
9 The principles of prevention and precaution in international law: two heads of the same coin?

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Introduction

Given that prevention and precaution appear in some ways intimately linked – two heads of the same coin – the aim of this chapter is to explore some of the key issues arising in discussion on the status of these two principles in international law.

The principle of prevention

1. Prevention in a nutshell

Curative measures may remediate environmental damage, but they come too late to avert it. In contrast, preventive measures 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.

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 damage 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 avert damage the moment it becomes evident.

2. The interaction between the principle and the obligation not to cause environmental damage to the environment of other States or to areas beyond national jurisdiction

Pursuant to Principle 2 of the 1992 Rio Declaration on Environment and Development, States 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’. This can be seen as a manifestation of the principle of prevention (de Sadeleer, 2002: 62). Rio’s Principle 2 has been incorporated, for instance, into the Preambles of the UNFCCC. Rio’s Principle 2 is widely recognised to reflect 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 (Sands, 1995: 190–1).

Accordingly, States find themselves bound by a due diligence requirement to prevent transboundary pollution. In other words, the State must have failed to show due diligence if it is to be held liable. However, customary law does not specify what diligent conduct entails or what concrete measures States are required to take in order to fulfil their duties under Rio’s Principle 2. Indeed, the obligation to prevent transboundary harm is subject to a variety of

interpretations as to what preventive actions may be required of a State, as well as what amount of damage is to be prevented.

3. The formulations of the principle in the different environmental sectors

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 (environmental impact assessments, 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.

In addition, the preventive principle is implicitly or explicitly set out by an extensive body of international treaties and related instruments (Sands, 1995: 196), the subjects of which include:

- the marine environment (for instance, UNCLOS, 1982: Articles 194(1)(2), 195, 192, 196, 204, 207, 208, 209, 210, 211, 212),
- the management of high seas fisheries (for instance, Article 5 of the 1995 UN Fish Stocks Agreement),
- the protection of rivers (for instance, Article 21 of the 1997 New York on the Law Relating to the Uses of International Watercourses for Purposes other than Navigation),
- climate (for instance, UNFCCC, 1992: Article 3(3)),
- the ozone layer (for instance, Article 2(2)(b) of the 1985 Vienna Convention for the Protection of the Ozone),
- waste management (for instance, Article 4(2)(c) of the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal),
- biodiversity (for instance, Article 14 of the 1992 CBD),
- vulnerable ecosystems such as the Antarctic and the Alps (for instance, Article 3(2) of the 1991 Madrid Protocol on Environmental Protection to the Antarctic Treaty, Article 2 of the 1991 Salzburg Convention on the Protection of the Alps),
- transboundary environmental risk assessment (for instance, the 1991 Espoo Convention on Environmental Impact Assessment in a Transboundary Context; Article 3(1) of the 1992 Helsinki Convention on the Transboundary Effects of Industrial Accidents).

The stringency of preventive obligations will depend largely on the nature of the instrument (soft law or hard law) and the relevant provision (for example, reference to the preventive principle in a preamble fulfils an interpretative function, while its enunciation in an operative provision is binding).

The precautionary principle

1. Precaution in a nutshell

Known at the start of the 1990s by only a few specialists in environmental law, the precautionary principle has within the space of a decade experienced a meteoric rise and, as a result,

been able to establish itself as a new general principle of international law (de Sadeleer, 2002: 91–223). In addition, it has come to occupy an uncontested position not only in international but also in EC law, as well as in several European countries (particularly in France), to the point where it overshadows the principle of prevention. Furthermore, the precautionary principle has been applied increasingly often in a wide array of areas ranging from classical environmental issues (nature, water, air, etc.) to wider areas such as food safety (mad cow disease, the spread of genetically modified organisms, etc.) as well as health issues (the French HIV blood-contamination scandal, health claims linked to phthalates in PVC toys and endocrine disruptors, among other issues). Lastly, as discussed below, some international courts draw inspiration from it, and important scholarly analyses have been devoted to it. A complete discussion of this rich literature is impossible in the space available here.

Yet, despite the success of the precautionary principle in the field of 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. Although fairly recent in the history of environmental law, no other environmental principle has produced as much controversy as the principle of precaution. Indeed, much ink has been spilled in a wide variety of books, journals and other publications over the status and the legal effects of the principle of precaution.

