU) obliges Member States to ‘take all appropriate measures . . . to ensure fulfilment of the obligations arising out of this Treaty or resulting from action taken by the institutions of the Union’ and ‘facilitate the achievement of the Union’s tasks’ as well as ‘abstain from any measure which could jeopardize the attainment of the objectives’ of the Treaty. Article 4(3) thus subjects national authorities to wide-ranging obligations in relation to environmental protection, preservation, and conservation, in order to implement the principles of prevention and precaution.¹⁵² Moreover, national authorities are required to interpret the environmental obligations stemming from secondary law strictly, irrespective of whether these principles are encapsulated in directives or regulations. For instance, with respect to the assessment and authorization procedures within Natura 2000 sites laid down in the Habitats Directive, consideration must be given to the PP referred to in Article 191(2) of the TFEU, even though the principle is not mentioned as such in that Directive.¹⁵³

Finally, Member States may invoke the PP in order to justify the proportionality of any measures that impede the free movement of goods.¹⁵⁴

3.4 National laws

When considering national laws a distinction must also be drawn between principles embodied in soft-law and hard-law instruments. While the former are not binding, the latter can play an important role in litigation.

3.4.1 Soft-law instruments

Several national authorities—in the United Kingdom before 2020 environmental principles have sometimes appeared in government policy documents—have limited themselves to proclaiming the polluters-pays, preventive action, and precautionary principles in policy documents. In other countries, the framework legislation is complemented with an array of administrative guidelines that also incorporate these principles. Such principles are generally devoid of binding

¹⁵² A Doyle and T Carney, ‘Precaution and Prevention: Giving Effect to Article 130r Without Direct Effect’ 8 (1999) *EEELR* 44.

¹⁵³ In *Waddenzee*, the CJEU assessed the validity of a Dutch project in the light of the EU PP (Case C-127/02 *Waddenzee* [2004] ECR I-7405, para 44). See Chapter 3, Section 3.4.

¹⁵⁴ Opinion of AG Geelhoed in Case C-121/00 *Walter Hahn* [2002] ECR I-9193, para 51; and Opinion of AG Misho in Case C-6/99 *Greenpeace France* [2000] ECR I-1676, para 202. See the discussion in de Sadeleer, *EU Environmental Law* (n 142).

effect: they are not formally adopted by the legislator, and the administration continues to enjoy a wide degree of discretion as to what principles it lays down for itself. In order to assess each individual case precisely, the administration must always have the choice of ignoring the lines it has set for itself, but in that case it must put forward good reasons for its actions. Thus, as it considers each individual case, an administration must ask whether the principle set out in policy documents it is attempting to follow is relevant; if not, it must find reasonable grounds for setting it aside.¹⁵⁵ In this way, even though these principles are set out in soft-law instruments, they may strongly influence administrations by providing coherence to their actions.

3.4.2 Hard-law instruments

3.4.2.1 Formal approach

As we have seen, several national law-makers have followed the example of the international organizations, and particularly of the EU, by setting out the polluters-pays, preventive action, and precautionary principles in their framework laws. In Germany important legislation such as the Federal Emissions Control Act (BImSchG), the Atomic Energy Act (AtG), and the Biotechnology Act (*GenT*) specify that various activities subject to authorization are to be constructed and operated in such a manner that precaution is exercised against damaging environmental effects. In addition, processes of codification of environmental law have presented an occasion to insert basic principles into framework laws.

The Environment Bill 2020,¹⁵⁶ the French Environmental Code,¹⁵⁷ the Italian Code,¹⁵⁸ and various federal statutes and regional environmental codes in Belgium have adopted and adapted the principles set out in Article 191(2) of the TFEU.¹⁵⁹ In addition, many national laws also contain preambles the aim of which is to set out guidelines for implementing rules or measures.

Contrary to the international or EU legal systems, which are only directed at international organizations and States Parties, environmental principles recognized in several European states are addressed in general terms to all users of the

¹⁵⁵ The Dutch Council of State held that the PP had to be applied to a water pollution case on the grounds that it was incorporated in policy documents (RvS, 12 May 2000). See Verschuuren, *Principles* (n 9) 120.

¹⁵⁶ Pursuant to the Environment Bill 2020, which applies to England, Wales, and Northern Ireland, the Secretary of State must prepare a draft of the policy statement on the environmental principles that are derived from the ones set out in TFEU, Art 191(2) (§17) (integration, prevention, PP, PPP, and rectification at source). The five principles encapsulated in the TFEU had developed at a particular point in time, and it was arguable there were other more modern principles such as non-regression or substitution which might be more suited to deal with future environmental issues.

¹⁵⁷ Arts 100–1.

¹⁵⁸ Art 301.

¹⁵⁹ 1999 Belgian Federal Act on the protection of the marine environment, Art 4(1); Walloon Environmental Code, Art D1 and D3; Flemish Environmental Code, Art 1.2.1.

environment, both public and private.¹⁶⁰ For instance, according to the Danish Environmental Protection Act 358 of 6 June 1991: 'Any party proposing to commence activities likely to cause pollution shall choose such a site for the activities that the risk of pollution is minimized [and] shall take measures to prevent and combat pollution'; the 2004 Dutch Environmental Management Act (*Wet milieubeheer*) requires that 'every person shall treat the environment with due care';¹⁶¹ the French Environmental Code affirms that it is 'essential to contribute to protecting and improving the environment';¹⁶² the 1999 Belgian Federal Act on the protection of the marine environment stipulates that 'users of the marine environment and the government shall take into consideration ... the principle of prevention, the precautionary principle ... when carrying out activities in the marine environment'.¹⁶³ This extension *ratione personae* is justified as it implies that the State does not intend to exclude professional operators from preventive and precautionary obligations. Indeed, these principles should apply to any person involved in activities that entail a risk. This would serve to extend the general duty of care and due diligence, which requires that any exposure of persons to risks should be avoided and subsequently that any such risks, whether potential or actual, need to be managed. Although not referred to as 'principles', these provisions share the attributes of legal principles, such as a high degree of generality or authority, resulting from their ranking within the hierarchy of norms.¹⁶⁴

3.4.2.2 *Substantive approach*

In addition to proclaiming the polluter-pays, preventive, and precautionary principles within framework laws, these principles can also be incorporated into more concrete rules. By way of illustration, Section 8.11 (3) of the Dutch Environmental Management Act reads as follows:

A licence shall be subject to conditions necessary to protect the environment. In so far as attaching conditions to the licence cannot prevent the adverse effects that the establishment may have on the environment, the licence shall be made subject to conditions that offer the greatest possible protection to the environment from those effects, unless this cannot reasonably be required.

This provision, which is somewhat indeterminate in nature, clearly mirrors the principle of prevention and the obligation to seek a high level of protection. It

¹⁶⁰ Regarding the personal scope of the principle, the French Court of Cassation held that individuals carrying out hazardous activities may be held liable in virtue of the PP. See Cass. fr., 3 March 2010, *SA des eaux minérales de Vals c/ Di Mayo*.

¹⁶¹ Section 1.1a.

¹⁶² Art 2.

¹⁶³ Art 4(1).

¹⁶⁴ P Gilhuis, 'The Consequences of Introducing Environmental Law Principles' in Sheridan and Lavrysen, *Environmental Law Principles* (n 40) 49.

lays down a clear obligation to pursue the highest level of protection, although a weighing of interests might occur where this is deemed to be unreasonable.¹⁶⁵ By the same token, according to Article 7a(1) of the German Federal Water Act (*Wasserhaushaltsgesetz*): ‘A permit to discharge waste water may only be granted if the pollutant load of the waste water is kept as low as possible while maintaining the procedures according to the state-of-the-art.’ That provision clearly expresses a principle of waste minimization that offers considerable leeway to the administration; the level of pollution reduction will have to be decided on a case-by-case basis in accordance with the BAT. Of course the more general the language of the text, the greater the discretion left to the interpreting body.

While in formal terms the normative character of the polluter-pays, preventive, and precautionary principles does not really give cause for any discussion when those directing principles are set out in framework laws, various substantive arguments have been proposed in an attempt to deny them of any binding status.

First, directing principles of environmental law are often presented as ‘guiding’ principles meant solely to inspire the law-maker or executive. For example, the French Environmental Code provides that principles exist to ‘inspire’ environmental legislation ‘within the framework of the laws that define their effect.’ However, this wording has not prevented the French Conseil d’État (hereafter CE) from directly invoking the PP in several cases on the protection of public health.¹⁶⁶ In the United Kingdom the Environment Bill 2019 laid before parliament in October rejected making the five environmental principles have direct legal effect. Although these new UK principles are deprived of direct legal effect, every Minister must have ‘due regard’ to them when conducting/implementing their policies.¹⁶⁷

Similarly, there has been a reluctance to liken directing principles to normative principles, on the grounds that their violation is not sanctioned by criminal law. This is however to confuse judicial review with criminal punishment. While the breach of a rule always entails a sanction, it is not necessarily provided for under the criminal law—far from it. The fact that violations of most rules of indeterminate nature,¹⁶⁸ including the three directing principles of environmental law, are not censured under criminal law does not mean there are no other sanctions. For instance, under administrative law an authority can always refuse or withdraw a licence due to a breach of an environmental principle. It is also worth noting that a breach of the duty of care can in any case also give rise to civil liability for the tortfeasor.¹⁶⁹

¹⁶⁵ See also Verschuuren, *Principles* (n 9) 118–9.

¹⁶⁶ See CE fr., 19 February 1998, *Association Greenpeace France*.

¹⁶⁷ Environment Bill 2020, §18.

¹⁶⁸ See above, Section 2.

¹⁶⁹ A Cliquet, ‘Recente ontwikkelingen inzake natuurbehoudswetgeving in het mariene en kustzonemilieu van België’ 5 (1999) TMR 346.

We must ask, however, whether the lack of precision within these principles, and indeed their unpredictability, represents a serious obstacle to their application in particular cases. This doubt might be countered by noting that, when reviewing the legality of national regulations that restrict individual freedoms, the ECtHR has shown great flexibility when reviewing relatively imprecise rules applied to professionals in a given field.¹⁷⁰

Finally, it is sometimes argued that the directing principles set out in framework laws cannot have normative effect owing to the extremely vague nature of the concepts they convey. In order to address this, we must consider what is in fact prescribed by notions as intangible as polluter-pays, precaution, or prevention. In Part I of this book the difficulty in determining the effect of these principles was noted. In fact, directing principles of environmental law sketch out very general guidelines, from which it is difficult to infer precise obligations; their lesser degree of precision, or conversely their greater degree of abstraction, attenuates their normative character. However, as was demonstrated in the first section of this chapter, a rule need not necessarily have unequivocal content in order to be normative. Although it is closed at the strictly normative level, a legal system is characterized by its openness to other systems, whether these are moral, economic, or scientific. If legal norms must be capable of incorporating external legal elements, their meaning should then be able to evolve as a function of that level of integration. Consequently, by referring to elements outside the legal system, the definition of principles is more dynamic than static.

An overview of the German, French, Belgian, and Dutch case law highlights the autonomous normative value of these principles. For instance, in Belgium the Conseil d'État judged that a noise regulation which constituted a relaxation of the level of protection for man and the environment against the harmful effects of racing circuits was incompatible with the constitutional right to a clean environment and the standstill principle, which had been laid down in regional legislation:

whereas Article 23 of the Constitution enshrines for each person the right to the safe-guarding of a healthy environment; whereas this basic right appears to imply, among other things, that a relaxation of the existing environmental regulations can only be deemed compatible with the Constitution if there are compelling reasons for doing so; whereas the 'standstill principle' that flows from this provision has been laid down for the Flemish Region in the decree of 5 April 1995 laying down general provisions of environmental policy; ... whereas the Flemish government should be mindful of these principles when ... it

¹⁷⁰ *Groppera Radio AG v Switzerland*, 14134/02, 28 March 1990, para 68.

decrees general environmental conditions or conditions that apply per category of establishment ... Whereas it appears from the foregoing that the challenged provision gives rise to an attenuation of the protection of man and the environment against the harmful effects of the operation of racecourses for motor vehicles; whereas, as has already been said, if such an arrangement is to be compatible with Article 23 of the Constitution, compelling reasons must be given for doing so; whereas no such reasons can be inferred from either the administrative records or the defence put forward by the defendant; whereas the argument is serious.¹⁷¹

The Belgian Constitutional Court has several times referred to the PPP in order to verify whether taxes on discharges of wastewater and the management of wastes were adequate and proportionate.¹⁷²

Since the 1980s the German administrative courts have recognized the PP as having the status of a binding principle of environmental law (*rechtssatzförmiges Prinzip*), which means that it must be considered by decision-making authorities.¹⁷³ Likewise, the French administrative courts have been applying this principle not only in the field of environmental law but also in the area of public health. As the EU courts have also done, the French CE has extended the scope of the PP into the field of public health, despite the lack of legal backing equivalent to that provided by the framework law on the protection of the environment.¹⁷⁴ In the Netherlands, the PP has been widely applied by Dutch courts in conjunction with the due care¹⁷⁵ and the justification principle. It has resulted in the quashing of certain administrative decisions appealed against. In *Urgenda*, the Court of Appeals of The Hague as well as the *Hoge Raad* (HR) held in relation to the PP, referring to the UNFCCC and the case law of the ECtHR, that it is the uncertainty—in particular regarding tipping points—that requires the State to adopt a proactive climate policy.

In light of these case-law developments, the principles of environmental law, including in particular the PP, should constitute genuine legal rules, irrespective of the regulations they apply to.

