

# Refining the Precautionary Principle in Public International Law\*

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Public international law was once characterized by damage prevention in accordance with the preventive principle which required countries to control activities that would cause environmental damage. The precautionary principle challenged conventional technocratic approaches to the probability and magnitude of environmental risk. It presents an alternative to risk assessment and other frameworks thought to be insufficiently sensitive to pervasive scientific uncertainty, hidden scientific presumptions, and underlying value choices. The essence of the precautionary principle is that of taking action to address an environmental threat ahead of a disaster. The proliferation of international environmental law in the past quarter-century has been extraordinary, and the precautionary principle has been recognized by commentators as an exalted guiding principle for decision-makers. Applied logically, the principle would cannibalize itself and potentially obliterate public international law regulation.

*Keywords:* public international law, scientific uncertainty, precautionary principle, international status

We have sufficient scientific evidence to state that action is required. And where uncertainty still exists we must give the environment the benefit of the doubt.<sup>1</sup>

Jan P. Syse  
Former Prime Minister of Norway

All over the world, there is increasing interest in a simple idea for the regulation of risk: In case of doubt, follow the precautionary principle (O’Riordan & Cameron, 1994). In a catchphrase: Better safe than sorry. In ordinary life, pleas of this kind seem quite sensible, indeed a part of ordinary human rationality. People buy smoke alarms and insurance. They wear seat belts and motorcycle helmets, even if they are unlikely to be involved in an accident. Should not the same approach be followed by rational regulators as well? Many people believe so (Sunstein, 2003, pp. 1003-1058). Emerging in the early 1980s, the precautionary principle has undoubtedly grown in prominence and is widely recognized as the “fundamental principle” and “cornerstone” of environmental policy and protection (McIntyre, 1997, p. 221). The theory can be traced back to Rachel Carson’s *Silent Spring*, the environmentalist bible which warned against human tampering with nature with particular reference to pesticides (Plater, 1994, pp. 981-1000).

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<sup>1</sup> Address by Jan P. Syse, Ministerial Session, Bergen Conference, May 14, 1990, See Cameron and Abouchar (1991).

The essence of the precautionary principle is that of taking action to address an environmental threat ahead of a disaster. The precautionary principle has been highly influential in legal systems all over the world. In its strongest and most distinctive forms, the principle imposes a burden of proof on those who create potential risks, and it requires regulation of activities even if it cannot be shown that those activities are likely to produce significant harms.

### **Rational Action in a Context of Uncertainty**

Environmental risk in post-modernity era has shown the characteristics of “scientific uncertainty”, that is, the existing scientific evidence cannot prove the source of risk, nor can it prove that there is an absolute causal relationship between risk and damage (Cameron & Abouchar, 1996, p. 29). This rationale is often expressed in terms from frequentist probability theory:

When a regulator makes a decision under conditions of uncertainty, there are two possible types of error. The regulator can over regulate a risk that turns out to be insignificant or the regulator can underregulate a risk that turns out to be significant. If the regulator erroneously underregulates, the burden of this mistake falls on those individuals who are injured or killed, and their families. If a regulator erroneously overregulates, the burden of this mistake falls on the regulated industry, which will pay for regulation that is not needed. This result, however, is fairer than setting the burden of uncertainty about a risk on potential victims. (Adelman, 2004, pp. 10131-10141)

### **Risk Characteristics in the Post-modernity Era**

Traditional accounts of regulation suggest that policy-makers and markets are under sensitive to long-term environmental harms (Plater, 1994, pp. 981-1000). The risks of traditional society mainly include natural disasters, such as plague, earthquake, famine, and so on. No matter to what extent these disasters threaten human society, we can attribute them to the punishment of human beings by supernatural forces, which is also one of the common psychological factors of human beings of religious origin. However, most of the risks since the industrialization era come from major man-made decisions, such as the development and utilization of nuclear energy resources, the emission of greenhouse gases, the import of modified living organisms, and so on (Gundling, 1990, pp. 23-30). These decisions are not made by a social individual, but by the government or an organization authorized by the government after weighing the risk costs and benefits of the project. Therefore, when people are faced with major risks or disasters, they no longer only feel fear and awe, but also file charges against government agencies, companies, intergovernmental organizations that make decisions on risk activities.

Science and technology have aggravated the imperceptibility or unpredictability of risks. Disasters, such as hazardous waste and chemical pollution, genetically modified foods and nuclear radiation have gone beyond the knowledge of human and even artificial intelligence, and these risks caused by scientific and technological progress are gradually dissociating from the scope of human control (Boutillon, 2001-2002). Even the scientists with the privilege of technology monopoly cannot solve this kind of real crisis, and no technical expert can make a completely deterministic prediction and judgment in the face of the huge environmental risks related to human life and death (Farber, 2015). Environmental risk may also evolve into economic risk, or even into political risk and social risk. The traditional risks and their damage consequences are often limited to one country or region, and the scope of influence is extremely limited, while the risks in modern society show cross-boundary and

global characteristics. It is not restricted by geographical factors and affects everyone in an overall and equal way. Compared with the risk in the traditional society, the risk in the post-industrial era has undergone a fundamental change.

### **The Risk Society Theory**

Despite the scientific consensus on relatively minor risks posed by the use of techniques, environmental activists are concerned that genetically modified plants could pose unprecedented threats to environmental protection and human health (Adler, 2000, pp. 173-206). The risks in the process of modernization and its follow-up problems aroused the reflection on scientific rationality, and the theory of modernity rooted in the Enlightenment has been questioned all over the world. Concepts and terms, such as “post-modernity”, “late modernity”, and “reflective modernization” were used to describe the uncertainty and complexity of post-modern society (Favre, 1993, pp. 875-895). In 1986, German sociologist, Ulrich Baker, puts forward the theory of risk society for the first time in his book *Risk Society*, which holds that the concept of risk is directly related to the reflection of modernization (Mead, 2004). Risk can be defined as a way to systematically deal with the dangers and insecurity caused by modernization itself. Risk, as opposed to the early danger, is related to the threatening power of modernization and the globalization caused by modernization.