In a nutshell, precaution epitomises a paradigmatic shift. Whereas, under a preventive approach, the decision-maker intervenes provided that the threats to the environment are tangible, pursuant to the precautionary principle authorities are prepared to tackle risks for which there is no definitive proof that there is a link of causation between the suspected activity and the harm or whether the suspected damage will materialise. In other words, precaution means that the absence of scientific certainty – or conversely the scientific uncertainty – as to the existence or the extent of a risk should henceforward no longer delay the adoption of preventative measures to protect the environment. Put simply, the principle can be understood as the expression of a philosophy of anticipated action, not requiring that the entire corpus of scientific proof be collated in order for a public authority to be able to adopt a preventive measure.

Its significance lies also in its challenge to traditional legal systems, many of which are permeated by the need for certainty. The operator's civil liability can be incurred provided that the victim is able to shed light on the link of causation between the operator's behaviour and the ensuing damage. A WTO member is able to enact a food safety measure provided that its regulatory choice is based upon clear scientific evidence resulting from a risk assessment. This presupposes continuous recourse to scientific expertise, with experts being able to provide flawless data to both courts and decision-makers. However, at first glance, precaution provides for the possibility to act while uncertainties have not yet been cleared up.

Praised by some, disparaged by others, the principle is no stranger to controversies (see the contradictory views of Raffensperger and Tickner (eds) 1999; Harremoes et al. (eds), 2002; Sunstein, 2005). In particular, its implementation in the field of food safety has sparked off heated debates. Discussions about its status and functions have greatly intensified with respect to WTO trade issues. Indeed, much of the recent debate has focused on the question of whether the principle fosters protectionism in justifying arbitrary standards that cannot be met by developing countries and as a result, may jeopardise innovation. 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? Is there an obligation for scientists to disclose all uncertainties? Do the scientists need to carry out in any case a risk assessment and according to which methodology? Is it possible to draw a line between uncertainty and ignorance? Must the decision-maker aver a serious, significant, irreversible or collective damage? 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?

It is the aim of this section to provide insights as to how the principle – or the approach – has been fleshed out into a flurry of international environmental agreements embracing a wide array of environmental sectors.

2. Precaution in response to the limitations of science

One needs to keep in mind that science is the linchpin around which environmental law is organised. Several factors explain why science is much more in evidence in environment law than in other branches of the law. First, scientists detect, identify and set out the ecological problems to which the law must respond. Second, environmental crises are increasingly perceived through scientific descriptions of our physical world. Last but not least, science is often called upon to play a decisive role in judicial procedures. Scientists thus play a decisive role in the conception and implementation of environmental law; all the regulations adopted in this field, without exception, are based on their calculations, computations or affirmations. In fact, no area of public policy is comparably dependent on science. Yet this marriage of law and reason is not entirely free of strife: legal rules are meant to provide predictability, yet nature is unpredictable; while the jurist seeks certainty, the scientist points to the uncertainty inherent in ecological risk.

The significance of precaution lies in its challenge to conventional science. As a matter of fact, the rise of new technologies have caused a new generation of risk to emerge (CFCs, POPs, GMOs, hormone-disrupting chemicals, electromagnetic fields, etc.). Presenting unique challenges to the ability of science to anticipate and prevent harm, these risks are fundamentally different from traditional industrial risks. First, their impacts are much wider and diffuse. Second, they are permeated with uncertainty: insufficient experience makes it impossible to determine with accuracy their probability. Moreover, it is difficult to determine the damages they may provoke, in terms of localisation, of latency between the first exposure and the actual impact of damage, frequency, duration, nature and scale. Uncertainty may impinge upon one of these factors as well as all these factors. As a result, uncertainty is the linchpin around which the principle unfolds.

Accordingly, precaution came to centre stage in the field of environment policy in response to the limitations of science in assessing these complex and uncertain ecological and health risks (de Sadeleer, 2002: 20–30; Peel, 2005: 34–60). However, there is no definitive definition of uncertainty. The following examples are illustrative of the ways in which uncertainty pervades the risk assessment process:

- insufficiency: for instance, the various scientific disciplines involved in assessing the risk are not sufficiently developed to explain the cause-and-effect relationship;
- inconclusiveness: the realities of science dictate that the scientists, whatever the quality of their investigations, will never be able to eliminate some uncertainties; for

instance, there may be too many unpredictable variables to enable the identification of the relative influences of each factor;

- imprecision: could be caused by the fact that the data to analyse the risks are not available or are out-of-date, information gaps, measurement errors, contradictions, indeterminacy, ambiguity ...