¹⁷¹ CE Bg., no. 80.018, 29 April 1999, *Jacobs*; (1999) 4 TMR 301. See, e.g., Larmuseau, 'The Precautionary Principle...' in Sheridan and Lavrysen, *Environmental Law Principles* (n 40) 187–90.

¹⁷² Bg CCt, no. 16/92, 12 March 1992, B3.3; no. 41/93, 3 June 1993, B3.4; no. 42/97, 14 July 1997, B.52.4.

¹⁷³ *BVerwGE*, 17 February 1984, Bd. 69 (1985), 43.

¹⁷⁴ CE fr., 21 April 1997, *Barbier*, no. 180. 274; 24 February 1999, *Société Pro-Nat*, no. 192.465; 30 June 1999, *Germain*. Even if all these decisions do not explicitly rely on the PP, they apply it without basing themselves on a specific text.

¹⁷⁵ Pursuant to Awb, Art 3:2, 'when preparing a decision, the administrative authority shall acquire the necessary knowledge of the relevant facts and the interests to be weighed up'.

4. The effects of directing principles of environmental law on litigation

As autonomous norms, the directing principles of environmental law may produce concrete results at the criminal, civil, and administrative levels.

4.1 Principles and the review of legality

Procedural (compliance with the RA procedures) and substantive (proportionality, weighing of interests, etc.) requirements can be inferred from the PP. It follows that in the framework of judicial review, both EU and national administrative courts (notably in France, Belgium, Italy, Luxemburg, the Netherlands, and Germany) exercise control over the substance of a measure (internal legality) and on its respect for procedure (external legality). While review of procedural compliance is relatively extensive, review of the substance of a measure is limited in that EU and national statutory laws allow a wide margin of discretion to administrations. In the following subsections we discuss how the PP may at times reinforce and at other times weaken reviews of the internal and external legality of administrative decisions.

4.1.1 Review of manifest error of appraisal (internal legality)

It may happen that applicants claim that an administration has committed a manifest error of appraisal by having taken an unreasonable decision relating to environmental protection although it was not fully justified by the current state of scientific understanding. Courts have a tendency to dismiss such claims, invoking the PP to justify the contentious measure. Thus, in the case of BSE the CJEU referred to the PP set out in Article 191(2) of the TFEU to support the Commission's decision to ban British beef, on the grounds that the Commission could take measures to protect public health without having to wait until the reality and seriousness of the risk of developing Creutzfeld-Jakob Disease had been fully proved.¹⁷⁶ In view of the need to strike a balance between competing objectives and principles, and of the complexity of the application of the relevant criteria, judicial review must necessarily be limited to whether the EU institution, in adopting the contested act, committed a manifest error of appraisal.¹⁷⁷

Similarly, the French CE has on several occasions had recourse to the PP, both to validate health protection norms¹⁷⁸ and to suspend a decision authorizing the commercialization of GM maize.¹⁷⁹ By proceeding in this way EU and national

¹⁷⁶ Case C-180/96 *UK v Commission* [1998] ECR I-2269, paras 99 and 100.

¹⁷⁷ See Case C-616/17 *Blaise* (n 132), para 50.

¹⁷⁸ CE fr., 24 February 1999, *Société Pro-Nat*.

¹⁷⁹ CE fr., 19 February 1998, *Association Greenpeace France*.

courts allow administrations a wide margin of discretion when they adopt administrative measures in a context of scientific uncertainty. Unlike the reviewing of procedural obligations (*contrôle de légalité externe*) recourse to the PP sets aside the possibility of reviewing the internal legality of the measure on the grounds that it conflicts with the principle (e.g. for reasons to do with the absence of proportionality or manifest error of appraisal).

The use thus made of the PP is connected to the aversion of administrative courts to scientific debate; they are not ready to involve themselves in highly technical points of scientific controversy. For example, within German case law, while legal control of the PP has been increased, the role of the courts in verifying respect for the current state of science and technology nonetheless remains marginal.¹⁸⁰ The German courts take the view that judicial review should be limited to ensuring that a contentious assessment is based on sufficient information and non-arbitrary assumptions.¹⁸¹ Likewise, the UK courts have shown judicial restraint in reviewing risk regulations. Such decisions fall within the realm of the administrative authorities.¹⁸² Given the low burden of proof incumbent upon the regulator in relation to potential risk, coupled with its wide margin of appreciation, it would be difficult to challenge precautionary measures successfully.¹⁸³

This reserve on the part of courts reviewing the internal legality does not appear to have been questioned thus far. Indeed, the fact that legal doctrine sets out the need to allow administrations a wide margin of manoeuvre favours a restrained review of internal legality. In any case, a court is no substitute for an administration. Such discretion in assessing the facts of a case is all the more indispensable when the scientific evidence assembled by an administration does not dictate a clear solution to a problem. Moreover, when risk is involved public decisions must often be taken very quickly. Domestic courts are aware of the difficulties involved in ruling in emergency conditions and thus are rarely strict as regards possible errors made by public authorities in their haste to protect the public interest.

The PP also supports judicial prudence when a public authority takes refuge behind the need to act under conditions of scientific uncertainty. This principle thus does no more than reaffirm the wide discretion that administrations already enjoy in carrying out their prerogatives.

However, the PP plays a role in French administrative case law in relation to the balancing of interests. The French administrative courts are required to consider whether the PP has been complied with before carrying out the balancing operation under which they weigh up the benefits and drawbacks of a project for which a declaration of public utility has been sought. The courts therefore subject

¹⁸⁰ Judgment of 8 August 1978 of the Federal Constitutional Court (*Bundesverfassungsgericht*).

¹⁸¹ OVG Hamburg, 27 January 1995, (1995) 2 *Umweltrecht* 93.

¹⁸² E Fisher, 'Is the Precautionary Principle Justiciable?' (2001) 13:3 *JEL* 315–34, 323.

¹⁸³ R Moules, *Environmental Judicial Review* (Hart, 2011) 61.

declarations of public utility to a requirement of compliance with the constitutional principle.¹⁸⁴ As a self-standing rule, the environmental principle is therefore separate from and superior to public utility, and must therefore be complied with when issuing declarations of public utility.¹⁸⁵ It follows that there can be no public utility if the PP is not complied with.

As discussed above the review of the statement of reasons is important.¹⁸⁶ In virtue of the British Environment Bill 2020, the Ministers cannot ignore the environmental principles, and must give a rationale explanation if they decide not to apply them in a particular case.¹⁸⁷ The obligation to ‘have regard’ to the policy ‘recognises that there may be circumstances when it does not have to be applied to the letter but in my view there must be very good reasons indeed for not applying it’. These reasons must be clearly stated.¹⁸⁸ The extent to which the British judiciary will in future feel empowered and encouraged to use the principles in the interpretation of environmental provisions is rather less predictable.¹⁸⁹

4.1.2 Review of procedural regularity (external legality)

By contrast, review of the external legality of administrative decisions should be reinforced by contact with the PP. For example, the decision by the French CE in a case concerning GM maize indicates the willingness of the high administrative court to review the RA procedure in the light of the PP.¹⁹⁰ The only irregularity in this case was that the dossier was incomplete, as a result of which an opinion required by the relevant legislation had been delivered by a scientific committee. Although this procedural irregularity might have been of no importance in another case, in this particular case it was deemed sufficiently serious for the CE to order that the decision by the Ministry of Agriculture authorizing the commercialization of a variety of genetically modified maize be suspended. Although quite minor, this type of irregularity seems to be sufficient to constitute a serious ground for annulment. This judicial trend closely corresponds to the spirit of the PP, which calls for procedural arrangements that allow the most complete examination possible of risk, so as to minimize uncertainty. When RA procedures are envisaged in order to prevent risks arising, it is normal that courts should verify respect for these procedures in an extremely rigorous, even punctilious, manner and that they would accordingly not hesitate to nullify decisions that disregard any of their

¹⁸⁴ Constitutional Charter for the Environment, Art 5.

¹⁸⁵ P Janin, ‘Principe de précaution et contrôle de l’utilité publique’ 6 (2017) RFD Adm. 1069.

¹⁸⁶ Regarding the influence of the PP on the statement of reasons in administrative law, see Chapter 3, Section 6.1.4.

¹⁸⁷ §18.

¹⁸⁸ For example, Mr Justice Collins in *Royal Mail Group plc v Postal Services Commission* [2007] EWHC 1205 (Admin): ‘The obligation to have regard to the policy recognises that there may be circumstances when it does not have to be applied to the letter but in my view there must be very good reasons indeed for not applying it.’

¹⁸⁹ R Macrory, *Irresolute Clay* (Hart, 2020) 172–3.

¹⁹⁰ CE fr., 19 February 1998, *Association Greenpeace France*. See Chapter 3, Subsection 3.6.4.

requirements. The PP thereby serves to reinforce the formal control of respect for procedure in cases involving scientific controversy.

The reviews recently performed by the French CE have mostly focused on whether the administration has complied with the various procedural requirements. This review involves three stages.¹⁹¹

First, the CE considers whether the occurrence of the risk is sufficiently plausible. Accordingly, it falls to the competent authority:

to seek to establish whether there are any circumstantiated reasons that are of such a nature as to justify the possibility of a risk of serious and irreversible harm ... that, despite any uncertainty as to its actual subsistence and scope having regard to the current state of scientific knowledge, would justify the application of the precautionary principle.¹⁹²

Secondly, the CE examines whether the authority has carried out a reliable RA procedure as required under Article 5 of the Constitution.

Thirdly, the proportionality of the precautionary measure must be reviewed in light of the 'plausibility and the gravity of the risk, on the one hand, and the general interest underpinning the project (*'opération d'intérêt public'*).

There is also a trend within the Belgian case law to avoid striking down any measures that have been adopted according to an appropriate methodology.¹⁹³ However, judicial review naturally varies from one area of the law to another, and indeed from one court to another.

4.2 Principles and civil liability

The preventive and precautionary principles may be implemented entirely by the procedural regimes and administrative arrangements, to the extent that these never altogether preclude harm. On the other hand, they may gain in consistency through civil liability or tort law: the fact that the operator may be liable should give rise to preventive behaviour beyond that envisaged by strict respect for standards and procedures. Seen from this angle, civil liability appears an indispensable complement to administrative law on which the preventive and precautionary principles are traditionally based.¹⁹⁴ Although civil liability still performs an essentially

¹⁹¹ CE fr., 12 April 2013, *Association Stop THT*, para 37.

¹⁹² *Ibid.*, para 36.

¹⁹³ M Pâques, 'La précaution en droit administratif' in Pâques, *Precautionary Principle and Administrative Law* (n 99) 17.

¹⁹⁴ International soft law clearly demonstrates that there is a need to give victims access to civil legal remedies. According to the 1992 Rio Declaration on the Environment and Development, Art 13, 'States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage'. See also Council of Europe Model Act on the Protection of the Environment (Strasbourg, 1994) which includes both regulatory approach and civil liability.

reparative or curative function, it should fulfil its potential by evolving in those areas where the preventive and precautionary principles are most used—the environment, health, and safety—with a view to preventing or even anticipating damages. This development proves particularly necessary where there is a question of serious and irreversible damage. In such cases it is important that action be taken to avert the irreparable; prevention and anticipation must override repairation.

As discussed in Part I of this book, the polluter-pays, preventive, and precautionary principles may influence civil liability litigation in various forms, with the reparative function of liability giving way to that of preventing damage.¹⁹⁵ In other words, these three principles may be invoked in turn to support legal arguments favouring victims or the environment. Fault, for example, should be interpreted more widely, and the burden of proof for those exposed to risk should be reduced, particularly by easing the requirement to show causation. In Chapter 3 we indicated that the PP did not necessarily conflict with risk theory; on the contrary, risk theory and the PP both have the same objective: that of protecting people against risks.¹⁹⁶

The prevalence of strict liability regimes in environmental law is fully justified by the three principles. In particular, the PP should prevent operators from taking advantage of scientific uncertainty to justify damage caused by their activities; the very fact of operating an activity that poses risks to others must be considered to give rise to an obligation to repair damage resulting from it.

The influence of the PP should by the same token be felt in the context of civil liability in assessing the ‘information requirement’ that applies to professionals. In effect, that principle requires that information provided by operators is not limited to scientifically established risks but also includes those that are likely or which give rise to suspected effects that have not yet been fully proved. In assessing professional liability the courts should take a stricter stand on the information communicated to consumers and should penalize those who have been content to disseminate information that downplays the risks generated by their products.

Furthermore, the duty to interpret national law in conformity with EU law can influence the content of tort liability. It can be said that, via the doctrine of consistent interpretation, the civil liability of the tortfeasor might increase in the light of the requirements of environmental law principles found in EU directives and regulations. For example, under the EU interpretative obligations of the PPP the defendant could be held more strictly liable than under the liability regime of national legislation taken in isolation.¹⁹⁷

¹⁹⁵ See the discussion on civil liability regimes in Chapters 1–3.

¹⁹⁶ See the discussion in Chapter 3, Subsection 6.2.3.3.

¹⁹⁷ G Betlem, *Civil Liability for Transfrontier Pollution* (Graham & Trotman, 2001) 222. However, one has to differentiate between the impact of indirect effect doctrine on civil and criminal liability. See Subsection 4.3.

However, some people are concerned that the PP might eventually turn into a legal time-bomb which, years after the fact, could engage liability for operators who made decisions without full knowledge of the consequences. They would then find themselves dragged before the courts and held liable for risks accepted at an earlier time on the basis of hoped-for benefits. We consider these fears excessive. While it is true that courts could more easily penalize a lack of duty of care by invoking the PP, they are unlikely to wish to abuse the correct application of the principle in this way.