Anthony Giddens also analyzes the risk and risk society as a social construction: in the world we live in, we create more risks than external risks (Gundling, 1990, pp. 23-30). It lies in the industrial society itself and is the inevitable companion of modernity. The constructive nature of risk is gradually highlighted: Modern risk is the product of social construction, which is closely related to cultural perception and definition (Sachs, 2011). In his dialogue with Chinese scholars, Baker clearly pointed out that industrialism has violated its logic, transcended its boundaries, and began to move towards the process of self-resolution. Modernization is becoming “reflexive” (Applegate, 2002-2003).

The criticism of modernity by the proponents of risk society theory is consistent with the critical thinking of previous theorists, such as Habermas’s criticism of instrumental rationality and Horkheimer’s criticism of enlightenment (Stewart, 1999, pp. 350-373). In the view of the proponents of the theory of risk society, the expression form and internal mechanism of risk in the post-industrial era are extremely complex, and the environmental problem is a remarkable example. Scott Rush once pointed out the essence of the theory: The theory of risk society does not pay attention to whether radical ideas should be controlled in the whole society, but how to use improved methods to effectively control environmental risks and other risks, and thus construct a post-modern renewal theory (Lash, 2000, pp. 47-62). Precaution has gradually become the overwhelming political needs of modern society, and the effective management of risk has become the basic orientation of public policies in various countries (Wagner, 2004, pp. 1619-1725).

### **From the Preventive Principle to the Precautionary Principle**

States in international law are held responsible for polluting activities inside their territory that cause harm in neighboring states according to the premise upon which all state responsibility rests: “one must so use his own as not to do injury to another” (Hickey & Walker, 1995, pp. 423-454). International environmental law was once characterized by damage prevention in accordance with the preventive principle which required countries to

reduce, restrict, or control activities that would cause environmental damage. The preventive principle was recognized by international environmental treaties, and has been one of the basic principles of international environmental law (Sands & Peel, 2012, p. 412).

### **The Concept of Prevention and Precaution**

Having its origin with the rise of environmentalism in Germany in the 1970s, the precautionary principle was exported to the United States in the 1980s before it became an element of the European Community's environmental policy in the 1990s. It shows that the precautionary principle was called upon in relation to many environmental issues, at the same time, the principle was incorporated into numerous international conventions and declarations, ranging from general environmental protection to air, water, ocean, genetically modified organisms, and hazardous waste (Boutillon, 2001-2002, pp. 429-470). At its core, the precautionary principle embodies two fundamental regulatory policies: Anthropogenic harm to human health and the environment should be avoided or minimized through anticipatory, preventive regulatory controls; and, to accomplish this, activities and technologies whose environmental consequences are uncertain but potentially serious should be restricted until the uncertainty is largely resolved (Applegate, 2002-2003, pp. 13-78).

The precautionary principle challenged conventional technocratic approaches to the probability and magnitude of environmental risk. It presents an alternative to risk assessment and other frameworks thought to be insufficiently sensitive to pervasive scientific uncertainty, hidden scientific presumptions, and underlying value choices (Cameron & Abouchar, 1996, p. 29). Although this principle has been phrased in many ways in environmental declarations and treaties, perhaps the phrasing in Principle 15 of *the 1992 Rio Declaration on Environment and Development* best reflects the international community's views on this principle:

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.<sup>2</sup>

Similar precautionary statements can be found in other environmental treaties, including *the Vienna Convention for the Protection of the Ozone Layer*, *the United Nations Framework Convention on Climate Change*, and *the Convention on Biological Diversity*, among others (Freestone, 1994). The precautionary principle has been embodied in those treaties as "general obligations" and "basic principles and obligations". Some international conventions, such as *the 1991 Bamako Convention*, *the 1992 Convention for the Protection of the Marine Environment of the Baltic Sea*, *Resolution 9.24 of the 1994 Convention on International Trade in Endangered species of Wild Fauna and Flora*, and *the 2000 Cartagena Protocol* also provide for the specific implementation measures of the precautionary principle, including prohibition and limitation of pollution sources, best available technologies, best environmental practices (Gundling, 1990, pp. 23-30). The widespread existence of the precautionary principle in international treaties proves the generality and universality of this principle, and the signing and ratification of such environmental treaties by a large number of countries is itself a form of state practice.

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<sup>2</sup> Rio Declaration on Environment and Development, U.N. Conference on Environment and Development, *U.N. Doc. A/Conf. 151/5/Rev. 1*, June 13, 1992, p. 879.

### Disparities Between the Two Principles

Professor Nicolas De Sadeleer of St. Louis University has made the following distinction between the preventive principle and the precautionary principle: Damage prevention is based on the existence of deterministic environmental impacts, which depends on long-term experience in the perception of the degree of risk; thus the implementation of the preventive principle is based on scientific knowledge, technical control, and risk assessment, so as to reduce the possibility of environmental damage when the causal relationship between risk and damage has been established. The distinction between the precautionary principle and the preventive principle lies in the degree of risk uncertainty (de Sadeleer, 2002). There is no doubt that the precautionary principle is the choice of environmental risk regulation under the existing technical conditions, and can provide a solution of the functional evolution of environmental law.