To sum up, precaution aims to bridge the gap between scientists working on the frontiers of scientific knowledge and decision-makers willing to act to determine how safe is safe enough. In other words, precaution is testament to a new relationship with science, where it is consulted less for the knowledge which it has to offer than for the doubts and concerns which it is in a position to raise.

3. *Methodological observations*

So far, the precautionary principle has been embroiled with controversies, critics being confused as the scope and the status of the principle. For the sake of clarity, I would like to distinguish, on one hand, prevention and precaution, and, on the other, a legal principle and a political approach.

First, prevention and precaution should not be confused. A dividing line could be drawn between the two principles: while prevention is based on the concept of certain risk, precaution is distinguished by the intrusion of uncertainty. Accordingly, the question is no longer merely how to prevent assessable, calculable and certain risks, but rather how to anticipate risks permeated by a high level of uncertainty. Indeed, precaution does not posit a perfect understanding of any given risk: it is sufficient that a risk be suspected, conjectured, feared. As a matter of policy, envisaging anticipatory action in response to uncertainty, precaution represents an additional milestone in risk reduction. In other words, precaution urges prevention forward in the hope of closing the gap that always exists between decision-making and the mastery of risk.

Second, variations in terminology have emerged, reflecting the considerable controversy surrounding the principle. As a matter of fact, disputes have arisen as to whether precaution should be labelled as a 'principle' or merely as 'an approach' (Peel, 2004: 483–501). This debate reflects different perceptions as to the suitable regulatory response to avoid environmental and health damages amid uncertainties. Proponents of an 'approach' take the view that precaution is not legally binding, whereas a legal principle is clearly stated as such. To avoid the more extreme versions of the precautionary principle, which press for greater environmental protection, some – including, among others, US policy-makers – prefer to use the term precautionary *approach* rather than precautionary *principle*; the latter term is preferred by the European Community institutions and some of its Member States.

The various provisions of international agreements enshrining precaution mirror this variation. For instance, in the 1992 Rio Declaration on Environment and Development, the 1996 Protocol to the London Dumping Convention and the 2001 Stockholm POPs Convention, 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 in the Barcelona Convention to Protect the Mediterranean Convention. Furthermore, to make matters even more complex, 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 (Article 4.3(f)). Lastly, the

CPB refers to the 'precautionary approach' in its preamble, but uses terminology that clearly reflects the same basic rationale for application of the precautionary principle in Articles 10 and 11.

For my part, I consider this a semantic squabble. Indeed, from a legal point of view, the question is whether precaution could become a principle of customary law in international law, on one hand, and a general principle of environmental law at the national level on the other hand. As discussed below, the answer to that question depends whether a number of criteria set out by courts and scholars alike are fulfilled (see below Subsection 5).

For the sake of clarity, in this chapter, I will therefore use the terms precautionary principle and precautionary approach interchangeably.

4. The formulations of the principle in the different environmental sectors

Precaution has slowly but inexorably been permeating the numerous crevices of international law, whether through the declaration of public policy objectives (soft law), agreements (hard law) or judicial interpretation (case law). Since the 1992 Rio Conference, it has been taken up in the majority of bilateral and multilateral international treaties relating to environmental protection. At present, the precautionary principle can be found in some 60 multilateral treaties, covering a wide array of environmental issues ranging from air pollution to waste management (see Marr, 2003; Trouwborst, 2002; Douma, 2003; de Sadeleer (ed.), 2007). Given that the principle is applied in a variety of contexts, its formulation often differs from agreement to agreement. This section reviews some of the definitions given to the principle in various international agreements, as well as representative court decisions, in order to set out the problematic elements inherent in this principle.

4.1. POLICY DOCUMENTS

The precautionary principle has been established as a general principle of environmental policy in various soft-law declarations adopted by the United Nations Economic Commission for Europe (Bergen, 16 May 1990), the Governing Council of the United Nations Environment Programme (UNEP Governing Council Decision 15/27, 1989, on the Precautionary Approach to Marine Pollution), the Council of Ministers of the Organization of African Unity (Addis-Ababa, 1990), the Ministerial Conference on the Environment of the UN Economic and Social Commission for Asia and the Pacific (Bangkok, 1990), the Environment Ministers of the Organisation for Economic Co-operation and Development (1991). It was eventually accorded universal recognition at the UN Conference on Environment and Development. Recognised in Agenda 21 of 16 June 1992, the principle was defined in the non-binding 1992 Declaration on Environment and Development, which declares that:

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. (Principle 15)

4.2. MARINE POLLUTION

The principle emerged in the 1990s as a response to transborder environmental concerns, notably the pollution of the North Sea. Explicit reference to it was made at each North Sea Ministerial Conferences (1984 Bremen, 1987 London, 1990 Hague, 1993 Esbjerg declarations).