4.3 Principles and criminal liability

Is the PP incompatible with criminal law? The question needs to be put because the environmental principle on the one hand and this area of the law on the other might appear at first sight to be quite distant from each other.

It is instructive to start by considering an analogy with civil law. A producer of goods is liable for any damage caused, unless they are able to demonstrate 'that the state of scientific and technical knowledge at the time when it placed the goods into circulation would not have made it possible to establish the existence of the defect'.¹⁹⁸ Accordingly, the producer will incur criminal liability based on the knowledge available at the time of the event if it was unable to ensure the safety of the product marketed by it. The producer must bear responsibility for any scientific uncertainty. Thus, the producer has every interest in avoiding any risks. Can this form of reasoning, which is inherent in civil law where the PP has a promising future, be transposed to criminal law in the light in particular of the principle of no punishment without law (*nullum crimen, nulla poena sine lege*)?

This is indeed a significant question given that the PP is akin to a scarecrow for many decision-makers. There are a number of reasons why decision-makers currently feel far more exposed to prosecution than was previously the case. First, the regulatory impetus that is now apparent within the fields of environmental, health, and consumer protection has been accompanied by a proliferation in the number of offences, with each new provision being associated with penalties for non-compliance. In addition, owing to the relatively painless nature of civil judgments as a result of general insurance and the growth of guarantees or compensation funds, victims are increasingly turning from civil to criminal proceedings.¹⁹⁹ Finally, decision-makers are worried at the willingness of criminal courts to be more severe with defendants who wielded the greatest power when an offence

¹⁹⁸ Art 1386-11,4°, c.

¹⁹⁹ In France several ministries have been prosecuted and found guilty by the *Cour de Justice* of the Republic for infractions committed when exercising their powers in connection with AIDS-contaminated blood.

was committed. Out of the possible consequences of the application of the PP, an increase in the number of criminal proceedings is obviously the one that is most feared by public or private decision-makers whose negligence may have given rise to risks with harmful consequences. This tendency towards criminalization will fuel their fear of criminal prosecution. In order to avoid risking criminal liability, they may tend to make excessive use of precaution, to the detriment of innovation.

Nevertheless, any violation of the PP must be specifically provided for under the Criminal Code or under special criminal legislation. This requirement results from the fundamental principle of no punishment without law, under which a criminal conviction must be based on a legal offence that was provided for in a sufficiently clear and definite manner before the events that resulted in the prosecution took place. The drafting of sufficiently clear and precise texts must enable each person to act in such a way as to avoid criminal punishment. In effect, respect for individual liberties demands that it is the law that strictly defines the constituent elements of an offence and the penalties incurred by the defendant. In addition, it is difficult to reconcile *ex ante* the extremely general principle of precaution with the requirement of legality.

In almost all legal systems, the failure to exercise precaution does not in general constitute an offence. Similarly, no criminal sanction specifically provided for by law punishes the violation of this principle, even though numerous offences are premised on a lack of precaution (e.g. in the area of hazardous waste management).²⁰⁰ Absent any criminal provision that expressly covers a failure to exercise precaution, the defendant will not be exposed to any greater penalty. For this reason, a broad interpretation of the criminal law in the light of the PP would run contrary to the principle of no punishment without law. Moreover, the fact that the principle is enunciated in a directive cannot establish or aggravate any liability in criminal law for persons acting in breach of that directive.²⁰¹

That said, the PP might eventually insinuate itself into some offences that are defined in very general terms.²⁰² Until a short time ago, the constituent elements of the offence endangerment were largely based, for a specific technical field, on the common standards, obligations, and prohibitions characteristic of a trade or profession. For several years now however, many national laws have recognized offences based on the 'endangerment of others'.²⁰³ In such cases the offence is

²⁰⁰ A Marchai, 'Le délit de mise en péril et son objet' (1968–1969) *Revue de droit pénal et de criminologie* 299.

²⁰¹ Case C-14/86 *Pretore di Salò v X* [1987] ECR I-2545; Case C-80/86 *Kolpinghuis Nijmegen* [1987] ECR I-3989.

²⁰² E Dreye, 'Droit pénal et principe de précaution' (2015) D 1912.

²⁰³ See the French Criminal Code, Art 223–1, under which 'the fact of directly exposing another to an immediate risk of death or wounding ... by an patently wilful violation of a specific requirement of safety or duty of care laid down by law or regulation is punishable by one year's imprisonment ...'. See also the Swedish Penal Code, Art 9, and the US Model Penal Code, Art 211–2.

complete even where no specific harm has occurred. It is not necessary to cause harm: it is rather the offender's clear lack of concern that is sanctioned, in that it demonstrates their indifference to the potential consequences of their act.

Such offences leave extremely broad discretion to the criminal courts, which must assess on a case-by-case basis the extent of the danger caused by the offender. In such cases, the PP could lead the criminal courts to treat more severely any defendants who did not bother to consider all of the possible consequences of their acts, thus potentially exposing society to clear risks. In any case, however, it is not possible to convict a person hypothetically due to pure endangerment.

5. Concluding observations

In seeking to throw light on the legal nature of the polluters-pays, preventive action, and precautionary principles, we must take care not to rely on *appearances*. All the provisions in this legal discipline that are designated as 'principles' do necessarily constitute true normative principles; inversely, certain provisions that are not termed 'principles' nonetheless share the characteristics of normative principles. The identification of the legal status of these provisions should be determined by conceptual rather than nominalistic steps. Similarly, it requires a nuanced assessment rather than an overly categorical judgement, since the latter would merely destroy their flexibility.

In order to qualify as normative principles, provisions must be taken up in legally binding text (formal approach) and be addressed to specific categories of people—in this case State authorities—and prescribe duties (substantive approach). The wide discretion given to public authorities in formulating environmental regulation under principles such as precaution or preventive action does not call into question the status of normative principles. Indeed, the fact that principles are highly abstract, that their binding character may be less marked than that of precise substantive norms, and that that they are not sanctioned by criminal law does not deprive them of all normative effect, as long as they are taken up in binding legal sources and set out in sufficiently prescriptive terms. When they are laid down in text with normative effect in international law (e.g. a multilateral agreement); in EU law (e.g. treaty law, a directive, or a regulation); or in national legal systems (e.g. framework legislation) the majority of directing principles thereby assume the characteristics of rules of indeterminate content.

The multifaceted nature of the three principles we observed is justified by the specificity of the environmental policy, which implies a tailored approach according to the nature of the risk. The absence of a single expression of a principle does not deprive it from its legal effect. Of course, their high degree of generality

entails a twofold corollary: on one hand they are somewhat less binding than more prescriptive rules, and on the other hand their legal predictability remains uncertain. We have seen, however, that the most emblematic environmental law principles described in Part I are not necessarily synonymous with legal uncertainty.

Environmental Directing Principles versus Free Trade

1. Introductory remarks

Trade liberalization constitutes a driver of environmental change. The beginning of the twenty-first century will be thus remembered for two parallel developments without precedent in the history of humankind: on one hand the emergence of ecological crises of global scope (climate change, loss of biodiversity, ozone depletion, etc.) and on the other hand a progressive liberalization of world trade, embodied at the international level by the conclusion of the Uruguay Round in 1994. Underlying these parallel developments is a clash of legal rules on several fronts that goes well beyond the disputes of the past. The doctrine of free trade, based on the postulate that products should be able to circulate freely without hindrance from technical obstacles erected by States, is traditionally opposed to national or regional regulation in the areas of public health or environmental protection. Indeed, the need to open up markets directly conflicts with the need to promote legitimate environmental objectives. Moreover, environmental and trade law are embodied in two distinct branches of international law: the former is embodied in a flurry of multilateral environment agreements (MEAs) whilst the latter is integrated in World Trade Organization (WTO) law and regional trade agreements. Although the continuous expansion of international trade rules has recently led to much larger linkages with environmental issues,¹ efforts to reconcile these two distinct bodies have hitherto been unsuccessful.

In an attempt to attenuate these conflicts international organizations have sought to harmonize national rules (positive harmonization) by setting common denominators able to facilitate commercial exchanges.² Nevertheless, positive harmonization is difficult to achieve at international level,³ and even at EU

¹ CJEU, Opinion 2/15 [2017] C:2017:376, paras 142–8.

² In this regard it should be noted that the TBT and SPS Agreements promote the harmonization of standards (TBT Agreement, Art s 2(4), 2(6), and 9 of the; SPS Agreement, Art 3(4)). Positive harmonization is transposed into EU law through the adoption of directives and regulations based on the Treaty on the Functioning of the European Union (TFEU), Art 114 intended to guarantee the functioning of the internal market.

³ One must fear that the international negotiation process will lead to the lowest common denominator, as few States in the world have very high protection levels.

level.⁴ When no common ground can be found between States that do not share the same goals, free trade is encouraged by a principle of mutual recognition that allows goods lawfully produced and marketed in one State to be commercialized in another State (negative harmonization) and by requiring States that impose stricter standards than those applied in the producer country to prove that those standards are necessary to protect the citizens of the State regulating them, and to prove that they are not discriminatory to the producer State.

Ideally, free trade presupposes that States share concepts of product safety on one hand and of human health and the environment on the other. In fact, goals for the protection of human health, the environment, and consumers vary appreciably from one State to another. Hormones in meat, for example, which are banned in the EU because of consumer concerns about their effects, are freely available across the Atlantic.

States can be inclined to lower their standards with a view to attracting trade and investment, leading to a race to the bottom. These pollution havens will give a competitive edge to undertakings avoiding stringent environmental standards. In addition, their attempts to increase standards can be challenged before investor state dispute settlement (ISDS) tribunals, giving rise to a regulatory chill. In contrast, other States are not only pursuing higher environmental standards but are also willing to place restrictions on imported products to reduce their environmental impact caused by the ‘process and production methods’ (PPMs).⁵ Consumers in the developed countries have also become concerned about the collective risks (emissions of greenhouse gases (GHG), non-sustainable industrial operations, etc.) to which they contribute through their consumption patterns. In particular, a wave of food safety scandals has put public health in the spotlight and undermined the confidence of European consumers, and consequently also that of their public representatives in food production techniques such as hormones and genetically modified organisms (GMOs).

By adopting a higher level of safety to respond to such concerns, these more advanced States are acting in ways likely to restrict commercial trade with States that do not share these goals; their competitors will view such measures as disguised protectionism.⁶ Thanks to further market integration stemming from free-trade agreements, the stricter environmental standards are likely to be adopted by foreign producers that are exporting to that market (‘California effect’). The imposition of PPM measures nonetheless questions the right of the exporting countries

⁴ The establishment of the EU internal market after the Single European Act (SEA) entered into force has been seen by some Member States as a downward harmonization. See N de Sadeleer, *EU Environmental Law and the Internal Market* (OUP, 2014)

⁵ *EC—Measures Prohibiting the Importation and Marketing of Seal Products*, WTO Doc. WT/DS400/AB/R and WT/DS401/AB/R (16 June 2014).

⁶ Developing states can also enact discriminatory environmental measures. See *Brazil—Measures Affecting Imports of Retreaded Tyres*, WTO Doc. WT/DS332/AB/R (17 December 2007).

to determine their own level of protection and increases barriers to trade.⁷ There is thus every reason to believe that the WTO's criticism of EU's measures against hormones and of the United States' actions in cases relating to the exploitation of marine resources (the *Tuna-Dolphin* and *Shrimp-Turtle* cases) are only the first in a wider series of trade crises.⁸

Some principles of environmental law, particularly the precautionary principle (PP), have taken these conflicts to a higher stage by widening the gap between the conditions underlying international trade liberalization and the urgent need, recognized particularly by the EU, to adopt a high level of protection for the environment, consumers, and public health. Does the EU, which is more likely than its trading partners to invoke that principle in international forums, have the right to apply it beyond the scope envisaged in the various WTO agreements? In other words, does repeated State use of the PP render it a general principle of international law or a customary rule? That question, which has been the subject of important debates in international legal circles, has been addressed in Chapter 6.

The purpose of this final chapter is to demonstrate how some of the environmental directing principles described in Part I of this book can shed new light on the conflict between free trade and environment protection. Since the relationship between trade and environment has been examined in numerous legal analyses over the past decades, we confine our consideration here to how such principles have influenced the resolution of conflicts.

2. Environmental directing principles versus GATT/WTO obligations

2.1 Background

Before 1994, the environment–trade debate was primarily an arcane speciality that attracted little attention within the legal community. In endeavouring to encourage ‘the full use of the resources of the world,’⁹ the General Agreement on Tariffs and Trade (GATT) 1947 system paid very little attention indeed to environmental concerns; consequently, trade policy and environmental policy evolved along separate paths for several decades. Despite the change of tone in 1994 in the

⁷ A Ziegler and D Sifonis, ‘The Assessment of Environmental Risks and the Regulation of PPMs in International Trade Law’, in M. Ambrus et al (ed), *Risk and the Regulation of Uncertainty in International Law* (OUP, 2017) 220.

⁸ *US—Restrictions on Imports of Tuna*, not adopted, GATT BISD 39S/155 (1991) (hereinafter *Tuna I*); *Report on US—Restrictions on Imports of Tuna*, not adopted, WT/DS/29/R (10 June 1994) (hereinafter *Tuna II*); *US—Import Prohibition of Certain Shrimp and Shrimp Products*, adopted, WTO Doc. WT/DS/58/R (6 November 1998).