Another question to be discussed is whether the precautionary principle exists because of scientific uncertainty, or should it be stated that the precautionary principle should be applied despite scientific uncertainty (Trouwborst, 2009)? The solution of this problem involves the logical relationship between the precautionary principle and the preventive principle, that is, are the two principles absolutely separate? In other words, does the scope of the precautionary principle include damage prevention? It is true that the causal relationship between some environmental risks and damage cannot be determined by the existing scientific evidence; however, does the implementation of this principle exclude preventive measures? Principle 15 of *the 1992 Rio Declaration* was expressed as “lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”.<sup>3</sup> Article 2.2(a) of *the 1992 Northeast Atlantic Convention on the Protection of the Marine Environment* also stipulates that the precautionary principle should be applied and preventive measures should be taken.<sup>4</sup> Some other international environmental declarations and treaties that contain provisions on the precautionary principle, such as *the 1992 Convention for the Protection of the Marine Environment of the Baltic Sea*, and *the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Substances*, also have adopted this expression.<sup>5</sup>

Thus, the precautionary principle and the preventive principle are not absolutely separated in practice, and taking preventive measures is one of the ways to implement the precautionary principle. Meanwhile the preventive principle has not been completely replaced by the precautionary principle. In the field where scientific evidence has been proved, the preventive principle is still one of the basic principles of international environmental law.

### The Particular Applying Triggers of Precautionary Principle

The essence of the precautionary principle is that positive action, for example, a ban on certain activities in order to protect the environment or public health, may be required before the existence of a risk has been

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<sup>3</sup> Idem.

<sup>4</sup> The Convention for the Protection of the Marine Environment of the North-East Atlantic, at <http://www.ospar.org/convention/text>, Feb.12, 2020.

<sup>5</sup> The Convention on the Protection of the Marine Environment of the Baltic Sea Area, at <http://helcom.fi/Recommendations/Rec%207-8.pdf>; The 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, at <http://www.imo.org/en/OurWork/Environment/LCLP/Documents/PROTOCOLAmended2006.pdf>, Feb.12, 2020.

scientifically established (Bohanes, 2002, pp. 323-331). The precautionary principle focuses on the philosophical and spiritual relationship between humankind and the environment which sustains our physical existence. It marks a re-evaluation of the development path chosen by many societies since the great period of industrialization that began in England in the late 18th century. Its purpose is to encourage-perhaps even oblige decision-makers to consider the likely harmful effects of their activities on the environment before they pursue those activities (Cameron & Abouchar, 1991, pp. 1-28).

Although the definition of the precautionary principle in international environmental treaties and declarations is not exactly the same, the commonness in these definitions can be abstracted, or it can be called the “applying triggers” of the precautionary principle. First, risk cannot be effectively assessed, that is, the scientific uncertainty of risk. Second, the purpose of risk control is to prevent irreversible damage; third, precautionary measures should be taken. Arie Trouwborst (2006) of Tilburg University had vividly compared these three core elements to the “tripod” of the precautionary principle (p. 30).

### **Scientific Uncertainty**

The first applying trigger of the precautionary principle is “scientific uncertainty of environmental risk”. The second half of Principle 15 of *the Rio Declaration* stipulates that “cost-effective preventive measures shall not be delayed on the grounds of lack of scientific evidence”, and “lack of scientific evidence” here refers to the state of scientific uncertainty caused by the lack of scientific knowledge. Scientific uncertainty means that people know something about the state of danger or damage, and if people are not aware of the possible environmental damage, it is not uncertainty, but a state of ignorance (Zander, 2010, p. 15).

Taking the environmental risk in the utilization of transboundary water resources as an example, its natural drainage system includes not only rain water, but also non-point source pollutants on land and point source pollutants from industry, agriculture, and so on. When there are few pollutants, turbulent flow, sediments, and suspended solids, these substances can flow into the ocean with the downstream river, and when the discharge of waste water exceeds the capacity of the river, it may lead to the increase of microorganisms, organic matter, and eutrophics. The reduction or even extinction of oxygen and certain aquatic species in the water may have serious negative effects. In this case, the fact that the environment being threatened by river pollution is certain, but the possibility of the risk is uncertain. On the one hand, the sampling and statistical methods, calculation errors, and data analysis methods will lead to the uncertainty of the data, and the lack of mathematical model and parameters will lead to the uncertainty of the model construction. Errors in the construction, maintenance, and operation of water conservancy projects will lead to operational uncertainty. On the other hand, after entering the transboundary water body, the pollutant will spread to the whole basin with the flow of the water body from a certain country, forming a continuous evolution process of pollution, in which the risk variables may be numerous and complicated. First, whether the pollutant comes from a point source or a non-point source, with the long-distance migration of the transboundary water body, it will be affected by advection and turbulence, and chemical and biological reactions will occur. When there are confluences and tributaries, it will increase the uncertainty of the migration and transformation of pollutants in the water body. Second, the transboundary river is different from the river within a country, it will show a strip after being polluted, and all the environmental factors related to the transboundary river may be affected by water pollution, such as the industrial and

agricultural users who develop and utilize the river water, the vegetation on both sides of the river, the radiated population of the river basin, and so on; these factors make the uncertainty of environmental risk more obvious (Ganoulis, 2009, p. 137).