Ever since, the precautionary principle has been at the forefront in the field of marine pollution, where an abundance of data on pollution yielded little understanding but much concern. Since the beginning of the 1990s, the principle has been set out in a host of agreements, among them:

- the 1990 International Convention on Oil Pollution Preparedness, Response, and Co-operation (preamble),
- the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) (Article 2(2)(a)),
- the 1992 Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area (Article 3(2)),
- the 1976 Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (as amended in 1995) (Article 4(3)(a)),
- the 1980 Athens Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources and Activities (as amended in 1996) (Fifth Recital of the Athens Protocol as amended in Syracuse on 7 March 1996 (not yet in force),
- The 2003 Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Article 5).

As a matter of course, its scope varies tremendously from one agreement to another. Some of the marine pollution agreements endorse a rather stringent version of the principle. By way of illustration, pursuant to the 1976 Barcelona Convention, OSPAR and HELCOM agreements, the contracting Parties ‘shall apply the precautionary principle ...’. In contrast, in other agreements concerning marine pollution, the principle has been framed in hortatory terms rather than prescriptive language. 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’.

In addition, the OSPAR and HELCOM agreements are probably among the most stringent international agreements relating to the marine environment as regards the level of proof 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 the Rio Declaration, which submitted the precautionary principle 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 principle should only apply to risks entailing non-negligible damage. Thus, the 1992 UNFCCC and 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, damage is specified in slightly less abstract terms. The 1992 OSPAR Convention turns 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 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 marine environment, prudence and caution require’, the Parties ‘establish mechanisms for exchanging information and assessing the risks or effects of land reclamation works ...’ (*Case concerning Land Reclamation by Singapore in and around the Straits of Johor*, 2003) .

4.3. FISHERIES

Marine fisheries management is intrinsically uncertain. Uncertainties relate to individual stocks being harvested, other affected species, and the likely impacts of fishing on the ecosystem of which the species form part. Given the risk of over-fishing and the eventual collapse of fish stocks, an explicit precautionary approach encapsulated in both international agreements and national legislations is strongly needed.

Developments in this area were fostered by the entry into force of the 1995 UN FAO Code of Conduct for Responsible Fisheries and the 1995 UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks. It must be stressed that the UN agreement was the first global fisheries agreement requiring a precautionary approach, which is to be applied to fisheries conservation, management and exploitation measures. The precautionary approach is 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 (Article 5(e)). The scope of the principle is not restricted to stocks targeted in the fisheries, but encompasses all living marine resources and the marine environment (Article 6(1)). States are subsequently required to take into account the effects on other species of the ecosystem when adopting conservation measures for the target stocks and could be required to establish measures specially directed at protecting other species or their habitats. The obligation to endorse a precautionary approach reads as follow:

States shall be more cautious when information is uncertain, unreliable or inadequate. Nonetheless, one could wonder what does the obligation to be ‘more cautious’ mean in practical terms. That said, the absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures. (Article 6(2))

It is not only scientific information about the stock in question that is relevant. States are also to take into account uncertainties relating to environmental and socio-economic conditions (Article 6(3)(c)).

It is important to stress that in contrast to other international instruments, the enactment of precautionary measures is not subject to specific thresholds, such as the threat of serious or irreversible damage (see UNFCCC). Hence, that Agreement signals a significant shift in the burden of proof, by creating a presumption in favour of conservation. Therefore, it mirrors a major change in the traditional approach to fisheries management, which has tended to react to management problems only after they reach crisis level.

With respect to international jurisdictions, the ITLOS order of 27 August 1999 in the *Southern Bluefin Tuna* cases seems to view the precautionary principle in a more favourable light than decisions by other international courts such as the ICJ or the ECtHR. In a case opposing Australia and New Zealand on the one hand and Japan on the other concerning an experimental fishing programme for southern bluefin tuna being carried out by the Japanese authorities, ITLOS had stressed the need to carry out a precautionary policy. Although there

was scientific uncertainty regarding the conservation measures to be taken, ITLOS held that the Parties should ‘act with prudence and caution to ensure that effective conservation measures are taken to prevent serious harm to the stock of southern bluefin tuna’ (*Southern Bluefin Tuna Cases*, 1999). Furthermore, 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 (§§77 and 80). However, ITLOS avoided bringing further clarification as to the meaning and the status of the principle.