⁹ GATT 1947, Preamble.

wording of the WTO's aims—'an optimal use of the world's resources in accordance with the objective of sustainable development'¹⁰—the fundamental principles of GATT remain unaltered; environmental concerns are still considered the black sheep of the trading community. Indeed, under both the GATT Agreement and the Technical Barriers to Trade (TBT) Agreement, environmental concerns are likely to justify derogations to the obligations encapsulated in these treaties, derogations that should be interpreted narrowly.¹¹ Moreover, the Members implementing these more trade-restrictive measures are called on to comply with a necessity test. Principle 12 of the Rio Declaration on Environment and Development, which states that 'trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade' in its own way also recognizes the primacy of free trade over environmental interests. Furthermore, Principle 12 clearly discourages unilateral action to deal with environmental challenges outside the jurisdictions of importing countries; transboundary or global issues should be based, as far as possible, on international consensus.¹²

As a result, trade restrictions to achieve environmental goals have given rise to an increasing number of international trade disputes during the two past decades. Recently, with the emergence of the circular economy and the EU 2019 green deal, the 'trade-environment' relationship has become one of the hottest topics in a number of political circles.

Environmental principles such as those of prevention or precaution are important factors in the trade–environment debate, since they can be used under multilateral environment agreements (MEAs) to justify the adoption of trade measures which potentially conflict with WTO obligations. First, it must be stressed that several trade-related environmental measures (TREM) have been justified in the light of environmental directing principles (Subsection 2.2). Secondly, those principles could be invoked before WTO Dispute Settlement Bodies (DSBs) to justify these trade measures. At this point we should recall that TREMs are not always the result of international co-operation but can also be the expression of unilateral State policy. We will therefore distinguish between multilaterally agreed (Subsection 2.3) and unilaterally enacted TREMs (Subsection 2.4), even though the distinction is at times not an easy one.¹³

¹⁰ 1994 WTO Agreement, Preamble. As noted by the WTO AB, this change in orientation must 'add colour, texture and shading to the interpretation of the agreements annexed to the WTO Agreement' (*US—Shrimp* (n 8), para 153).

¹¹ GATT, Art XX; TBT, Art 2.2.

¹² M Young, 'Principle 12', in J Viñuales (ed), *The Rio Declaration on Environment and Development* (OUP, 2015) 325–49.

¹³ P Demaret, 'TREM, Multilateralism, Unilateralism and the GATT', in J Cameron et al (eds), *Trade and the Environment: The Search for Balance*, vol. I (Cameron May, 1994) 59.

2.2 Justification of trade-related environmental measures (TREMs) in the light of environmental directing principles

Among the hundreds of environmental treaties a small number of MEAs allow TREMs in order to increase their effectiveness. In particular, restrictions on trade with non-Parties may be put in place to prevent free riders from enjoying benefits without adhering to a multilateral agreement, as well as to encourage non-Parties to become signatories to a convention.

Trade restrictions on non-Parties are to be found in the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, which is influenced by a precautionary approach,¹⁴ and the 1973 Convention on International Trade in Endangered Species (CITES), which has progressively been based on a precautionary approach.¹⁵ Without such measures, these agreements would be easily scuttled by the non-Parties that are likely to trade in prohibited goods.¹⁶

TREMs also occur in the context of waste management in instruments such as the 1989 Basel Convention on the Transboundary Movement of Hazardous Wastes. The Basel Convention aims to reduce hazardous waste movements through the treatment and disposal of hazardous wastes in an environmentally sound manner (principle of prevention) as close as possible to the place where they were generated (proximity principle) and to minimize the production of wastes (principle of rectification of environmental harm at source). Several trade mechanisms have been justified in the light of the self-sufficiency principle. In particular, Parties have adopted the Basel ban amendment prohibiting the export of hazardous wastes from OECD countries to non-OECD countries for disposal or recycling, even for States that are not Parties to the Basel Convention.¹⁷

The 2000 Cartagena Protocol on Biosafety (CPB) addresses the 'transboundary movement, transit, handling and use of all LMOs (living modified organisms) that may have adverse effects on the conservation and sustainable use of biological diversity'.¹⁸ Its key element is a prior notification and consent procedure for the import and export of LMOs. The Protocol explicitly endorses the PP for the regulation of imports or exports, allowing import restrictions in the face of scientific uncertainty due to insufficient scientific information. An unlimited import ban on LMOs would undoubtedly conflict with the Sanitary and Phytosanitary (SPS) Agreement, which only allows provisional precautionary measures, while a more objective risk assessment (RA) must be obtained within a reasonable period of

¹⁴ See the discussion in Chapter 3, Subsection 2.1.

¹⁵ CITES Resolution of the Ninth Conference of the Parties, known as Conf. 9. 24. Recommendations made by the CITES Standing Committee can require Parties to prohibit all trade with a Party that is not complying with the Treaty's obligations.

¹⁶ International Institute for Sustainable Development (IISD) and United Nations Environment Programme (UNEP), *Environment and Trade. A Handbook*, 2nd ed (2005) 66.

¹⁷ Decision III/1.

¹⁸ Art 1.

time.¹⁹ As the relationship between the Protocol and WTO obligations has been one of the core areas of disagreement during negotiations, the Preamble to the CPB reflects a delicate compromise between the trade and environmental interests at stake. The wording of different recitals of the Preamble implies that although the CPB and WTO agreements are on an equal footing, they are not impervious to one another.²⁰

The use of TREMs in the major MEAs described above clearly indicates their potential for achieving specific environmental goals, in conformity with directing principles.²¹ This regulatory approach has been successful. Since the 1989 Basel Convention entered into force, the worst forms of waste dumping in developing countries have ceased, while the 1987 Montreal Protocol has served to drastically reduce the production of substances known to destroy the ozone layer.

2.3 Multilaterally agreed TREMs versus GATT/WTO obligations

Although no WTO contracting party has ever complained of alleged conflicts between GATT/WTO rules and MEAs containing environmental trade measures, such environmental agreements have given rise to questions about their consistency with the legal order regulating world trade. The core of the conflict is that the TREMs found in environmental agreements discriminate between countries on the basis of their membership in an MEA or of their environmental performance, whereas the GATT/WTO system is specifically designed to eliminate discriminatory trade practices for reasons of economic efficiency. In other words, TREMs are intentionally discriminatory, with the purpose of compelling States to change their policies or to phase out hazardous production. TREMs could thus constitute a most favoured nation (MFN) violation under Article I, contravene the non-discrimination clause in Article III, or violate the prohibition on quantitative restrictions for imports or exports according to Article XI of the GATT 1994.²²

A few well aimed changes to GATT could enable the concerns of MEAs to find a counterweight in international trade regimes.²³ As there has never been any general consensus on this issue for the moment it remains to be seen which obligation should prevail. The conflict between an MEA provision that restricts trade and a WTO obligation prohibiting restrictions on trade will have to be resolved in the

¹⁹ SPS Agreement, Art 5(7). See Subsection 3.2.3.

²⁰ S Charnovitz, 'The Supervision of Health and Biosafety Regulation by World Trade Rules' 13 (2000) *Tulane Env LJ* 271.

²¹ D Brock, 'The Shrimp-Turtle Case: Implications for the MEA-WTO Debate' 9 (1998) *YbIEL* 14.

²² C Tietje, 'Process-related Measures and Global Environmental Governance', in G Winter (ed), *Multilevel Governance of Global Environmental Change* (CUP, 2006) 254–67.

²³ G Van Calster, *International and EU Trade Law, International and EU Trade* (Cameron May, 2000) 183; P Birnie et al, *International Law and the Environment*, 3rd ed (OUP, 2013) 768–9.

light of the rules in force. That solution will differ according to the membership of the Parties: in some cases all disputants might be members of both the WTO and the MEA; in other cases only one of the disputants might be a Party to the MEA. Therefore one should distinguish between conflicts where MEA membership is identical to that of the WTO and the situation where not all WTO Parties are members of the MEA. Article 30 of the 1969 Vienna Convention on the Interpretation of Treaties (VCIT) provides for resolution of such conflicts.

2.3.1 Membership is identical

It must be recalled that the membership of the WTO Agreements is quite similar to the membership of the MEAs providing for TREMs. Therefore in most cases litigants would be parties to both the conflicting regimes, for example WTO Member States that are also Parties to the Basel Convention. Being a valid international agreement, the MEA a priori enjoys equal status with WTO obligations.

When the consistency of an MEA with GATT/WTO obligations is challenged, TREMs must be considered a limited derogation by mutual agreement,²⁴ and in particular as a consensual departure from mutual State obligations relating to import and export.²⁵ Therefore trade restrictions with an environmental purpose in MEAs should be rebuttably presumed to be 'necessary' and not 'unjustifiably discriminatory' in terms of Article XX of GATT.²⁶ In practical terms there can be no impairment of GATT/WTO obligations between Parties to the MEA, at least to the

²⁴ T Schoenbaum, 'Free International Trade and Protection of the Environment: Irreconcilable Conflict?' 86 (1992) AJIL 719; D Wirth, 'Trade Implications of the Basel Convention Amendment Banning North-South Trade in Hazardous Wastes' 3 (1998) RECIEL 242; Demaret, 'TREMs, Multilateralism' (n 13) 55.

²⁵ Some authors suggest that MEAs should be viewed as a *lex specialis* compatible with the trade regime, even if it preceded the Uruguay Round/WTO agreements in time. Nevertheless, it is difficult to decide the issue of priority of MEAs over WTO obligations on the basis of the *lex posterior derogat* rule (VICT, Art 30(3)). Prior to the Marrakesh Agreements, all the MEAs entered into force after the GATT 1947. After the entry into force of the GATT 1994, the MEAs must be considered as prior agreements in the *lex posterior* rule. In addition, the rule *generalia specialibus non derogant*, which suggests that more specific treaties enjoy priority over more general treaties whatever their date, is also difficult to apply in the MEA-WTO debate. See, e.g. Van Calster, *Trade Law* (n 23) 137.

²⁶ Of particular importance to the balance between the need to open markets and the need to regulate them in order to promote other legitimate objectives, Art XX has been the focal point for most environment-related disputes. Though Article XX(b) does not require the performance of an RA, the AB found in *EC—Asbestos* that the risk entailed by this mineral has to be of a 'very serious nature' (*EC—Measures Affecting the Prohibition of Asbestos and Asbestos Products*, WTO Doc. WT/DS135/AB/R (12 March 2001), para 167). Regarding Art XX(g), the AB requires a 'substantial relationship between the measure at issue and the objective of conservation. That relationship should not be 'merely incidental or inadvertently aimed at conservation'. See *US—Standards for Reformulated and Conventional Gasoline*, WTO Doc. WT/DS2/AB/R (20 May 1996), 19. At this stage, it is somewhat difficult to determine the extent to which the DSBs would be ready to take into consideration the PP in assessing the validity of this derogation. Some authors have emphasized that the AB's principled interpretation helped it to move away from the more rigid trade focus of earlier panel awards. See Birnie et al, *International Law and the Environment* (n 23) 765. Other regimes are much more favourable to environmental concerns. For instance, where there is conflict between the North American Free Trade Agreement (NAFTA) and the obligations of trade-related MEAs, the latter will prevail (Art 104(1)).

extent that national measures employed to implement an Agreement are consistent with that instrument.

This reasoning is supported by Principle 4 of the 1992 Rio Declaration, which provides that ‘in order to achieve sustainable development environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it’. In addition, it must be recalled that the WTO Appellate Body (AB), in the *Shrimp–Turtle* dispute, expressed a strong preference for multilateral action over unilateral action.²⁷ Therefore a strong case may be made that TREMs are permissible if they are agreed and applied multilaterally in a way that does not distinguish arbitrarily between countries.

Justification for multilaterally agreed TREMs in the light of environmental directing principles has been put forward by several authors:

the ban on imports of waste from non-Parties imposed by the 1989 Basel Convention could be considered as necessary to protect the importing Party’s own environment under the polluter-pays principle and the proximity principle. The claim can be made that, with respect to waste, a new international rule is emerging according to which each State is in principle responsible for dealing with its own waste and is, as a result, entitled to exclude waste from abroad in order to protect its environment.²⁸

2.3.2 Membership is not identical

If both litigants are parties to, for example, the SPS and TBT Agreements, it is possible that the State challenging an environmental measure may not be a Party to the MEA under dispute, for example the CPB. In the *EC–Biotech* case, neither the United States nor Canada was a party to the Protocol. In such a conflict, SPS and TBT obligations should apply because the mutual rights and obligations of the litigants are determined by the treaties to which both are Party—the SPS and TBT Agreements—and not by the treaty to which only one is Party—the CPB. The underlying logic is that WTO obligations can be altered by another treaty obligation only with the consent of the other Party (*pacta sunt servanda*). As a result, the LMO approval procedure under the CPB is likely to be considered an SPS measure; additional requirements, such as labelling,²⁹ could be considered technical measures falling under the TBT Agreement.

²⁷ *US–Shrimp* (n 8), paras 43 and 55. See also the AB Report of 22 October 2001, WT/DS58/AB/RW, para 134. The AB did require, however, that there be an environmental ‘nexus’ between the PPM measures at stake and the issue these measures addressed.

²⁸ Demaret, ‘TREMs, Multilateralism’ (n 13) 58.

²⁹ CPB, Art 18(2)(a) states that each party shall take measures to require that documentation accompanying LMOs that are intended for direct use as food or feed or for processing clearly identifies that they ‘may contain’ LMOs.