The risks of the utilization of transboundary aquifers are more complex and volatile. Once the aquifer is polluted, it cannot be directly integrated into the water and into the ocean like surface water, and the flow of aquifer pollutants is affected by soil and rock permeability, aquifer geological structure and pressure gradient. The larger the particles that make up the soil and rock, the stronger the permeability of the pollutants, and vice versa. The geological structure of aquifers varies in different countries and regions, making it difficult to determine the speed and depth of pollutants flowing into the ground (Burton, 1969, pp. 141-165). The geological, chemical, and biological processes of aquifers will experience rapid changes in time and space, which makes the uncertainty of aquifer pollution more obvious. During the drafting of *the Draft Law on Transboundary Aquifers*, the Special Rapporteur, Mr. Yamada, stated in his fifth report that “aquifer States should adopt a precautionary approach, because the nature, scope and vulnerability of transboundary aquifers or aquifer systems are uncertain”.<sup>6</sup>

In addition to the uncertainty of environmental risk itself, the “uncertainty of causality” between risk and damage also constitutes the factors of uncertainty. For example, Article 7 of *the 1987 North Sea Declaration* states that precautionary measures should be taken even if there is no absolutely clear scientific evidence to prove the existence of causality;<sup>7</sup> Article 2 of *the 1992 OSPAR Convention* stipulates that partners shall apply the precautionary principle even if there is no conclusive evidence of the causal relationship between emission pollution and negative effects;<sup>8</sup> Article 2.5(a) of *the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes* states: “the precautionary principle shall apply. Even if scientific research has not fully demonstrated a causal relationship between these substances and potential transboundary effects”.<sup>9</sup> Article 23.2 of *the 2004 Berlin Water Rules* also stipulates that the basin country should take all precautions even if there is no conclusive evidence of a causal relationship between pollution emissions and their expected effects.<sup>10</sup> The implicit meaning is that environmental protection is imminent and it is too late to take measures when the definite causality is proved.

### **Serious or Irreversible Environmental Damage**

The second applying trigger of the precautionary principle is that the environment faces the threat of “significant”, “serious”, or “irreversible” environmental damage. Germany’s *1974 Clean Air Act* was the first legal document to propose that precaution requires action to reduce risks when serious or irreversible

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<sup>6</sup> See Fifth report on shared natural resources: transboundary aquifers, by Mr. Chusei Yamada, Special Rapporteur, A/CN.4/591, at [http://legal.un.org/docs/?path=../ilc/documentation/english/a\\_cn4\\_591.pdf&lang=ESX](http://legal.un.org/docs/?path=../ilc/documentation/english/a_cn4_591.pdf&lang=ESX), Jan. 22, 2020.

<sup>7</sup> See OSPAR Commission, North Sea Conferences: Ministerial Declarations and statements, *Hague Declaration*, at [http://www.ospar.org/site/assets/files/1239/3nsc-1990-hague\\_declaration.pdf](http://www.ospar.org/site/assets/files/1239/3nsc-1990-hague_declaration.pdf); *Esbjerg Declaration*, at [http://www.ospar.org/site/assets/files/1239/4nsc-1995\\_esbjerg-declaration-1.pdf](http://www.ospar.org/site/assets/files/1239/4nsc-1995_esbjerg-declaration-1.pdf); *Bergen Declaration*, at [http://www.ospar.org/site/assets/files/1239/5nsc-2002\\_bergen\\_declaration\\_english.pdf](http://www.ospar.org/site/assets/files/1239/5nsc-2002_bergen_declaration_english.pdf); *Gothenburg Declaration*, at [http://www.ospar.org/site/assets/files/1239/6nsc-2006-gothenburg\\_declaration.pdf](http://www.ospar.org/site/assets/files/1239/6nsc-2006-gothenburg_declaration.pdf), Feb. 9, 2020.

<sup>8</sup> See The Convention for the Protection of the Marine Environment of the North-East Atlantic, Article 2.2(a), at <http://www.ospar.org/convention/text>, Feb. 9, 2020.

<sup>9</sup> See The Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Authentic texts (as adopted in 1992), Art. 2.5.

<sup>10</sup> See ILA, Rules of International Groundwaters, Seoul Conference (1986), Art. 23.2.

environmental threats occur (Harremoes et al., 2002, p. 4). Since then, international declarations and treaties have adopted the same or similar expressions, setting a minimum threshold for the implementation of the precautionary principle with terms, such as “possible damage”, “irreversible environmental threat”, “significant derogation threat”, and “possible significant adverse effects”. Thus, how to understand the exact meaning of “significant”, “serious”, and “irreversible”? What are the specific criteria for judging the threat of environmental damage? The International Law Commission (hereinafter referred to as “The ILC”) explained the “significant negative impact” in its comments on the draft second Reading of the 1997 Convention on International watercourses. Article 3.2 of *the Draft Second Reading* stipulates that the conclusion of watercourse agreements by two or more watercourse States shall not have a “significant” negative impact on third countries. According to the ILC, first of all, the word “significant” means that the damage impact cannot be trivial and that there must be objective evidence that tangible damage will occur. The Commission noted that in the France/Spain Lake Lanux arbitration case, Spain would not lose completely if it could prove that France’s development of Lake Lanux would cause serious damage to the Carlo River, or that the chemical composition, temperature or other characteristics of the backwater would harm Spain’s interests. Unfortunately, this was not mentioned at all in the documents proposed by Spain.<sup>11</sup> “Significant” cannot be equated with “substantial” as well. The degree of “substantial damage” is too high, imposing a heavy burden on third countries. Article 7 of *the Draft Second Reading* also sets out the “obligation of watercourse states not to cause significant damage”. The ILC stresses in particular that the word “significant” contains both “appreciable” and “real”, and that “serious damage” is replaced by “serious damage” only because the latter has both “significant” and “measurable”. It is not intended to improve the standard of application of the obligation not to cause significant damage.