4.4. RIVERS

The principle has also been enshrined in a number of agreements related to the protection of river ecosystems, among them:

- the 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Article 2(5)),
- the 1994 Charleville-Mézières Agreement concerning the Protection of the Scheldt and Meuse Rivers (Articles 2(a) and 3(2)(a)),
- the 1994 Sofia Convention on Cooperation for the Protection and Sustainable Use of the Danube (Article 2(4)),
- and the 1998 Rotterdam Convention on the Protection of the Rhine (Article 4).

Again the principle has been framed rather differently in these different agreements. For instance, whereas the 1992 Helsinki Convention as well as the 1998 Rotterdam Convention on the Protection of the Rhine state that ‘The Parties shall be guided by ... the precautionary principle ...’, the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River sets out that ‘the Precautionary principle constitute a basis for all measures aiming at the protection of the Danube River ...’.

The principle has been invoked in international litigation as regards river protection. For instance, in the *Gabčíkovo-Nagymaros* case brought before the ICJ, Hungary invoked the precautionary principle to support the existence of an environmental state of necessity as a ground for justifying the breach of its obligations towards Slovakia (unilateral suspension of works on its section of a dam on the Danube) (*Gabčíkovo-Nagymaros Case*, 1997). While recognising 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 (§53), the ICJ refused to accept the existence of a ‘grave and imminent peril’ justifying a state of necessity because of the uncertain nature of the dangers invoked by the Hungarian authorities. Consequently, a state of necessity can only be invoked under international law of State responsibility if there is a sufficient degree of certainty and inevitability that a peril will materialise. In so doing, the ICJ eschewed addressing the issue of precaution. However, in a separate opinion Judge Weeramantry saw the precautionary principle as a constituent of the wider legal principle of sustainable development.

4.5. AIR POLLUTION AND CLIMATE CHANGE

The uncertainty surrounding the causes and effects of atmospheric pollution has also served to favour the use of the precautionary principle. 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 had reached its height. The sixth Recital of the 1985

Vienna Convention presented the Parties as 'Mindful ... of the precautionary measures for the protection of the ozone layer which have already been taken at the national and international levels'. Since then, the principle has been endorsed by other instruments concerning air pollution. The preambles of the 1998 LRTAP Protocols on POPs and on Heavy Metals state that the Parties are 'resolved to take measures to anticipate, prevent or minimize emissions of persistent organic pollutants, taking into account the application of the precautionary approach, as set forth in principle 15 of the 1992 Rio Declaration on Environment and Development'.

As to climate change, Article 3(3) of the 1992 Framework Convention on Climate Change (UNFCCC) obliges Parties

to take precautionary measures to anticipate, prevent or minimise 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.

4.6. NATURE AND BIODIVERSITY

Attempts to conserve biodiversity must grapple with a wide range of uncertainties as well as ignorance. The difficulties are compounded by a lack of sufficient data as well as the complexity of modelling the functioning of ecosystems and understanding the complex relationship between human activities and the state of conservation of ecosystems and species. Indeed, there are still major gaps in understanding how ecosystems and species interact and react against new threats. In some cases, uncertainties cannot be reduced by gathering more accurate data; in other words, uncertainty is intractable. Accordingly, the principle has become the cornerstone of several international agreements, the purpose of which is to protect nature or to thwart risks that could impoverish biological diversity (for example, invasive species, GMOs). For instance, in 1994, the principle was explicitly endorsed at the Ninth Conference of the Parties to CITES, as well as in several of the Agreements on the conservation of migratory species, established under the Convention on Migratory Species (Article 2(2) Agreement on the Conservation of the African-Eurasian Migratory Waterbirds; Article 2(4) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Areas; Article 2(3) of the 2001 Canberra Agreement on the Conservation of Albatrosses and Petrels). What is more, it should be noted that the Preamble of the 1992 Convention on Biological Diversity (CBD) 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 minimise such a threat. Though this statement is not binding, on the grounds that it is encapsulated in the preamble of the agreement and not its operative provisions, it is not however devoid of legal effects (interpretative function).