Nevertheless, some authors have argued that the use of Article 31(3)(c) of the VCIT can assist in the interpretation of a WTO Agreement even where membership in an MEA is not identical.³⁰ In such a case, the PP embodied in the CPB could be considered 'relevant' within the meaning of Article 31(3)(c) in interpreting, to take but one example, Article 5(7) of the SPS Agreement.³¹ However, in the *EC—Biotech* decision, the panel discarded that interpretation.³²

2.4 Unilaterally enacted TREMs versus GATT/WTO obligations

2.4.1 The pros and cons of unilaterally enacted TREMs

The absence of international co-operation in a number of environmental fields has led States with high standards of environmental or health protection increasingly to regulate imports of hazardous products, not only in order to safeguard their own domestic resources but also to protect public health and the environment at a global level.³³ In such instances trade measures are either adopted in the absence of agreed international standards or rules, or go beyond existing international standards. This trend is likely to take on greater importance with the adoption of measures intended to protect the environment beyond a national jurisdiction, for example the US ban on killing dolphins or endangered sea turtles when harvesting tuna or shrimp, the import restrictions on tropical timber that does not come from sustainable managed forest, or EU Regulation 3254/91 on leghold traps which bans the import into the EU of fur products originating from animals trapped by methods that do not meet 'internationally agreed humane trapping standards'. Beyond ethical or conservationist grounds, importing States concerned by a

³⁰ G Marceau, 'A Call for Coherence in International Law' (1999) JWT 123–6.

³¹ This seems to have been acknowledged by the AB in *US—Shrimp*, where it used a number of MEAs, to which all the disputants were not members, in order to interpret the term 'exhaustible natural resources' found in Art XX(g) (*US—Shrimp* (n 8), footnote 111). In *US—Gasoline*, by virtue of the Dispute Settlement Understanding, Art 3(2), the AB linked the WTO legal system to the rest of the international order and imposed on panels the duty to interpret WTO Agreements in accordance with the customary law of interpretation.

³² The Panel declared that Art 31(3)(c) was inapplicable given that the EC was the only party in this dispute bound by the CPB. *EC—Measures Affecting the Approval and Marketing of Biotech Products*, WTO Doc. WT/DS291/R (21 November 2006), para 4688. In other words, in order to interpret WTO obligations in light of an environmental principle, all WTO Members must be parties to the international agreement. Such a condition appears impossible to fulfil given the number of WTO Members. See, e.g., J Gomula, 'Environmental disputes in the WTO', in M Fitzmaurice et al (eds), *Research Handbook on International Environmental Law* (E Elgar, 2010) 415.

³³ According to the French Constitutional Council, the prohibition on exporting from France pesticides containing active substances that have not been approved under EU law violates the constitutional freedom of enterprise. However, this violation is related to the objectives of the constitutional standing of protecting health and the environment. Therefore, the legislator has struck 'a balance that is not manifestly unreasonable between freedom of enterprise and these objectives of constitutional standing'. In particular, the three-year transitional period gives the French undertakings ample transitional time in line with their freedom of commerce. WTO law is not addressed in the judgment. CC, 31 January 2020, no. 2019-823 QPC.

situation where competitive advantage is obtained through lower standards which cannot be eliminated by environmental duties will be willing to restrict the import of products based on those standards.

On one hand, unilateral trade measures may be needed under certain conditions to avoid the degradation of global commons which lie outside any national jurisdiction. For instance, unilateral measures to protect the global commons should be accepted when damage might occur before a relevant international agreement could be concluded, particularly if the adoption of such measures could hasten international consensus on the need to protect the global commons.³⁴ On the other hand, such trade restrictions raise concerns under international trade law, since they act to close markets to countries that cannot afford strict environmental controls. In sum, the willingness to influence the domestic standards of another State through import bans raises concerns about eco-imperialism.

2.4.2 The importance of scientific justification for unilaterally enacted TREMs

Some Uruguay Round instruments, notably those on TBT and SPS, establish a legal presumption that national standards are compatible with the system if they conform to international standards (e.g. Codex Alimentarius, Comité Européen de Normalisation (CEN), International Standard Organization (ISO)).³⁵

However, international standards can be deemed ineffective or inappropriate owing to varying geographical or climatic conditions or production systems. Therefore Article 2(4) of the TBT Agreement states that Member States are not obliged to use international standards as a basis for their technical considerations: 'for instance because of fundamental climatic or geographic factors or technological problems'. In this case, if a Party implements a stricter standard than the international one, the complainant bears the burden of proving *prima facie* that the higher standard is inconsistent; thereafter the onus shifts to the defendant, which will have to prove that its measure needs to be stricter than international standards, guidelines, or recommendations in order to achieve specific goals and that it is not discriminatory. Furthermore, a higher level of protection than that afforded by international standards, guidelines, or recommendations can be justified only if there is scientific justification according to the SPS Agreement.³⁶ According to the TBT Agreement, in assessing the health or environmental risks that a technical regulation is intended to avoid the national regulator is obliged to consider, among other things, 'the available scientific information'.³⁷

³⁴ E Brown-Weiss, 'Environment and Trade as Partners in Sustainable Development' 86 (1992) AJIL 733; Demaret, 'TREMs, Multilateralism' (n 13) 64.

³⁵ SPS Agreement, Art 3(2); TBT Agreement, Art 2(2).

³⁶ SPS Agreement, Art 3(3). According to that provision, however, the application of measures which result in a lower standard of protection than the level afforded internationally is not deemed to be inconsistent with the SPS Agreement.

³⁷ TBT Agreement, Art 2(2).

Where disputes arise scientific analysis is called upon as an essential means of conflict resolution. A State that is unable to provide scientific justification for its measures may not maintain them. The appropriateness of a measure is reviewed on the basis of scientific assessment alone, since the SPS and TBT Agreements do not permit economic and social factors to determine such choices. Difficulties arise, however, when the level of protection adopted is based on scientific grounds that are disputed owing to the absence of definitive proof.³⁸ We have seen earlier in this work how WTO DSBs have until now subjected uncertainty to strict constraints, making it difficult for States to pursue a higher level of protection than that set by international standards or guidelines within a context of scientific uncertainty.³⁹ Thus scientific justification lies at the heart of conflicts between the free circulation of goods and national or regional policies of health and environmental protection.

In this context assessing risk becomes a task of paramount importance. Recognition of scientific uncertainty by virtue of the PP would make it easier for States to seek a higher level of protection; requiring scientific certainty to justify stricter national measures would, on the contrary, re-establish the primacy of free trade.

2.4.3 The role of environmental directing principles

Principles of general or customary international law⁴⁰—among them, in our view, the PP—must under certain conditions be taken into account by Dispute Panels and the AB in their interpretation of Article XX or other related provisions, even if they are not specifically embodied in an MEA.⁴¹ AB decisions, including *US—Gasoline*⁴² and *US—Shrimp*⁴³ have acknowledged that even in the case of unilateral trade measures the WTO system remains part of a broader body of international law. According to this new jurisprudential trend, which represents a departure from earlier GATT panel jurisprudence, the WTO system is not a hermetically sealed regime that may refuse to take basic principles of environmental law into account.

³⁸ In the French *Asbestos* case, the AB held that where there is a scientifically proven risk to health 'WTO members have the right to determine the level of protection ... that they consider appropriate'.

³⁹ See the discussion on SPS case law in Chapter 3, Subsection 3.5.3.3.2.

⁴⁰ See the discussion in Chapter 6, Subsections 3.2.3 and 3.2.4.

⁴¹ Marceau, 'A Call for Coherence' (n 30) 87.

⁴² In that case the WTO AB stated that 'customary rules of interpretation' would include VCIT, Art 31, which 'has attained the status of a rule of customary or general international law' (*US—Gasoline* (n 26), p. 17).

⁴³ For instance, the concept of 'natural exhaustible resources' embodied in the words of Art XX(g) must be interpreted, according to the AB, 'in the light of contemporary concerns of the community of nations about the protection and conservation of the environment' (*US—Shrimp* (n 8), para 129). The AB also considered the 1992 Rio Declaration on Environment and Development to illustrate international support for a multilateral approach to the adoption of environmental measures (*US—Shrimp* (n 8) para 168).

Article 31(3)(c) of the 1969 VCIT is once again of particular relevance for customary environmental principles. This Article provides that ‘there shall be taken into account, together with the context ... (c) any relevant rules of international law applicable in the relation between the parties.’ Article 31(3)(c) could be developed into an operationally useful tool to oblige the WTO DSBs to interpret classical obligations in the light of new principles of customary international law, such as the PP and the obligation to prevent transboundary environmental harm.⁴⁴ If such an approach were taken in future it would enhance the value and authority of the directing principles of environmental law identified in Part I.⁴⁵

Although WTO DSBs have in the past referred to various MEAs, and in that connection to Article 31(3)(a) and (b), when reviewing unilateral trade measures they have thus far resisted any reference to Article 31(3)(c) of the VCIT. However, this situation might be set to change. In the *EC—Hormones* case the AB reviewed the status of the PP; while it did not rule on its status in international law,⁴⁶ it supported its application by acknowledging the right of a Party to establish its own level of protection and softening the requirements for RA in such a way as to allow a wider margin for consideration of the principle. The AB also made extensive use of the general principle of *in dubio mitius* in this case, enlarging the scope of the EC’s discretion to determine its own health standards.⁴⁷

Two examples illustrate how more systematic recourse to the principles could prove particularly useful in supporting some unilateral measures. First, according to one author, an absolute ban on imports of hazardous wastes from abroad could be considered consistent with Article XX if it could be justified in the light of the polluter-pays and proximity principles;⁴⁸ the latter aims to restrict transboundary movements of wastes and hazardous substances to the greatest possible extent.⁴⁹ In this respect interesting comparisons could be made with the case law of the CJEU, which has ruled that such a unilateral prohibition is permissible under the TFEU.⁵⁰

Secondly, the principle of rectification of environmental harm at source may shed new light on the ability of Parties to ban imports of goods produced using environmentally unsustainable practices. From the viewpoint of sustainable

⁴⁴ P Sands, ‘Environmental Protection in the Twenty-First Century: Sustainable Development and International Law’, in RL Revesz et al (eds), *Environmental Law, the Economy, and Sustainable Development* (CUP, 2000) 403.

⁴⁵ The AB concluded that the PP, at least outside the field of international environmental law, still awaits authoritative formulation and does not override the provisions of the SPS Agreement. *EC—Measures Affecting Meat and Meat Products (Hormones)* (*EC—Hormones*) WTO Doc. WT/DS26&48/AB/R (13 February 1998) (hereinafter *EC—Hormones I*), para 403).

⁴⁶ *EC—Hormones I* (n 45), para 123.

⁴⁷ J Cameron, ‘Dispute Settlement and Conflicting Trade and Environment Regimes’, in A Fijalkowski and J Cameron (eds), *Trade and the Environment* (Cameron May, 1998) 20.

⁴⁸ Demaret, ‘TREM, Multilateralism’ (n 13) 60–1.

⁴⁹ The proximity principle is embodied in the 1998 POPs Protocol to the Convention on Long-range Transboundary Air Pollution (CLRATP), Art 3(1) of the Protocol stipulates that, whenever feasible, disposal should be carried out domestically.

⁵⁰ de Sadeleer, *EU Environmental Law* (n 4) 237–320.

development the production process is as important as the characteristics of the goods themselves.⁵¹

Nevertheless, Article 31(3)(c) of the 1969 VCIT only requires States 'to take into account ... the relevant rule'; therefore although the customary principle of rectification at source can influence the contested conventional norm it cannot replace it. Furthermore, there is no guarantee whatsoever that international environmental law principles, supposing they were to be included in the reasoning of WTO DSBs, would be correctly implemented by those bodies.⁵²

3. The precautionary principle in WTO law

The PP is not mentioned explicitly in any of the constitutive agreements of the WTO, although recourse to the principle has been somewhat unsatisfactorily addressed on a case-by-case basis by the WTO DSBs. It thus comes as no surprise that authors have been crossing swords as to whether WTO law allows or accommodates Members to enact precautionary measures. The aim of this chapter is to shed light on these controversies. Given that the PP came into the forefront in cases regarding the SPS Agreement, the first subsection is concerned with the manner in which a precautionary approach has been taken into consideration so far. A second subsection examines whether the GATT Agreement could justify measures implementing the PP.

3.1 SPS Agreement case law

WTO DSBs have already tackled the PP in a number of cases concerning health measures.⁵³ These cases are of interest to environmental lawyers as the public health issues that they raise concerning the nature of RA may be similar to issues that arise in environmental cases regarding restrictions placed upon hazardous substances.

The SPS Agreement elaborates specific rules 'for the application of Article XX(b)' of the GATT that allow national measures 'to protect human, animal and plant

⁵¹ From an environmental point of view the possibility of differentiating between products according to the sustainability of their production process is important because environmental policy intends to discriminate against environmental unfriendly products in favour of less damaging substitutes. See Chapter 3, Subsection 3.5.3.4.5. The AB recognized that the 'effects of a product, such as carcinogenicity or toxicity' constitute a defining aspect of the physical properties of the product that have to be taken into account in assessing the likeness of two products (EC—*Asbestos* (n 26), paras 113–14). In the case of GMOs, it would be difficult to maintain that a modified organism is indeed the same ('like product') as a non-modified organism, whatever their outward appearance. This distinction finds support in the PP.

⁵² JL Dunoff, 'Border Patrol at the WTO' 9 (1998) YbIEL 27.

⁵³ J Scott, *The WTO Agreement on SPS Measures: A Commentary* (OUP, 2007).

life or health.⁵⁴ In particular, this agreement strikes a delicate balance between the right of Members to adopt and to maintain measures ‘necessary to protect human, animal or plant life or health’ and the need to restrict the use of such measures for protectionist purposes. Given that SPS measures must necessarily achieve their goals, less trade restrictive alternatives must be excluded (necessity test).