In addition, the word “significant” is used throughout *the Second Reading of the Draft* to indicate the degree of environmental damage. For example, Article 12 provides that the watercourse states shall notify the watercourse states of the planned measures to the watercourse states that has been “materially adversely affected”, and Article 21 provides that the watercourse states shall prevent, reduce, and control pollution that may cause “significant damage” to other watercourse States, either individually or jointly.<sup>12</sup> The above provisions have been considered by the working Group of the whole of the sixth Committee of the General Assembly and are finally directly reflected in the text of the Convention.

*The 2004 Berlin Water Rules*, compiled by the River Committee of the International Law Association, also adopted the expression of “significant negative impact”. Article 23, Paragraph 2, of *the Berlin Water Rules* provides that when the sustainable use of transboundary water resources is “significantly negatively affected”, States parties shall take all appropriate measures, even if there is no conclusive causality, prevent, eliminate, reduce or control damage to the water environment. In addition, the rule also sets the requirements of “significant negative impact” in the aspects of alien species invasion, environmental impact assessment, and so on. Article 25 of the rules provides that when alien species may have a significant negative impact on the water environment, States parties shall take all appropriate measures to prevent the introduction of alien species. Article 29 of the rules provides that States parties shall conduct prior and continuous environmental impact assessments when

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<sup>11</sup> See the law of non-navigational uses of international watercourses, draft articles and commentaries thereto adopted by the Drafting Committee on second reading, *A/CN.4/L.493 and Add.1*, p. 94.

<sup>12</sup> *Idem*, pp. 111-121.

projects, works or activities may have a “significant impact” on the water environment or sustainable development.<sup>13</sup> The comments of the International Law Association pointed out that there are no uniform international standards for the threat of damage under which countries need to perform their obligations of environmental assessment, such as “foreseeable impact”, “serious damage”, “significant damage”, and so on. Another threshold set by international environmental declarations and treaties for the implementation of the precautionary principle is “serious or irreversible” environmental damage, such as the provisions of Principle 15 of *the Rio Declaration* and Article 3 of *the 1992 Framework Convention on Climate Change*. However, there is no authoritative international law research or codification organization to explain “serious” or “irreversible” damage. Some scholars believe that “serious damage” refers to the persistence and persistence of environmental damage, and its implication is that even after a period of repair, the quality of resources donated by nature will still be impaired (Trouwborst, 2006, p. 57). Morris (2000) believed that, strictly speaking, any change is irreversible, similar to the philosophical view that “one cannot step into the same river again” and some seemingly irreversible environmental changes may actually be repaired (p. 14). Indeed, we cannot deny that once-submerged coastal areas may surface and some extinct creatures may reappear after the next round of global climate change. However, there is no scientific evidence to prove the possibility. In fact, “irreversibility” does not refer to the absolutely irrecoverable state of the environment or resources, but is intended to emphasize the high cost of repairing environmental damage, for example, once the ecosystem is destroyed, the recovery time may be as long as hundreds of years. The 1997 Hungarian/Slovak Project case also dealt with the interpretation of “serious” and “irreversible” environmental damage. The Hungarian complained to the International Court of Justice (ICJ) that it had the right to suspend and then abandon specific parts of the project undertaken under the 1977 treaty between the parties, because the project would have a “serious or irreversible impact” on the Danube. Specifically, the discharge of wastewater from the project in Slovakia to the Danube was originally 50 cubic meters per second, but with the operation of the project, the discharge is likely to reach 200 cubic meters per second, and in the long run, it will seriously affect the quality of surface and groundwater in the Danube. If the project in Hungary continues, the danger will be even more serious and urgent, not only affecting the upstream reservoir and eroding the downstream riverbed, but also having an irreversible impact on the source of drinking water in Budapest.<sup>14</sup>

The Court held that the “seriousness” of the environmental risk did not contain an element of “imminent”, and could not alone constitute a “peril”, for the effective termination of the treaty, and that the evidence provided by the Hungarian could not prove that the project would have the “serious impact” of its claim. The Court stressed that it was assumed that, as believed by the Hungarian, the construction and operation of the project would have a serious environmental impact and that the Hungarian Government also had other ways to deal with the risks, rather than suspending and abandoning the projects it was supposed to undertake.<sup>15</sup> The Court finally ruled that Hungary had no right to abandon its projects under *the 1977 Treaty*, but at the same time, it noted that in the field of environmental protection, the “irreversibility” of environmental damage and the huge cost of repairing the environment require vigilance and preventive awareness.<sup>16</sup>

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<sup>13</sup> See ILA, Rules of International Groundwaters, Seoul Conference (1986), Art. 23-29.

<sup>14</sup> See Gabčíkovo-Nagymaros Project (Hungary/Slovakia), Judgment, *I. C. J. Reports 1997*, pp. 35-43.

<sup>15</sup> *Idem*, pp. 42-43.

<sup>16</sup> *Idem*, p. 78.

### Precautionary Measures

The third applying trigger of the precautionary principle is the precautionary measures, which is also the manifestation of this principle in practice. Due to the imperceptibility and unpredictability of the risk itself, coupled with the strong diffusion and contagion of pollution, the environmental risk and the causal relationship between risk and damage are usually uncertain. In the field of development and utilization of international water resources, with the increasing intersection of influencing factors, people's understanding of the possible environmental impact and risk degree of the development of international rivers, lakes and aquifers is becoming more and more difficult. If we wait to prove that there is a causal relationship between water resources development behavior and pollution damage, the current environmental problems will become extremely complex, unpredictable and difficult to control.

The myriad of regulatory approaches available to implement the principle include: clean production methods, best available technology and environmental practices, timely environmental impact statements, the principle of non degradation, emission controls at the source, cradle-to-grave control of hazardous substances, and comprehensive monitoring techniques (Fullem, 1995, pp. 495-522).