With respect to the conservation of biodiversity, risk issues entailed by the placing on the market and the spread in the environment of GMOs has gathered momentum at the international level. The extent to which GMOs pose a risk of adverse effects on the environment as well as on human health remains hitherto controversial. Moreover, these controversies have so far been exacerbated by the relative novelty of gene technology coupled with lack of available data regarding the potential health and environmental impacts. Accordingly, the principle has been at the core of the Cartagena Protocol on Biosafety (CPB) adopted under the

auspices of the Convention on Biological Diversity (CBD). The Protocol reaffirmed the precautionary approach contained in Principle 15 of the Rio Declaration on Environment and Development in several operative provisions of the Protocol (Article 1). In addition to referring to the precautionary principle, the CPB expressly authorises Parties to refuse to import living modified organisms (LMOs) on a precautionary basis (Articles 10(6) and 11(8)). However, the precautionary principle 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 of the Party of import to review a decision in the light of new scientific evidence upon request by an exporting country. Nevertheless, the insertion of precautionary provisions in the CPB is significant for potential trade conflicts concerning GMOs (see the section on WTO law below).

4.7. WASTE MANAGEMENT

So far, unlike EC law (Cases C-418/97 and C-419/97, *Arco Chemie*, ECJ: para. 40), the principle has not succeeded in securing a strong foothold in waste management. The 1991 Bamako Convention on the Prohibition of International Trade in Waste with Africa, not yet in force, defines the precautionary approach as entailing, *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' (Article 4(3)(f)).

4.8. CHEMICALS

Unlike waste management policy, the regulatory approach as regards the safety of chemicals has been underpinned by rather cumbersome, time-consuming and expensive scientific assessments in the USA and in the EU alike. Indeed, chemicals policies have been related to a general preference for a certainty-seeking regulatory style in which formal, science-based and standardised risk assessment has been singled out as the predominant tool for decision-making relating to chemicals. Though chemicals assessment procedures have been calling for absolute certainty, data are nonetheless incomplete and results may be unclear or contradictory. 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 effects associated with a chemical agent. As a result of limited knowledge, experts are not always able to provide conclusive evidence of a threat to human health and the environment.

It follows that the precautionary principle has been at the core of negotiations over two major international conventions on chemical pollutants. Recognising the risk posed by persistent organic pollutants to human health and the environment, the 2001 Stockholm Convention on Persistent Organic Pollutants (POPs) lays down the precautionary approach as its main objective (preamble, para. 8; Article 4). Precaution also underpins the listing procedure for new POPs (Article 8(7)). In addition, the 2001 London 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 (Article 6(3) and (5); preamble, fifth recital).

4.9. NUCLEAR ENERGY

So far, none of the international agreements dealing with nuclear energy enshrine the princi-

ple. To make matters worse, international courts are not willing to endorse the principle with respect to risks entailed by nuclear activities.

Whereas the principle was invoked by New Zealand in the *Nuclear Test II* case, the ICJ rejected the claim in the preliminary phase of the case without entering into the merits of the matter. The case law of the organs of the European Convention on Human Rights (ECHR) indicates that these bodies are not keen to take the precautionary principle into account. In the case of French nuclear testing in French Polynesia, the European Commission of Human Rights held that 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' (Report of 4 December 1995, re No. 28204-95). In addition,

A claim must demonstrate in a defensible and detailed manner that owing to failure by the authorities to take 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 the case *LCB. v. United Kingdom*, the ECtHR stated that in going ahead with nuclear tests, the United Kingdom had not infringed 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 (*LCB v. United Kingdom*, 1998: para. 38). By the same token, in its decision *McGinley and Egan v. United Kingdom*, 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. Even when involved in activities that could give rise to long-term health effects (nuclear testing), the applicants must demonstrate that, at the time of the occurrence in question, the national authorities withheld relevant documents concerning the risks of ionising radiation. In the absence of such proof, they may not claim a violation of their right to respect for their private lives based on a failure to have provided them access to relevant information.

Lastly, the ECtHR ruled in two cases against 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 (*Balmer-Schafroth and Others v. Switzerland* Case, 1997; *Athanassoglou v. Switzerland*, 2000). Even if the victims had successfully challenged the technical defects of the plant, they had not convincingly demonstrated a cause-and-effect relationship between the alleged risk and their right to protection of their physical integrity.

However, in a case concerning the Irish claim to suspend the authorisation of the Mox plant at the Sellafield nuclear power station, ITLOS 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' (Order no. 10, para. 84).

4.10. EU LAW

The principle is one of the pillars of EC environmental policy. Enshrined in paragraph 2 of Article 174 of the EC Treaty – a provision declaring the principles underpinning Community action in the field of environmental protection – it has, however, not been defined by the Treaty framers, even though there are various definitions in international environmental law.

The use of the indicative rather than the conditional confirms that such provision is binding: 'Community policy on the environment ... shall be based on the precautionary principle'. As a result, institutions as well as Member States are obliged to apply the principle when carrying out action in the environment field (Case C-127/02, *Waddenzee*).