In virtue of Article 2.2, Members have the right to enact SPS measures if they are based on ‘scientific principles’ and are not maintained without ‘sufficient scientific evidence’. Furthermore, pursuant to Article 2.3, SPS measures may not be chosen arbitrarily or give rise to ‘unjustifiable restriction or disguised restriction on trade’.

In accordance with Article 3.2, WTO Members may choose measures that ‘conform to international standards’ (e.g. Codex Alimentarius). Nonetheless, Article 3.3 allows them to introduce or maintain a distinctively higher level of protection than these international standards, so long as their measures are:

- scientifically justified;
- or adopted ‘as a consequence of the level of sanitary or phytosanitary protection a Member determines to be appropriate in accordance with the relevant provisions of paragraphs 1 through 8 of Article 5’.

Regarding the scientific justification of the SPS measures, Article 5.1 requires ‘an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations’. Moreover, in virtue of Article 5.2 ‘in the assessment of risks, Members shall take into account available scientific evidence’. Accordingly, science is regarded as the benchmark of rational policy-making. As discussed below, this reasoning has been endorsed by the DSB that took the view that Article 5.1 has to be interpreted as entailing the performance of an RA.

As the language used in these provisions is not always a model of clarity, the text leaves many questions unanswered. Indeed, the concepts of ‘scientific principles’ as well as ‘insufficient scientific evidence’ laid down in Articles 2.2 and 5.7 are left undefined. Likewise, the concept of RA provides little clarification as to the content and the methodology of such assessment.⁵⁵

A number of disputes have arisen in relation to these provisions. In two decisions of 18 August 1997, a WTO Panel determined that identification of the risk posed by hormones in meat was a condition *sine qua non* for the RA required by Article 5. Failing such an identification, the European Community (EC) was not justified in having recourse to the PP to justify its ban on hormones in beef, which was being

⁵⁴ Preamble, last sentence.

⁵⁵ J Peel, *Science and Risk Regulation* (CUP, 2011) 182.

challenged.⁵⁶ According to the Panel, the PP is applicable only in the case of provisional measures under Article 5.7 of the Agreement. The Panel could not have been clearer: any measure that restricts trade must be based on fully assessed risks and not on the uncertainties inherent in scientific research.⁵⁷ The AB, for its part, accorded a broader role to the PP but left open the way in which it should be applied.⁵⁸

Whereas the EC argued that the PP was embedded in international customary law, the AB declined to rule on its status, stating that it was ‘unnecessary, and probably imprudent’ for it to take a position on the legal status of this principle.⁵⁹ It nevertheless acknowledged that the PP ‘finds reflection in Article 5.7 of the Agreement’, where it is not expressly recognized.⁶⁰ Furthermore, it noted that the principle is reflected in the sixth paragraph of the SPS Agreement’s Preamble and in Article 3.3, both of which recognize the right of Members to individually determine the appropriate level of sanitary protection even if this is different from the level of protection that would be achieved by measures based on ‘international standards, guidelines or recommendations’.

However, the PP does not by itself, and without a clear textual provision to that effect, relieve a Panel of the duty to apply the normal principles of treaty interpretation. Accordingly, the AB dismissed the Commission’s view that there was no requirement to carry out a formal RA under Articles 5.1 and 5.2. Given that the SPS measures must be supported by scientific evidence, these two paragraphs entail the obligation to perform an RA. In other words, scientific justification requires the performance of such an RA. Moreover, given that the PP is not incorporated into the SPS Agreement, it could not override the explicit wording of Articles 5.1 and 5.2. Accordingly, the EC had to rely on an RA in order to implement its precautionary measures.⁶¹ The AB consequently held that the EC ban on hormone-treated beef was incompatible with the SPS Agreement.

Later on, the EC carried out an RA in order to buttress the soundness of the measures found to be WTO-inconsistent in the *EC—Hormones* case and requested the DSB to remove the US retaliatory measures. In 2008, the AB reversed the Panel’s finding that the EC’s import ban relating to oestradiol-17 β was not based on an RA

⁵⁶ *EC—Measures Concerning Meat and Meat Products (Hormones)*, Complaint by the United States, OMC WT/DS 26/R/USA (18 August 1997); *EC Measures Concerning Meat and Meat Products (Hormones)*, Complaint by Canada, OMC WT/DS 48/R/Can (18 August 1997).

⁵⁷ *Ibid.*, sub. VIII D5 (b)(iii).

⁵⁸ *EC—Measures Affecting Meat and Meat Products (Hormones)* (*‘EC-Hormones’*), WTO Doc. WT/DS26&48/AB/R (13 February 1998) (hereinafter *EC-Hormones I*). For a review of the literature on this case, see Peel, *Science and Risk Regulation* (n 55) 215.

⁵⁹ Concerning the customary value of the principle, see Chapter 6, Subsection 3.2.4.

⁶⁰ *EC—Hormones I* (n 45), para 124.

⁶¹ In the *Hormones* case, the AB concluded that the risk assessors should have reviewed the carcinogenic potential, not of the relevant hormones in general, but of ‘residues of those hormones found in meat derived from cattle to which the hormones had been administered for growth promotion purposes’ (para 200). In the *Japan—Varietals, Japan—Measures Affecting Agricultural Products*, WTO Doc. WT/DS76/AB/R, (22 February 1999), the AB endorsed the same reasoning (para 199).

as required by Article 5.1; however, the AB made no findings as to the consistency or inconsistency of the import ban relating to oestradiol-17 β with Article 5.1.⁶²

A second dispute in which the PP was invoked, *Australia—Salmon*, arose from a decision by Australia to ban fresh, chilled, or frozen salmon imported from Canada. The Australian measure was based on an RA that, according to the Panel, ‘addressed and to some extent evaluated a series of risk reduction factors, in particular, on a disease-by-disease basis.’ Referring to its *EC—Hormones* Report,⁶³ the AB stated, in its report of 20 October 1998, that in this kind of case an RA must evaluate, among other things, the likelihood of adverse health effects: ‘the “risk” evaluated in a RA must be an “ascertainable risk”’; theoretical uncertainty is not the kind of risk which, under Article 5.1 of the SPS Agreement, is to be assessed. ‘Science can never provide absolute certainty that a given substance will not ever have adverse health effects.’⁶⁴ As a result, it will not be sufficient for governments to impose regulations simply on the basis of the ‘theoretical’ risk that underlies all scientific uncertainty.⁶⁵ Hence, a risk in the context of Article 5.1 is more than a mere possibility.⁶⁶ This does not mean, however, that a Member cannot determine its own appropriate level of protection to be ‘zero risk.’ However, in *Australia—Salmon*, the AB concluded that the import prohibition on salmon was not based on an RA as required by Article 5.1 and that Australia had therefore acted at variance with this provision.⁶⁷

In a report of 22 February 1999, *Japan—Varietals*, the AB again based its decision on the *EC—Hormones* case to reject direct application of the PP and rule against a Japanese import prohibition that was not based on an RA.⁶⁸

Finally, the Panel report of 29 September 2006 in *EC—Biotech* dismissed the precautionary arguments put forward by the EU authorities regarding the restrictions put on the placing on the market of different GMOs.

3.2 Lessons to be drawn from the DSBs case law

The following conclusions can be drawn from the *EC—Hormones*, *Australia—Salmon*, *Japan—Varietals*, and *EC—Biotech* cases. The PP can be applied through two different venues:

⁶² *US—Continued Suspension of Obligations in the EC—Hormones Dispute*, WTO Doc. WT/DS320/R (14 November 2008) (hereinafter *EC—Hormones II*), paras 207–8.

⁶³ In *EC—Hormones II* (n 62), the AB reiterated its previous findings regarding the need to assess ‘ascertainable’ risk rather than ‘theoretical uncertainty’ (para 569).

⁶⁴ *EC—Hormones I* (n 45), para 187.

⁶⁵ Peel highlights that the dividing line between what is ascertainable as a matter of science and what falls into the realm of uncertainty is inherently fuzzy because science can never provide full certainty. See Peel, *Science and Risk Regulation* (n 55) 200–2.

⁶⁶ M Matsuhita et al, *The WTO. Law, Practice, and Policy* (OUP, 2004) 495.

⁶⁷ *Australia—Measures Affecting the Importation of Salmon*, WTO Doc. WT/DS18/AB/R (6 November 1998).

⁶⁸ *Japan—Varietals* (n 61).

- where there is sufficient scientific evidence, Members may choose their level of protection provided that, in accordance with Article 5.1, an RA has been carried out; the measure must have a reasonable relationship with the RA;⁶⁹
- where there is insufficient scientific evidence, Members can adopt provisional SPS measures in accordance with Article 5.7.

This calls for a closer analysis of the role that a precautionary approach could play at these two stages.

3.2.1 Recourse to an RA in accordance with Article 5.1

Given that Article 5.1 has been interpreted as requiring the performance of an RA, the Member can be risk-averse insofar as its measure is supported by an RA. That begs the question: what is an RA?

Although the SPS Agreement provides little guidance as to the characteristics of an RA, the lessons to be drawn from the above case law provides important lessons which could be transposed to other types of RA procedures, particularly in the field of environmental protection. In *EC—Hormones*, the Panel understood the term RA to mean ‘at least for risks to human life or health, a scientific examination of data and factual studies; it is not a policy exercise involving social value judgments made by political bodies.’ The AB took the view that an RA is ‘a process characterized by systematic, disciplined and objective enquiry and analysis’ which must be specific to the facts of the case, and examine risk as it applies to ‘the real world where people live and work and die.’⁷⁰ According to the Panel that adjudicated the *Bio-tech* case, an ‘adequate RA’ is one that applies Annex A(4) standards.

The principles, drawn from the *Hormones* decision, and by and large reiterated by the AB in the *Hormones II* decision can be summarized as follows:

1. Although the EC was not required to demonstrate that adverse health effects ‘would actually arise’, it was nevertheless required to demonstrate that ‘these adverse effects could arise’ from the presence of residues of hormones in meat from treated cattle.⁷¹ The risk must be ‘ascertainable’ and not ‘theoretical’, since science can never provide absolute certainty that a given substance will never give rise to adverse health effects.⁷²
2. The manner in which RAs are tailored is subject to several limits. The RA ‘must be sufficiently specific to the risk at issue.’⁷³ It must address ‘the specific

⁶⁹ I Cheyne, ‘Gateways to the Precautionary Principle in WTO Law’ 19:2 JEL (2005)162.

⁷⁰ *EC—Hormones I* (n 45), para 189.

⁷¹ *Ibid*, para 559.

⁷² *EC—Hormones I* (n 45), para 186. In *Australia—Salmon*, the AB has stated that it will not be sufficient for governments to impose regulations simply on the basis of the ‘theoretical’ risk that underlies all scientific uncertainty (para 129).

⁷³ *EC—Hormones I* (n 45), para 199; *Japan—Varietals* (n 61), para 191.

risk at issue'. The obligation placed on the member to limit the examination of residues of the hormones found in meat rather than a general evaluation of the carcinogenic potential of entire categories of hormones is compatible with the definition of an RA in Annex A(4) of the Agreement.⁷⁴

3. RA criteria are nonetheless ambiguous: on the one hand, the object and purpose of the SPS Agreement justify the examination and evaluation of all such risks for human health whatever their precise and immediate origin; on the other hand, any RA must be sufficiently specific (an RA must be conducted for each substance).⁷⁵

However, by stressing that all national precautionary measures must be based on 'sufficient scientific evidence' gathered as a result of an RA, as required under SPS Article 5,⁷⁶ the AB seems to have overestimated the role that scientific evidence may legitimately play in resolving trade disputes.⁷⁷ That said, Members are endowed with some room for manoeuvre in carrying out their RAs that would allow them to endorse a precautionary approach in addressing lingering scientific uncertainties.

1. There is no obligation to follow any particular methodology for conducting an RA.⁷⁸ Given this flexibility, Members are not precluded from organizing their RAs in accordance with the disease or pest at issue. Furthermore, they are free to consider in their risk analysis multiple agents in relation to one disease.⁷⁹
2. RAs can be conducted either quantitatively or qualitatively.⁸⁰ When a panel is charged with determining whether sufficient scientific evidence exists to warrant a WTO Member maintaining a particular measure, it 'may of course, and should, bear in mind that responsible, representative governments act from perspectives of prudence and precaution where the risk of irreversible, e.g., life-terminating, damage to human health is concerned'.⁸¹
3. The risks to be evaluated in an RA under Article 5.1 are not only risks 'ascertainable in a science laboratory operating under strictly controlled conditions'.⁸² What matters is not only risk ascertainable by standard laboratory

⁷⁴ *EC—Hormones II* (n 62), para 558.

⁷⁵ *Ibid.*, para 206.

⁷⁶ *EC—Hormones I* (n 45), para 177.

⁷⁷ R Pavoni, 'Biosafety and Intellectual Property Rights: Balancing Trade and Environmental Security—The Jurisprudence of the European Patent Office as a Paradigm of an International Public Policy Issue', in F Francioni (ed), *Environment, Human Rights and International Trade* (Hart, 2001) 95.

⁷⁸ *EC—Hormones I*, para 200; *Japan—Varietals* (n 61), para 204.

⁷⁹ *Japan—Varietals* (n 61), para 204.

⁸⁰ *EC—Hormones I* (n 45), paras 184–6; *EC—Hormones II* (n 62), para 530; *Australia—Salmon* (n 67), para 124. See also *Seal Products* (n 5) paras 5 and 215.