The precautionary principle can dominate the reform direction of international environmental law in the past few decades because it transforms uncertainty into a deterministic entity and procedural mechanism through a series of specific obligations and measures.

### International Status of the Precautionary Principle

At some level of generality, precaution is undoubtedly a customary rule of international law. At the level of specific words and provisions, however, there remains significant diversity in the meaning of the precautionary principle, and this diversity is both the product and target of considerable political maneuvering.

### International Treaties

As early as 1950, the ILC stated in its report to the United Nations General Assembly that customary international law may exist in a bilateral or multilateral agreement; for other states, the rule still exists in the form of customary international law.<sup>17</sup> The judgment of the ICJ also stated that "treaties can and must be taken into account in identifying the content of customary international law".<sup>18</sup> In his third report to the ILC in 2015, Special Rapporteur Michael Wood elaborated on the importance of international treaties in proving the existence of customary international law: Treaty provisions do not in themselves constitute customary international law, but these provisions, as a clear expression of the will of states, can provide valuable evidence of the existence of the rules of customary international law.<sup>19</sup> In accordance with Article 11 of the *2016 Draft Identification of Customary International Law*, treaty provisions reflect the rules of customary international law in three cases: first, to codify existing rules of customary international law; second, to fix the rules of customary international law that emerged prior to the conclusion of the treaty; and third, to promote a universal state practice and legal conviction, resulting in new rules of customary international law.

<sup>17</sup> See *Yearbook of the ILC 1950*, Vol. II, p. 268, para. 19.

<sup>18</sup> See *Continental Shelf (Libyan Arab Jamahiriya/Malta)*, Judgment, I. C. J. Reports 1985, p. 13.

<sup>19</sup> See ILC, *Third Report on Identification of Customary International Law*, by Michael Wood, Special Rapporteur, A/CN.4/682, at <http://legal.un.org/docs/?symbol=A/CN.4/682>, Jan.19, 2020.

The concept of precaution has gradually evolved into a recognized principle of environmental law since the 1990s. It can be considered that the widespread existence of the precautionary principle in international treaties proves the generality and universality of this principle, and the signing and ratification of such environmental treaties by a large number of countries is itself a form of state practice.

### International Cases

Judgments of international courts and tribunals relating to the existence and content of customary international law are supplementary means of proving customary international law.<sup>20</sup> The cases concerning to the precautionary principle in international judicial practice were the Nuclear Test case (New Zealand v. France), the Danube Project case (Hungary v. Slovakia), the Pulp Mill case (Argentina v. Uruguay), the Kishenganga Project case (Pakistan v. India), the Southern Tuna case (New Zealand v. Japan), the MOX Nuclear Plant case (Ireland v. United Kingdom), and the Hormone Beef case (United States v. European Union).

The Hormone Beef case is the most representative case concerning to the precautionary principle in the practice of WTO dispute settlement. The United States and Canada submitted a claim against the European Communities alleging that the EC prohibition of imports of meat and meat products derived from cattle that had been treated with natural or synthetic hormones was contrary to the provisions of *the GATT*, *the SPS Agreement*, and *the TBT Agreement*. The European Community maintains that the precautionary principle has constituted customary international law and that the hormonal beef ban imposed was an appropriate precautionary measure in line with the provisions of customary international law.<sup>21</sup> The European Community also quoted Professor David Fullistone's view that the emergence of the principle in a large number of international environmental documents had proved its universal applicability. The United States, on the other hand, claims that although international documents have listed the precautionary principle as an important principle, it has not constituted customary international law and can only be classified as a method.<sup>22</sup> In its report, the Panel avoided the discussion on the legal status of the precautionary principle, arguing that even if the precautionary principle formed part of customary international law, it cannot overturn the clear provisions of Articles 5.1 and 5.2 of *the SPS Agreement* on risk assessment.<sup>23</sup>

The appellate body stated that the status of the precautionary principle in international law had been a topic of ongoing controversy. It took the point of view that it was unnecessary, even unwise and imprudent, for the Appellate body to explain this issue in the present case.<sup>24</sup> With regard to the relationship between the precautionary principle and *the SPS Agreement*, the Appellate body agreed with the view of the European Community that it was not necessary to consider that Article 5.7 of *the SPS Agreement* exhausted the connection between the Agreement and the precautionary principle, as reflected in the sixth preamble paragraph of *the SPS Agreement* and Article 3.3 of the text. Members can establish inspection and quarantine measures that are suitable for their own countries and are higher than the existing international

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<sup>20</sup> See ILC, Identification of Customary International Law, *Text of the Draft Conclusions Provisionally Adopted by the Drafting Committee*, A/CN.4/L.872, at <http://legal.un.org/docs/?symbol=A/CN.4/L.872>, Jan.19, 2020.

<sup>21</sup> EC's appellant's submission, para. 88.

<sup>22</sup> United States' appellee's submission, para. 92.

<sup>23</sup> Report of the Appellate Body, *European Communities-Measures Concerning Meat and Meat Products*, WT/DS26/AB/R, para. 120.

