The Emergence of International Environmental Law

by Oscar Schachter[1]

It has long been evident that international legal restraints and obligations were necessary to cope with environmental damage that transcended national boundaries. Governments have responded largely through agreements—multinational and bilateral—addressed to particular situations. General legal principles have also emerged in international forums, lawyers' commentary and in judicial and arbitral cases. Much of the impetus for international legal restraints has come from outside national governments—from scientific communities, concerned publics and international organizations.

As a result, a body of international environmental law has now come into being, though it is still partial and uneven. Most governments hesitate to give up sovereign rights over activities within their jurisdictions, while uncertainties as to causes and effects impede action. Most serious, perhaps, is the resistance to restraints that might reduce economic growth and well-being. The law that has evolved is in large part "soft"—composed of principles and standards of conduct not clearly accepted as obligatory and uncertain in application. On the other hand, in some areas, states have accepted the rules and decision procedures that have evolved as binding and comply with them in practice. With the great diversity of threats and the uneven character of responses to them, we can be sure that the law that evolves will be many-sided and complex.

The main object of this article is to throw light on basic ideas and principles that may give coherence and direction to this evolving law. The presentation is therefore organized along conceptual lines, cutting across the various practical applications. The sections that follow address the formation of an international law on the environment; definitions of environmental harm and risk;

1. A version of this article will apprear in the author's forthcoming revision of *International Law in Theory and Practice* (Boston, MA: Martinus Nijhoff, 1991).

prevention in light of conflicting interests; the duty to inform, assess and consult; liability and compensation; and enforcement and remedies.

The Formation of an International Law on the Environment

The necessity for international action on environmental problems was brought to the world's attention first by scientists and then by intergovernmental meetings, the most notable of which was the United Nations Conference on the Human Environment held in Stockholm in 1972. The Stockholm Conference underlined recognition of the environment as a holistic entity, the "biosphere," to be protected in its entirety by international law and organizations. This was a novel conception for governments. Some had resisted the idea as unnecessary and misleading. They contended that the actual problems—say, polluted water or toxic pesticides—had to be dealt with by specialized bodies and specific rules. To lump numerous disparate problems under a single heading and one all-embracing legal regime, they argued, would only result in a new bureaucracy and do nothing to solve the concrete problems. Some governments were also concerned that emphasis on environment as an overarching normative goal would be used to limit their sovereignty and to impede economic development. These concerns, it must be said, were neither trivial nor farfetched. They did not prevail, however, in the face of the mounting evidence of threats to human well-being from a variety of sources. Diverse as these threats were, they could all be seen as part of a general assault on the "natural order." This view was reinforced as scientists produced reports showing the connections between various phenomena affecting the natural environment. Diverse groups of people worried by specific threats and damage moved toward unity in a common cause; concern for the protection of the environment became a powerful political force within many states. The transborder and global threats, in particular, clearly demanded international solutions and norms. Inevitably, the environment, seen as a whole, became a concept in international law, as in politics. "Ecological security" emerged as a major goal of

international relations. Obligations and rights were proposed to serve that objective.

The declaration unanimously adopted at the Stockholm conference proclaimed in Principle 21 the responsibility of all states "to ensure that the activities within their jurisdiction and control do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction."[2] The same principle also recognized the "sovereign right of states to exploit their own resources pursuant to their own environmental policies" in accordance with the U.N. Charter and the principles of international law. Thus Principle 21, in a characteristic U.N. formulation asserted the competing principles of international responsibility and national authority within a general framework of international rights and obligations. The governments recognized, of course, that a specific body of law would have to be developed to give effect to Principle 21. The declaration itself included Principle 22, which called on states "to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such states to areas beyond their jurisdiction."