⁸¹ *EC—Hormones I* (n 45), para 194; *EC—Hormones II* (n 62), para 112.

⁸² *EC—Hormones I* (n 45), para 187; *EC—Hormones II* (n 62), para 527.

methods but tangible risk in the ‘real world’ and its ‘actual potential for adverse effects on human health in the real world where people live and work and die.’⁸³

4. Members can use techniques such as conservation assumptions, safety factors, and worst-case scenarios.⁸⁴
5. Other factors listed under Article 5.2—such as inspections and testing methods—must also be taken into account. Accordingly, relevant processes and production methods may be relevant in an RA.
6. Divergent scientific opinions coming from qualified and respected sources can be taken into account by governments acting responsibly and in good faith. Accordingly, an RA can set out both the prevailing view representing the mainstream of scientific opinion and the opinions of scientists taking a divergent view provided that they are from ‘qualified and respected sources.’⁸⁵
7. The AB also rejected the inclusion of the word ‘probability’ in the Panel’s interpretation of the definition of RAs, considering that it introduced a quantitative dimension of the notion of risk and therefore implied a ‘higher degree or a threshold of potentiality or possibility’, whereas the word ‘potential’ in Annex A(4) of the Agreement only relates to the possibility of an event occurring.⁸⁶
8. There is no requirement for a proper RA to establish a ‘minimum magnitude’ or threshold level of degree of risk.⁸⁷ An SPS member’s acceptable level of risk could even be set at ‘zero risk’; hence, an RA indicating a slight degree of risk can serve as a valid basis for State action.
9. *Ratione temporis*, scientific evidence does not have to be provided at the moment the measure is adopted; it can be provided when the measure is challenged before a panel.
10. An SPS measure can be objectively justified in an RA carried out by another member or an international organization.⁸⁸

3.2.2 Setting a high level of protection at risk management level

The AB drew a clear distinction between the RA, which must be based on a scientific approach, and the political decision (risk management) that determines

⁸³ *EC—Hormones I* (n 45), para 187.

⁸⁴ *EC—Hormones II* (n 62), para 7.635.

⁸⁵ *EC—Hormones I* (n 45), para 194; *EC—Hormones II*, para 529. See also *EC—Asbestos* (n 26), para 178.

⁸⁶ *EC—Hormones I* (n 45), paras 183–4. In *EC—Biotech*, the Panel dismissed studies at the disposal of several Member States on the grounds that they did not indicate the relative probability of the potential risks. Paras 7.2044.

⁸⁷ While the Panel required an RA to establish a minimum magnitude of risk, the AB noted that imposition of such a quantitative requirement finds no basis in the SPS Agreement (*EC—Hormones I*, para 186). This was confirmed by the AB in *EC—Asbestos* (n 26), para 167.

⁸⁸ *EC—Hormones I* (n 45), paras 189–90; *EC—Hormones II* (n 62), para 530.

the level of protection, which may be ‘zero risk’. As a result, once a proper RA has been conducted and in cases where an ‘ascertainable risk’ is detected, WTO Members have the right to establish their own appropriate level of sanitary protection, which may be higher (i.e. more cautious) than that implied in existing international standards, guidelines, and recommendations.⁸⁹ It is thus settled case law that the Members have the right to choose an appropriate level of protection.⁹⁰ Given that the evidence of health impact of the use of asbestos was clearly established, France did not have to rely on the PP. Moreover, Members are not required to carry out a cost-benefit analysis. Therefore, the WTO Member concerned must make a ‘societal value judgement’ as to whether or not it can accept a given risk. This involves a qualitative decision involving social and political consideration.

The results of the RA must sufficiently warrant—that is to say, reasonably support—the SPS measure at stake. Nonetheless, the obligation to ‘base’ the SPS measure on an RA should not be understood to mean that the measure must conform to the RA.⁹¹ Conversely, the RA is not disconnected from the Member’s chosen level of protection. When that level is higher than would be achieved by a measure based on an international standard, the WTO Member may be required ‘to perform certain research as part of its RA that is different from the parameters considered and the research carried out in the RA underlying the international standard.’⁹² Nevertheless, the AB stressed that the chosen level of protection should not ‘predetermine this assessment, which ‘must retain, in essence, a rigorous and objective process.’⁹³

Whether such a rational relationship exists between an SPS measure and scientific evidence is to be determined on a ‘case-by-case basis’ and will depend on the particular circumstances of a case, including the characteristics of the measure at issue and the quality and quantity of the scientific evidence.⁹⁴ Although they are not entirely clear, the AB’s findings in both *Hormones* and *Hormones II* suggest that this relationship is a fairly flexible one. The ‘available scientific evidence’ is only one of several factors Members have to take into account in the assessment of SPS risks.⁹⁵ There is thus no need for the Member to establish ‘a direct causal relationship.’⁹⁶ The fact that the Member has to demonstrate ‘a rational relationship between the measure and the RA’⁹⁷ allows the panel to eschew in-depth-analysis

⁸⁹ *EC—Hormones I* (n 45), para 124.

⁹⁰ *Ibid*, para 85.

⁹¹ The obligation that an SPS measure may not be maintained without sufficient scientific evidence requires that there needs to be a ‘rational or objective relationship between the SPS measure and the scientific evidence.’ *EC—Hormones I* (n 45), paras 186, 189, 193, 197, 253.

⁹² *EC—Hormones II* (n 62), para 685.

⁹³ *Ibid*, para 534.

⁹⁴ *EC—Hormones I* (n 45), para 195; *Japan—Varietals* (n 61), para 84.

⁹⁵ SPS Agreement, Art 5.2.

⁹⁶ *EC—Hormones II* (n 62), para 563.

⁹⁷ *EC—Hormones I* (n 45), para 193.

of scientific conclusions.⁹⁸ This flexible approach should enable risk assessors to take into consideration cumulative risks. Accordingly, 'where multiple factors may contribute to a particular risk, a risk assessor is not required to differentiate the individual contribution made by each factor.'⁹⁹

In *EC—Biotech*, the Panel held that the EC RA did not identify possible uncertainties and did not explain why uncertainties were justifying the measures at issue. Because the safeguard measures were not warranted by the relevant RA, they were found to be inconsistent with Article 5.1.

3.2.3 Impossibility of taking into account uncertainty in provisional SPS measures pursuant to Article 5.7

In cases where it is not possible to conduct a proper RA, Article 5.7 of the SPS Agreement allows Members to adopt and maintain a provisional SPS measure, a provision that according to the AB incorporates the PP. Moreover, Article 5.7 is an autonomous right, not an exception in relation to Articles 2.2 and 5.1. This qualification has implications for the allocation of the burden of proof: the complaining party bears the burden of proof that the conditions set out in that paragraph are not correctly implemented. This shift should facilitate the defence of SPS measures endorsing a precautionary approach.¹⁰⁰

However, it must be stressed that Article 5.7 mirrors a precautionary approach to a limited extent, as this safety clause is submitted to four requirements, which are not only cumulative but also interpreted narrowly:

1. the 'relevant scientific information' must be insufficient;
2. the measure should be adopted 'on the basis of available pertinent information';
3. the Member must seek to obtain the 'additional information necessary for a more objective assessment of risk', which must be sought in order to allow the Member to conduct 'a more objective assessment of risk';¹⁰¹
4. the Member is obliged to 'review the ... measure accordingly within a reasonable period of time'. The requirement of a 'reasonable period of time' must be established on a case-by-case basis and depends on the specific circumstances of each case, including the difficulty of obtaining the additional information needed for review and the characteristics of the SPS measure.¹⁰²

⁹⁸ Peel, *Science and Risk Regulation* (n 55) 197.

⁹⁹ *Ibid.*, para 563.

¹⁰⁰ E Vecchione, 'Is It Possible to Provide Evidence of Insufficient Evidence? The Precautionary Principle at the WTO' (2012) *Chicago Journal of International Law* 260.

¹⁰¹ *Japan—Varietals* (n 61), para 92.

¹⁰² *Ibid.*, para 93. The CPB does not impose a comparable follow-up obligation for precautionary measures taken under its Arts 10(6) or 11(8).

Whenever one of these four requirements is not met, the measure at issue is inconsistent with Article 5.7 and falls within the scope of Article 2.2.¹⁰³

The first condition has caused controversy. What makes scientific evidence insufficient? In *Japan—Varietals*, the AB held that the application of the safeguard clause enshrined in that provision, ‘is triggered not by the existence of scientific uncertainty, but rather by the insufficiency of scientific evidence.’¹⁰⁴ ‘Relevant scientific evidence’ will be “insufficient” within the meaning of Article 5.7 if the body of available scientific evidence does not allow, in quantitative or qualitative terms, the performance of an adequate assessment of risks as required under Article 5.1 and as defined in Annex A to the SPS Agreement.¹⁰⁵ In other words, the inability to perform an RA appears to be the key factor to trigger provisional measures. However, insufficient scientific evidence cannot be equated with scientific uncertainty. Only insufficient results precluding the achievement of an RA may support such provisional measures.¹⁰⁶ It follows that under the SPS Agreement a precautionary measure could not be triggered by genuine scientific uncertainty¹⁰⁷ that is the cornerstone of the PP in environmental law.

Regarding the EC request to remove the US retaliatory measures on the grounds that the EC has removed the measures found to be WTO-inconsistent in the *EC—Hormones* case, the PP was invoked in order to justify a temporary ban of five specific hormones.¹⁰⁸ The AB reversed the Panel’s finding that the provisional import ban did not meet the requirements of Article 5.7; however, the AB was unable to determine whether the RA performed by the EC supported a case of insufficient scientific evidence.¹⁰⁹ It saw the assessment of insufficiency as a genuine scientific process disconnected from intended level of protection.¹¹⁰

The interpretation of the DSB is thus predicated on the assumption that there is a dichotomy between:

¹⁰³ *Japan—Varietals* (n 61), para 89.

¹⁰⁴ *Ibid*, para 184.

¹⁰⁵ *Ibid*, para 179.

¹⁰⁶ Along the same lines, in the *EC—Biotech* case, the Panel ruled that the availability of assessments of the risks entailed by several GMOs provided ‘sufficient scientific evidence’, therefore precluding the implementation of Article 5.7. (*EC—Biotech* (n 32), para 4.602). With regard to the national safeguard measures, the Panel was not convinced by the need to improve the already existing assessment carried out by the EC scientific committees (para 73226). As a result, the Panel concluded that the safeguard measures were inconsistent with Article 5.7. Given that Article 5.7 was inapplicable, the Panel found that the EC had acted inconsistently with its obligations under Articles 5.1 and 2.2 of the SPS Agreement with regard to all of the safeguard measures at issue, because these measures were not based on RAs satisfying the definition of the SPS Agreement and hence could be presumed to be maintained without sufficient scientific evidence.

¹⁰⁷ *Japan—Varietals* (n 61), para 184. See, e.g., I Gruszczynski, *Regulating Health and Environmental Risks under WTO Law* (OUP, 2010) 187–91.

¹⁰⁸ Testosterone, progesterone, trenbolone acetate, zeranol, and MGA.

¹⁰⁹ *Hormones II* (n 62), paras 207–8.

¹¹⁰ *Ibid*, para 7.612. Along the same lines, in the *EC—Biotech* case, the Panel dismissed the EC’s plea that the concept of ‘insufficiency’ had to be interpreted in relation to national concerns and the chosen level of protection. The Panel only considered the relationship between the scientific evidence and the obligation to perform an RA under Article 5.1. (*EC—Biotech* (n 32) para 4.602).

- the scientific output of an RA that allows a Member to set higher standards of protection; and
- and the lack of available scientific evidence that allows a Member to enact provisional measures pending the confirmation by traditional RAs.

Such interpretation does not meet with unanimous approval. As stressed by Vecchione, even the performance of an RA does not guarantee the removal of all lingering uncertainties.¹¹¹ Indeed, experts can take years to carry out their assessments without producing at the end of the day sufficient scientific evidence.

This dichotomy between insufficiency and uncertainty leaves a gap: a situation of unresolved uncertainty cannot be taken into account under either Article 5.1 or under Article 5.7. In other words, there is no way to provide evidence of scientific uncertainty.¹¹² That being said, the fact that ‘acknowledging uncertainty is a pervasive and inherent condition of scientific knowledge does not make science less useful or important.’¹¹³

To conclude, this *sui generis* application of the principle departs from the more flexible interpretation that prevails in environmental law.

4. Concluding observations

Given that environmental protection has never been considered a priority in trade law, this discipline does not endorse any general exceptions for environmental purposes. Environmental provisions are randomly scattered among the different trade agreements.¹¹⁴ In particular, WTO case law has tended to frown upon environmental unilateral measures; measures based on an international consensus seem to be favoured. However, in a time of global environmental crisis, unilateral measures are needed given the paucity of international measures. Whether Article XX(b)–(g) of the GATT Agreement allows WTO Members to enact precautionary measures remains to be seen.

Although the PP came to the forefront in cases regarding the SPS Agreement, its scope remains unsettled. Given that the AB has been placing strong emphasis on scientific evidence, significant questions remain regarding the right of WTO Members to invoke the PP in order to justify trade-restrictive measures with respect to GM technology. The obligation to perform an RA cannot be bypassed

¹¹¹ Vecchione, ‘The PP at the WTO’ (n 100) 164.

¹¹² *Ibid.*, 168.

¹¹³ E Vecchione, ‘Science for the Environment: Examining the Allocation for the Burden of Uncertainty’ 2 (2011) EJRR 227–39.