<sup>24</sup> *Idem*, para. 123.

standards. However, for the risk assessment measures that conflict with *the SPS Agreement*, the precautionary principle is not the reason to legalize such measures. The Appellate body finally agreed with the Panel's conclusion that the precautionary principle could not overturn the provisions of Articles 5.1 and 5.2 of *the SPS Agreement*.<sup>25</sup>

The 1999 Southern Tuna case was the first case of the International Tribunal for the Law of the Sea to affirm the concept of precaution. In this case, New Zealand filed a complaint, claiming that the unilateral capture of southern tuna by Japanese fishermen may threaten the reproductive capacity of the fish. Australia filed the same complaint and joined the case. According to the plaintiff, Japan violated its obligation to protect and make the best use of fishery resources, which in turn violated its precautionary obligation under *the 1982 United Nations Convention on the Law of the Sea*, and requested the Court to order Japan not to engage in illegal fishing practices, and comply with the fishing quotas in the existing agreement between the parties and implement the precautionary principle to conserve juvenile fish.<sup>26</sup> The Tribunal held that in order to ensure the species continuity of southern tuna, the parties should comply with their risk prevention obligations and ensure the effective conservation of fishery resources. Based on the serious threats and risks to fish stocks, scientific uncertainty does not constitute a reason to protect the parties, nor can it be an excuse to delay the adoption of precautionary measures.<sup>27</sup>

In the MOX Nuclear Plant case, Ireland considered that the MOX plant in the United Kingdom posed a potential threat to the marine environment and violated its precautionary obligations under UNCLOS. Ireland required a reversal of the burden of proof, that is, the United Kingdom should prove that the nuclear waste processing plant in its territory did not pose a threat of damage to the environment. The International Tribunal for the Law of the Sea did not comment on the precautionary principle, but pointed out in its judgment that precaution and vigilance in the field of the environment were necessary and that the parties should cooperate with each other and report to the Tribunal on consultations, some scholars believe that this is an implied expression of the concept of precaution (Sands, 1995, p. 222).

While the WTO and International Tribunal of the Law of the Sea (ITLOS) have increasingly accepted the precautionary principle in matters of international environmental law, the ICJ has always been more reticent. Before *Pulp Mills*, the precautionary principle was exclusively mentioned in dissents and concurrences in ICJ cases but never in a majority opinion (Kazhdan, 2011, pp. 527-552). *Pulp Mills on the River Uruguay* (Argentina v. Uruguay), decided in 2010 by the ICJ reversed a trend within international environmental law of reading the precautionary principle broadly (Favre, 1993, pp. 875-895). *Pulp Mills* decided a conflict between Argentina and Uruguay: Argentina accused Uruguay of authorizing construction of a pulp mill that polluted the Uruguay River, violating the countries treaty regarding the protection of the river. Argentina argued that under the precautionary principle, Uruguay, the defendant, was responsible for proving that the mill would not cause significant harm to the environment. In *Pulp Mills*, the court finally did address the principle.<sup>28</sup>

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<sup>25</sup> *Idem*, para. 124.

<sup>26</sup> *Southern Bluefin Tuna Cases* (N.Z. v. Japan; Austl. v. Japan), Request for Provisional Measures, 117 I.L.R. Int'l Trib. for the Law of the Sea, paras. 28-32.

<sup>27</sup> *Southern Bluefin Tuna Cases* (N.Z. v. Japan; Austl. v. Japan), Order, 117 I.L.R., International Tribunal for the Law of the Sea, paras. 77-80.

<sup>28</sup> See *Gabcikovo-Nagymaros Project* (Hungary/Slovakia), Judgment, *I. C. J. Reports 1997*, p. 78.

### State Practice

Aspects of the precautionary principle pervade domestic environmental and public health law as well. The legislative and administrative acts of states and domestic court decisions are specific ways of state practice and are direct evidence of the existence of customary international law. Article 13 of the draft pointed out that decisions of domestic courts relating to the existence and content of customary international law are also complementary ways of proving customary international law.<sup>29</sup>

In the 1970s, Germany as a highly industrialized country had formulated advanced environmental pollution prevention laws. In order to cope with the hazards of air pollution and acid rain on forests, Germany passed the Clean Air Act in 1974, which stipulates that

avoiding determined environmental damage does not fully achieve the objectives of the environmental policy; preventive environmental policies require anticipation of the environment that has not yet occurred. Damage and protect natural resources in a more prudent manner, the Vorsorgeprinzip principle. This principle combines risk foresight and the meaning of best environmental practices to encourage the reduction of negative environmental impacts, but does not require a scientifically certain link between specific pollutants and specific diseases. (Teouwborst, 2002, p. 17)

In 1984, the German Ministry of the Interior explained the precautionary principle in environmental law and environmental policy as follows:

Human responsibility for future generations requires us to protect the natural basis of life and to avoid irreversible damage, such as a sharp reduction in forest the precautionary principle requires us to avoid damage to the natural environment in advance according to the probability of the risk occurring. The principle also means that through comprehensive and comprehensive research, early detection of threats to human health and the natural environment, but scientifically determined cause and effect relationship is not a prerequisite for risk prevention measures. The precautionary principle should be applicable to all economic fields that can effectively reduce environmental pollution, especially those industrial sectors that may produce harmful substances. (Boehmer-Christiansen, 1994, p. 37)

Since the 1970s, the precautionary principle has appeared in the domestic legislation of major developed countries and its establishment and institutional construction gradually gained widespread international support.

The precautionary principle originated from the German environmental protection law, and has been widely applied and developed in Sweden, Norway, the Netherlands, Switzerland, and other European countries; even countries that initially opposed the precautionary principle, such as the United States, and countries that traditionally apply the preventive principle, such as the United Kingdom and France, have begun to specify the principle in the statute law (Favre, 1993, pp. 875-895). At the same time, this principle has been reflected not only in the environmental policies and statute laws of various countries, but also in their case law practice.