These principles are often cited as the starting point of international environmental law. Though the term only came into wide usage after the Stockholm conference, international law took cognizance of transborder environmental injury in some cases long before the Stockholm declaration. Shared rivers and other watercourses gave rise to problems of pollution and inequitable use that were considered in an international legal framework. Oil spills on the high seas, excessive fishing, transfrontier fumes and the transport of dangerous substances required legal answers before international environmental law was recognized as such.[3] Legal principles of a general character were readily at hand for

2. *Stockholm Declaration on the Human Environment*, U.N. Publication E. 73 II A.14 (New York, NY: United Nations, 1973).

3. See K. Hakapää, *Marine Pollution in International Law* (Helsinki: Tiedeakatemia, 1981); O. Schachter, *Sharing the World's Resources*, (New York, NY: Columbia University Press, 1977) pp. 64-83; J. Schneider, *World Public Order of the Environment* (Toronto: University of Toronto Press, 1979).

application to transboundary injuries. In the *Corfu Channel* case of 1949, the International Court of Justice, faced with the issue of mines in territorial waters that endangered international navigation, referred to "certain general and well-recognized principles" that supported "every state's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other states."[4] The maxim *sic utere tuo ut alienum non laedas* (literally, use your own so as not to injure another), a principle also expressed in the concept of abuse of rights, provided a basis for restricting the use of territory in ways harmful to other states. A variety of other broad legal concepts and principles has also been applied or suggested in cases of transboundary damage. The right of territorial integrity, for example, has been cited as a ground to bar conduct such as nuclear testing that causes injurious substances to enter other states.[5] "Good neighborliness" (*bon voisinage*) has also been invoked as giving rise to special obligations of neighboring states.[6] One writer has listed 27 such principles or concepts as grounds for obligations to prevent or abate transboundary pollution.[7]

In the two decades since Stockholm, the leading nonofficial bodies of international lawyers have adopted resolutions or other texts that broadly assert state obligations to prevent and reduce transborder environmental harm. For example, the *Institut de Droit International* adopted by large majorities a resolution in 1979 on pollution of rivers and lakes and, in 1987, a resolution on

4. *Corfu Channel Case (Merits), ICJ Reports* (1949) pp. 4, 22.

5. Australia and New Zealand argued before the International Court of Justice that French nuclear tests in the Pacific resulted in radioactive fallout in their territories. The Court did not pass on this argument, holding that the dispute disappeared when the French announced they would cease nuclear testing. *Nuclear Tests Case, ICJ Reports* (1974) p. 253. For Australian argument, see *ICJ Pleadings, Nuclear Tests Case*, 1, p. 14.

6. J. Andrassy, "Les relations internationales de voisinage," *Recueil des Cours*, Tome 79 (1951) p. 77.

7. J. Lammers, *Pollution of International Watercourses* (Boston, MA: Nijhoff, 1984), pp. 556-80. See also J. Salmon, "La pollution des fleuves et lacs et le droit international, Rapport provisoire," *Annuaire de l'institut de droit international*, 58 (1979) Part I, pp. 201-10.

air pollution across national frontiers.[8] The reports and comments of the *Institut's* eminent jurists on these resolutions emphasize concern over pollution more than evidence of widespread state practice. In 1982, the International Law Association adopted a broadly similar resolution addressed generally to transfrontier pollution, noting that this was merely a restatement of existing law.[9] The American Law Institute (ALI), an authoritative nonofficial body, has approved as part of its *Restatement of Foreign Relations Law of the United States (Third)* the general principle that a state is obligated to take such measures "as may be practicable" to ensure that activities within its jurisdiction do not cause significant injury to the environment of other states or areas beyond national jurisdiction.[10] The *Restatement* refers to "generally accepted international rules and standards," described as rules that have become customary international law or have been derived from international conventions, such as those applicable to the seas or to oil and radioactive wastes.[11]

The U.N. International Law Commission (ILC) is also in the process of adopting principles of law applicable to transnational environmental damage. The commission's work in this area has been undertaken under the heading of "International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law."[12] As of 1989, the articles provisionally approved would apply to activities within a state "when the physical consequences of such activities cause, or create an appreciable risk

8. *Annuaire de l'institut de droit international*, 58 (1979) Part II, p. 196; and *Annuaire de l'institut de droit international*, (1987), Part II, p. 296.