¹¹⁴ Gomula, ‘Environmental disputes in the WTO’ (n 32) 404.

thanks to the enactment of provisional measures because they are time-limited. From a legal perspective, the lessons drawn from the case law on the application of the SPS Agreement cannot be transposed in the field of environmental protection to other types of RA procedures. These conditions are peculiar to the SPS discipline.

Part II Conclusions

Both the international legal order and national legal regimes have recently undergone important changes. The systematization, generality, and coherence that characterized modern law seem to have given way to more regulative techniques that better reflect a complex and constantly changing world. The production of rules also seems suddenly to be racing ahead: legislators are competing against one another in a normative game whose rules are known only to a few, soft-law and hard-law instruments are proliferating rapidly, and the State is abandoning its traditional means of command and control in favour of negotiation. Likewise, there has been no shortage of deregulatory trends in environmental law. Thus law has become an integral part of a complex and multiform model bearing the name post-modernity, which will cause the last vestiges of modernity—the basis of today's legal systems—to disappear.

Must we simply give in to this transformation and resign ourselves to applying a negotiated, flexible, adaptable, pluralist, networked form of law, without further discussion? That way lies increased confusion, for a number of important legal struggles are concealed within the post-modern phenomenon, which will determine how legislative systems confront a rapid increase in complexity. For this reason detached consideration is essential in the face of such rapid, radical, undefined, and complex changes.

In Part II we strongly defended the argument that the advent of post-modernity has not done away with all forms of rationality. To the contrary, based on works in the field of general legal theory, we have tried to show that new legal principles, which we have called 'directing principles' in an effort to emphasize their dynamic nature, can contribute to a revival of rationality. Environment law is particularly suitable in this respect, for in addition to exhibiting many of the characteristics of post-modernity (growth in regulatory instruments, multiplication of levels of power, regulatory flexibility, etc.) it gives rise to more principles than any other branch of law.

Part II showed how these directing principles, Janus-like, present a double face: on one hand they recall the rationality inherent in modernity (function of coherence, codification) while on the other hand they are strongly shot through with post-modern characteristics (stimulation of public policy, weighing of interests). Facing towards the past and the future at once, these principles present striking particularities in comparison with the general principles of law that have been

created by national and international courts in order to fill legal gaps and thereby ensure the coherence of the legal system.

We considered these issues above in four stages. First, in Chapter 4 we attempted to define exactly, at the theoretical level, what is meant by modernity and post-modernity. It is impossible to pinpoint where modernity ends and post-modernity begins, for these two models interact more strongly than they conflict. Instead we therefore set out the main characteristics of both models and showed how directing principles differ from general principles of law. This theoretical approach allowed us to make preliminary observations concerning the status and functions of the polluter-pays, preventive, and precautionary principles described in Part I.

As demonstrated in Chapter 5, the functions of those three directing principles of environmental law emphasize a gradual shift from modernity to post-modernity. These principles increase the coherence of the legal system by gathering scattered rules into a coherent whole, rejuvenating institutions, and refining legal techniques (codification, etc.) thereby reintroducing an ideal of rationality—an essential element of modernity—into the legal system. At the same time they are able to mitigate the excesses of post-modernity. By promoting legal reform, they spur public policies; by clarifying objectives and freeing judges from having to interpret texts too literally, they set environment law in motion. They also help ensure the co-existence of public policies with often contradictory purposes and norms emanating from various legal regimes. They build bridges between the global and local levels, and between national, European, and international law. Rather than comprising a logic of exclusion, they form part of a series of normative processes (recognition of the right to a healthy environment at constitutional level, etc.) that are both necessary and insufficient.

These principles lie at the core of post-modernity when it comes to the weighing of interests. The mechanistic model of modern law has been replaced by new types of reasoning, which imply that the directing principles contained in legislation must be applied when weighing interests.

In Chapter 6 we identified a number of guideposts to help us understand the legal status of these three principles within several legal systems that are not easily compared. Despite their indeterminate character, these principles have sufficient legal force to be considered normative—that is, giving rise to legal effects. For that to be the case they must fulfil two conditions: first they must be part of a binding text, and secondly they must be formulated in sufficiently prescriptive terms. Nonetheless, their normative character differs at several levels from that of the numerous more complete norms found in environment law. In addition, their legal force varies as a function of the legal system in which they occur: national, EU, or international. These traits are all characteristic of a post-modern perspective.

The observations contained in Chapter 5 regarding the role of the principles in the weighing of interests were expanded in Chapter 7, which considered more precisely how the polluter-pays, preventive, and precautionary principles could help resolve the conflict between trade and environment. Needless to say, this function will become increasingly important in the near future.

Final Conclusions

We have chosen to base our analysis of the genesis and legal effect of the principles of environmental law on three principles found in international, European Community, and national law: the polluter-pays, preventive, and precautionary principles. That analysis rested on two theses: (i) vertical analysis of the origin, status, and application of these three principles in international, EC, and national legal systems indicates that a subtle shift in the battle against ecological risk is taking place; and (ii) horizontal analysis of the status and functions of these three principles shows that they represent the interface between modern and post-modern law. Although we considered these two theses individually, the extent to which they complement one another became increasingly apparent. We next briefly summarize the main conclusions we have drawn from our study.

Despite the increased value of their status (they are rules rather than mere political slogans) and functions (those rules influence the course of law) these three principles will continue to clash with other rules that occupy a higher position in the hierarchy of norms. Weighing of interests is at the core of these conflicts. Nonetheless, as set out in the Epilogue below, a number of arguments support tilting the balance in favour of environmental concerns.

1. First thesis: directing principles point to a subtle shift in the battle against risks

In Part I of this book we explained that the three principles have a common denominator: the battle against environmental risks. For that reason they are complementary and cannot function in isolation. We put forward the proposition that these three principles of the polluter-pays, prevention, and precaution could be described using three distinct models representing three paradigms of protection: a curative model (which would rely on civil liability and compensatory mechanisms financed by charges), a preventive model (relying largely on the enforcement power of public authorities), and an anticipatory model (informed by the precautionary principle).

The curative model rests on the hypothesis that nature has an infinite regenerative capacity. This model sees nature as invulnerable. In cases where damage

occurs the polluter will pay for reparation, under the polluter-pays principle, either through the mechanisms of civil liability or by the use of compensation funds financed by charges.

The preventive model is based on the understanding that some types of pollution are irreparable and must therefore be prevented. These must be addressed by special administrative measures relating to various environmental media such as water, soil, air, biodiversity, and natural habitats. The preventive model assumes the possibility of a scientific understanding of what level of damage will not compromise the restoration of ecosystems and their species: a level that can be technically repaired and economically compensated.

The culmination of this evolution is the precautionary model, born of the wish to break free of an assimilative approach and replace it with an anticipatory approach. While in some ways an extension of the preventive model, the precautionary model takes into consideration the fact that science cannot determine the degree of damage that nature can tolerate. This position does not indicate any particular mistrust of science; it merely acknowledges that scientists do not have the answers to some important questions. Consideration of the uncertainty that results from this stance compromises the relevance of the preventive model and at the same time makes untenable the idea that nature will always be able to regenerate.

Each of these models is thus based on an individual principle: a very general norm whose regulatory ramifications affect a number of fields of law, including international, public, liability, and fiscal law. We have attempted to show that there is an undeniable normative dimension to these three principles and that they will henceforth influence the course of positive law.

Whatever their formulations, however, these principles remain flexible, for several reasons. First, a principle is by nature difficult to define. Its application determines its substance. In addition, the polluter-pays, prevention, and precautionary principles set the conditions for action without actually describing that action, thus leaving a wide margin of interpretation to the authorities that must implement them. Finally, these principles are applied in extremely diverse ways, ranging from management of marine resources to health protection.

While there is certainly an element of slogan—of political manifesto—at work here, it is nevertheless impossible to reduce the use of principles such as those of the polluter-pays, prevention, and precaution to a tool of political combat: since they are set out in substantive legal texts and are binding on categories of persons they constitute true legal norms, even if their effect is long term rather than immediate. Nor is it possible to criticize them on the ground that they will give rise to too many or not enough legal effects, for their primary purpose is to guide and reform rather than to revolutionize.

2. Second thesis: directing principles represent the inter- face between modern and post-modern law

The proposition that there has been a subtle shift in the battle against ecological risk must necessarily lead to a second thesis, even more basic than the first in the context of legal theory. This led us to demonstrate that the polluter-pays, preventive, and precautionary principles described in Part I mark an epistemological shift between modern law, which rests on the fixed standards of traditional legal rule-making, and post-modern law, which emphasizes the pragmatic, gradual, unstable, and reversible nature of rules. In order to clarify this epistemological shift we contrasted three environmental principles, characterized as 'directing principles' of environmental law, with 'general principles of law', more typical of modernity.

This contrast was by necessity nuanced; as we have stressed throughout this work, the shift from modernity to post-modernity has not been a radical one, nor has rationality been abandoned in that transition. The two models will continue to co-exist, and the principles are the point where the conflicts of rationality that distinguish them from one another play themselves out.

This second thesis finds an echo in many other fields of positive law. Indeed, from the perspective of the general theory of law the emergence of a litany of directing principles in environmental law is part of a more general evolution affecting the entire legal system. If, in a modern perspective, there has long been a clear distinction between law, morality, and policy, this is no longer the case today. Law in a post-modern perspective is more likely to be organized around a group of very general norms that will provide the basis for conciliating conflicting interests. At both international and national levels a delicate interaction between law and other values has taken the place of a formal hierarchy of norms. Owing to their flexibility, the directing principles of environment law foreshadow the advent of a post-modern law dominated by the balancing of interests.

3. Epilogue: the balancing of interests at the heart of post-modernity

On the basis of our analyses should we conclude that the polluter-pays, preventive, and precautionary principles are harbingers of a radiant future for environmental law? We know they are currently in style; are they truly original as well? Or must we view the wide use of principles in the field of environmental law as a false start likely to have little subsequent effect; or even worse an excuse for an exercise in de-regulation that will threaten the advances made as the result of prolonged battles? Does the renewed emphasis on principles merely betray the inability of States to

move beyond a simple recognition of threats? In concluding we must try to answer some difficult questions about what role this new type of norm might play.

While the polluter-pays, preventive, and precautionary principles may help clarify the objectives of environmental law, they nonetheless risk having to take a back seat when various interests are weighed and other values and objectives of public policy take centre stage. It is thus always possible that public authorities and courts will set them aside, provided they have carried out a proportionality test and given an explicit statement of reasons for their decisions. The power of directing principles of environmental law is thus likely to find itself weakened at the first sign of a conflict of interests.

Should we therefore countenance a balancing of interests that would render those three environmental principles devoid of any useful effect? Can we accept that their effectiveness may be compromised simply by implementing the procedural principles of proportionality and statement of reasons? To pose these questions is to wonder about a possible 'hard centre' for the principles we have considered. Aside from clarifying the exact position of the protection guaranteed by these principles, determination of such a centre would reduce the legal insecurity linked to the rise of a 'government of judges'. It would also ensure more precise limits for principles of environmental law, thus protecting them from unreasonably wide application which would be likely to paralyse action. Several important considerations plead in favour of such a hard centre; however, important obstacles remain.

The 'right to the protection of a healthy environment' and the right to health which are the subject of constitutional recognition, in the way that the right to privacy and family life is protected by the European Convention on Human Rights (ECHR), may also be invoked to prevent compromising ecological interests when there is a risk to human health. But this leads us back to the heart of the question, for protection of the environment is taken into consideration as a corollary to the 'right to lead a life in conformity with human dignity'. Should we conclude from this that ecosystem preservation remains subordinate to the protection of human interests, for example health or respect for privacy and family life? This is a formidable question: does the environment represent an autonomous and original facet of the public interest, or merely a corollary derived from more basic values (first-generation human rights) to which it will always be sacrificed if the need arises?

Consideration of the time factor undoubtedly strengthens the argument for a 'hard centre'. Beyond a certain threshold environmental degradation reaches a stage of no return. When damage proves to be *irreversible*, it becomes unacceptable and must therefore be averted no matter what the circumstances. Since we cannot make ancient forests grow back from their ashes nor reproduce extinct species by the use of biotechnology the hard centre of environmental principles must provide nature the opportunity and time needed for regeneration. We must not, however, lose sight of the fact that irreversibility is difficult to predict. It is therefore not easy

for experts, courts, or legislators to fix irreversibility thresholds. Moreover, laws often combine irreversibility with a threshold of seriousness that is equally difficult to determine. Finally, seen in the context of human generations, legal 'time' is short: after several decades sanctions lose their force and responsibilities grow dim. We must ask ourselves if the remote future on whose behalf the precautionary principle pleads will always be as important in the balance of interests as the immediate present.

Time is also inherent in the concept of sustainable development, which leads to a long-term vision while taking care that present use does not jeopardize possible future use of natural resources. This reflects the human understanding of the limits set by the rhythms of nature. Retaining the potential for usefulness for both present and future generations thus becomes the hard centre. Nevertheless, caught between an economic logic seeking to maximize production for profitability and an ecological logic, sustainable development is situated at the junction of interests that are *a priori* at loggerheads. In keeping with an anthropocentric approach, the concept of sustainability remains imprecise in that it may apply to methods of exploitation as well as to natural resources.

While concentric circles are taking shape around environmental interests, each of those interests still gives evidence of a certain fragility. Yet they must be progressively strengthened, for that hard centre is essential if environmental directing principles are to succeed in increasing the coherence, cohesion, and rigour of this legal branch, so painfully come to maturity. Only in this way will the environment have some hope of escaping the assaults committed in the name of progress.

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