In the United States, the Colombian Circuit Court of Appeals pointed out in a landmark administrative decision on environmental agency cases that EPA officials should have discretion over scientific uncertainty of air pollutants; if the EPA is forced to be fully aware of the negative effects of pollutants before they can be included in the ban list, it is inconsistent with the "risk prevention nature" of Section 109 of *the Clean Air Act* (Fullem, 1995, pp. 495-522).<sup>30</sup> Since then, the Washington Circuit Court has also confirmed and strengthened

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<sup>29</sup> See ILC, Identification of Customary International Law, *Text of the Draft Conclusions Provisionally Adopted by the Drafting Committee*, A/CN.4/L.872, at <http://legal.un.org/docs/?symbol=A/CN.4/L.872>, Jan.19, 2020.

<sup>30</sup> *Lead Indus. Ass'n, Inc. v. EPA*, 647 F.2d 1130 (D.C. Cir. 1976), cert. denied, 449 U.S. 1042 (1980), see Fullem (1995, pp. 495-522).

the precautionary principle in Section 211 of the Act in case law. The measures taken after the scientific evidence is confirmed can only be called responsive regulations, not precautionary regulations (Kannan, 2006-2007).<sup>31</sup>

Australia has been a leading jurisdiction in the adoption of the precautionary principle, with widespread policy and legislative incorporation. This has paved the way for the development of a substantial jurisprudence on the interpretation and application of the principle (Peel, 2009, pp. 11-25). *Leeds v. National Parks and Wildlife Agency*, which was decided by the Land and Environment Court of New South Wales in 1993, was a classic case of the application of the precautionary principles in Australia (Gullett, 2000). Judge Stein noted in his decision that the precautionary principle was an important principle in Australian environmental law, and given the uncertain impact of endangered species habitats on these species, it was a legitimate administrative act for the National Parks and Wildlife Service to refuse to issue permits. When there is scientific uncertainty or lack of awareness, decision-makers should be cautious. The Australian High Court has further expanded the application of this concept in practice, pointing out that the precautionary principle was stipulated in a large number of treaties to which Australia is a party, so this principle can be used as the basis for judges to decide cases (Gullett, 1997).

### **The Precautionary Principle as an Emerging Customary International Law**

Almost all the international environmental declarations and treaties concluded since the 1990s have adopted the precautionary principle, and the domestic laws and judicial precedents of many countries also regarded the precautionary principle as one of the general principles of environmental law. It can be considered that the precautionary principle is an “emerging” customary international law. Professor Philip Sands (1994) pointed out that in the context of the rapid development of international environmental law and environmental policy, the precautionary principle can provide guidance for the international community, and need to be confirmed by more countries in legal texts and judicial practice (pp. 293-323).

“Identification of customary international law” has been discussed at past sessions of the ILC since 2012, and *the Draft of Identification of Customary International Law* was initially formed at the 68th session in 2016.<sup>32</sup> It introduces four categories as treaties, resolutions of international organizations and intergovernmental conferences, judgments of courts and doctrines. According to the ILC, these materials reflect the “evidence” of the existence of customary international law.<sup>33</sup> Despite its varied forms and amorphous definition, its prevalence justifies commentators’ assertions that the precautionary principle is emerging as a customary norm of international law (Applegate, 2002-2003).

### **Conclusion**

Is it indicating that it will refrain from interpreting, and thus, taking a position on the legal status of international rules outside the immediate realm of international trade law? If so, that position is laudable from the point of view of the need for a system of international law that is unified in substance. It, however, also raises various delicate issues so long as the relationship, or a hierarchy, among international dispute settlement forums

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<sup>31</sup> *Ethyl Corp. v. EPA*, 541 F.2d 1, 24-25 (D.C. Cir. 1976), cert. denied, 426 U.S.941 (1976), see Kannan (2006-2007).

<sup>32</sup> See ILC, *Identification of customary international law*, at [http://legal.un.org/ilc/guide/1\\_13.shtml](http://legal.un.org/ilc/guide/1_13.shtml), Jan.19, 2020.

<sup>33</sup> See ILC, *Identification of Customary International Law, Text of the Draft Conclusions Provisionally Adopted by the Drafting Committee*, A/CN.4/L.872, at <http://legal.un.org/docs/?symbol=A/CN.4/L.872>, Jan.19, 2020.

has not been formulated and in the absence of a system of compulsory dispute settlement in general international law (Hey, 2000, pp. 239-248).

We cannot take it for granted that future generations who inherit the earth from us will become clever and create things that contemporary people cannot make. As stated by the World Commission on Environment and Development in its report our Common Future, domestic and international legislation often lags behind actual developments. Today, the rapid and deep impact of economic development on the environment leaves the legal system far behind. Human law must be reconstructed to coordinate human activities with the eternal universal laws of nature.<sup>34</sup>

The precautionary principle has found ever wider acceptance in international environmental policy; strong versions of the principle have been systematically tamed-reduced, as it were, from a tiger to a housecat (Global Development Research Center, 2020).<sup>35</sup> The proliferation of international environmental law and federal environmental legislation in the past quarter-century has been extraordinary, and the precautionary principle has been recognized by commentators as an exalted guiding principle for decision makers (Fullem, 1995, pp. 495-522). Few principles are better ensconced in the law and philosophy of environmentalism than is the precautionary principle. The principle is a strategy to guide policy in the face of scientific uncertainty about the environmental and health consequences of human action (Wexler, 2006, pp. 459-528). Applied fully and logically, the principle would cannibalize itself and potentially obliterate all environmental regulation.

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<sup>34</sup> See Our Common Future: Report of the World Commission on Environment and Development, *UN Documents A/42/427*, Chapter 12, para. 80.

<sup>35</sup> The Wingspread Statement, developed by an international group of scientists, government actors, and environmentalists, presents a stronger version of the precautionary principle.

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