What is more, the EC Court of Justice and Tribunal's case law has not only managed to extend the scope of application of the precautionary principle to all policies involving scientific uncertainty, but has also introduced extremely useful clarifications on the application of the principle, in particular in the domain of public health (de Sadeleer, 2006: 139–72). EC measures not complying with the principle are likely to be subject to judicial review. Indeed, in the last few years, the principle has been regularly invoked before the Tribunal of First Instance of the EC in major food safety and drugs cases. However, the Tribunal as well as the Court leave the institutions a rather broad margin for discretion, provided a number of formal conditions are met (independent and qualified scientists, latest scientific information etc.). In looking at these judgments, one needs to draw a line between on the one hand, health and food safety cases, where scientific knowledge is far more advanced than it is in the environmental sector, and on the other hand, genuine environmental cases (waste management, nature conservation) where the uncertainties are far more important given the difficulty of predicting the reactions of ecosystems to ecological risks (for example, climate change). In addition, the stricter approach endorsed by the European courts with respect to the health and food safety cases can be explained by the fact that those cases chiefly deal with the placing on the market of products (GMOs, food additives, medicinal products) where a fundamental principle of the EC Treaty, the free movement of goods, is at stake. In sharp contrast to this, the environmental cases so far decided by the ECJ deal mostly with the interpretation of provisions of several environmental directives, rather than with the functioning of the internal market and the fundamental principle of free movement of goods.

Lastly, the principle appears to be strongly embedded within different environmental legal regimes at Member State level (the French Constitution, different environment national codes).

5. *Precaution: a principle of customary international law*

Although subject to varying interpretations and accorded over 12 different definitions in international treaties and declarations, the precautionary principle is fast becoming a fundamental principle of international environmental law. The question whether precaution has to be considered as principle of customary international law is of utmost importance: while treaties create law between parties, the recognition of the precautionary principle as an international custom will make it applicable to all States.

While the principle to ensure that activities within a State's jurisdiction or control do not cause damage to the environment of other States or of areas beyond national jurisdiction is deemed to be a principle of customary international law, the procedure appears to be a great deal more delicate in the case of the precautionary principle. Whereas only the repeated use of State practice and a consistent *opinio juris* are likely to transform precaution into a customary norm, authors are crossing swords on this question.

Thus far, although it has been invoked a number of times by claimants, the ICJ as well as other international tribunals such as ITLOS or the European Court of Human Rights, as discussed above, have not affirmed its customary status yet.

Nonetheless, in an assessment of the relevant conduct and statements of states against the

generally accepted standards concerning state practice and *opinio juris*, a scholar reached the conclusion that the core content of the precautionary principle had attained the status of general international law (Trouwborst, 2002; Trouwborst, 2006). By the same token, I take the view that the prevalence of the principle in recent State practice and in international law suggests that it may indeed have attained the status of a principle of customary law, at least at the regional level. Indeed, the diversity of applications described above in any case indicates the potential of a principle which, born of environmental law, is being called upon to govern wide sections of positive law in the longer term.

6. *Consistency between the precautionary principle embedded within international environmental law and WTO law*

The principle has also become a major point of controversy in the strained relationship between trade and environment, with the EC pleading for its expansion, while the US calls for trade measures to be based on 'sound science'. The principle is not mentioned explicitly in any of the constitutive agreements of the World Trade Organization (WTO), and recourse to the principle has been somewhat unsatisfactorily addressed by various WTO dispute settlement panels in a number of cases concerning health measures.

The principle gathered momentum with the European ban on beef produced with hormones, which has been challenged by the US as well as Canada (in *EC – Measures Affecting Meat and Meat Products (Hormones)* ('*EC – Hormones*'), 1998 Appellate Body Report: DS26 and 48). The Appellate Body stated that it was 'unnecessary, and probably imprudent' for it to take a position on the legal status of the precautionary principle (§124). Moreover, the implicit reference to the precautionary principle in Articles 3(3) and 5(7) of the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) could not lead to the conclusion that the principle would prevail – even once it had reached the status of customary law, over the obligation imposed by Articles 2 and 5(1) of the SPS, which require that risk be scientifically proved, and in particular based upon a risk assessment, a duty that the EC had failed to honour. As a result, the European Community could not rely on the precautionary principle to justify its ban on hormones in beef.

That said, the Appellate Body was able to highlight some aspects of a precautionary approach in some provisions of the SPS Agreement. It drew a clear distinction between risk assessment, which must be based on a scientific approach, and the political decision (risk management) that determines the level of protection, which may be 'zero risk'. In addition, the Appellate Body was ready to give some leverage as to the ways in which science should underpin the measure: risk assessment can be conducted either quantitatively or qualitatively (§§184–6) and can set out both the prevailing view representing the mainstream of scientific opinion and the opinions of scientists taking a divergent view (§194). Furthermore, there is no requirement for a proper risk assessment to establish a 'minimum magnitude' or threshold level of degree of risk. Lastly, an SPS Member's acceptable level of risk could even be set at 'zero risk'.

However, the obligation that an SPS measure may not be maintained without sufficient scientific evidence requires that there be a 'rational or objective relationship between the SPS measure and the scientific evidence' (§§186, 189, 193, 197, 253). 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 upon the particular circumstances of a case, including the characteristics of the measure at issue and the quality and quantity of the scientific evidence (§195).

In cases where it is not possible to conduct a proper risk assessment, Article 5(7) of the SPS Agreement allows Members to adopt and maintain a provisional SPS measure. The Appellate Body took the view that the precautionary principle ‘finds reflection in Article 5(7) of the Agreement’, where it is not expressly recognised (§124). However, it must be stressed that it does so only to a limited extent, as this safety clause is subject to four requirements, which are cumulative (insufficient ‘relevant scientific information’; the measures must be based on ‘available pertinent information’; obligation to seek additional information; obligation to review the safeguard measure). Lastly, it must be borne in mind that Article 5(7) enshrines a right and not an obligation, whereas many of the environmental treaties frame the principle as an obligation.

Beef Hormone was followed by a spate of other cases where the Appellate Body endorsed an even stricter approach. In *Australia – Salmon*, a case arising from a decision by Australia to ban salmon coming from Canada, the Appellate Body stated that a risk assessment must evaluate, among other things, the likelihood of adverse health effects: ‘the “risk” evaluated in a risk assessment 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 (in *Australia – Measures Affecting the Importation of Salmon*, 1998, Appellate Body Report: DS18). Consequently, the Appellate Body concluded that the import prohibition on fresh, chilled or frozen salmon was not based on a risk assessment as required by Article 5(1) of the SPS Agreement and that Australia had therefore acted at variance with this provision (§89).

In *Japan – Varietals*, the Appellate Body again based a decision on the *EC – Hormones* case to reject direct application of the precautionary principle and rule against a Japanese import prohibition that was not based on a risk assessment (in *Japan – Varietals*, *Japan – Measures Affecting Agricultural Products*, 1999, Appellate Body Report: WT/DS76/AB/R). Attention should be drawn to the fact that in interpreting Article 5(7) of the SPS Agreement, the WTO Appellate Body took the view that the application of the safeguard clause enshrined in that provision, which previously was deemed to reflect the precautionary principle (*Hormones*, 1998: §62) ‘is triggered not by the existence of scientific uncertainty, but rather by the insufficiency of scientific evidence’ (§184). As a result, under the SPS Agreement, a precautionary principle could not be triggered by uncertainty, but exclusively by insufficient results. Needless to say, such a view departs significantly from the ECJ case law, according to which uncertainty is the linchpin around which precaution applies.

Lastly, in the US-driven dispute against European regulation of GMOs (*European Communities – Measures Affecting the Approval and Marketing of Biotech Products* (DS291, DS292 and DS293), the Panel rejected the possibility for the EC to justify its measures in the light of the precautionary principle. The general *de facto* EC moratorium on GMOs was deemed to be inconsistent with several provisions of the SPS Agreement.

Conclusions

The status, scope of implementation, thresholds of precaution and prevention are largely determined by the characteristics of the various environmental policies: fishing, climate, marine pollution, technological risks, food safety. Accordingly, neither prevention nor precaution dictates a particular outcome. In other words, there is ‘no one size fits all’ expression of these principles (Peel, 2006: 200). In fact, the ways in which these principles are

applied are therefore likely to vary as a function not only of the technical requirements related to the nature of the various risks at stake, but also of the political needs of the field in question. A multitude of differing measures may follow from these principles, ranging from bans, phase-out, best available technologies, notification procedures etc., whose scope may vary according to the contextual features of the decision-making setting. To a large extent, concrete measures endorsed either at international or at national level are there to breathe life into the bare bones of these two principles.

But this is not to say that these principles are not playing a key role in their own right in both international and municipal law. We have demonstrated in other writings (de Sadeleer, 2002) the extent to which these two principles could usher in new legal developments.

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