9. International Law Association, *Report of the 60th Conference* (Montreal: International Law Association,1983) pp. 158-60.

10. American Law Institute, *Restatement of the Foreign Relations Law of the United States (Third)* (St. Paul, MN: American Law Institute Publishers, 1987) section 601, vol. 2, p. 103.

11. *ibid.*, p. 104.

12. The ILC began its project in 1978. The first special rapporteur, R. Quentin-Baxter of New Zealand, submitted five reports to the Commission, the fifth report in 1984. *Yearbook of the International Law Commission*, 2 (1984) p. 155. The second rapporteur, J. Barboza, submitted six reports from 1985 to 1990.

of causing, transboundary harm throughout the process."[13] Article 8 requires states of origin to take "appropriate measures to prevent or, where necessary, minimize the risk of transboundary harm." To this end, states are required to use the best available measures insofar as they are able to do so. Another article requires the state of origin to make reparation for appreciable harm. Still another article requires states to assess activities that may cause transboundary harm and, if harm is found, to provide information of the risk as well as technical data to other potentially affected states. A proposed article would require negotiations and fact finding between source states and affected states.

All these texts share common elements: They would require states generally to prevent, mitigate, repair or compensate for harm and to notify others of risks. The texts are drafted in general language applicable to all states. However, to assert categorically that the principles have become customary law would require evidence of general state practice and *opinio juris*. Such evidence is only fragmentary. Principle 21 of the Stockholm declaration is, at best, a starting point. On its own terms, it has not become state practice: States generally do not "ensure that the activities within their jurisdiction do not cause damage" to the environments of others. Nor have governments given any significant indication that they regard this far-reaching principle as binding customary law. Environmental treaties, though numerous, are limited in scope and in participation. On the whole, they are not accepted as expressions of customary law and are regarded as binding for the parties alone.

These facts suggest that the legal principles expressed in the above-mentioned texts are *de lege ferenda* and still await the imprimatur of state practice and *opinio juris communis* to endow them with the authority of customary international law. Nonetheless, many legal scholars go beyond that conservative conclusion by giving weight to the general principles asserted by the International Court in the *Corfu Channel* case and by the Canadian-U.S.

13. *Report of the International Law Commission 1989*, U.N. Document A/44/10 (New York, NY: United Nations, 1989) pp. 222-23.

arbitral tribunal in the *Trail Smelter* case of 1941.[14] These decisions declare that a state may not knowingly allow its territory to be used in a way that would cause serious physical injury to the environment of another state. The principle is rooted in domestic law (as shown by the *Trail Smelter* tribunal's analysis of U.S. cases) as well as in internationally recognized juridical maxims and postulates such as *sic utere tuo*, abuse of rights and territorial integrity. But the generality of the principle and the range and variety of environmental interferences raise questions of the practical application. To say that a state has no right to injure the environment of another seems quixotic in the face of the great variety of transborder environmental harms that occur every day. Many result from ordinary economic and social activity; others occur by accident, often unrelated to fault. No one expects that all these injurious activities can be eliminated by general legal fiat, but there is little doubt that international legal restraints can be an important part of the response.

Defining Environmental Harm and Risk

Harm and risk, key concepts in international environmental law, do not lend themselves to simple, precise definitions. A wide and very diverse range of situations has been identified as constituting environmental harm, but no single general definition has emerged as authoritative. Arguably, no such general definition is required since specific examples of harm can be identified for purposes of international regulation and responsibility. However, a general conception of environmental harm is implicit in the basic principles of the Stockholm declaration and in the proposals for international action. The world tends more and more to perceive environmental harm as a single, aggregate problem.

One approach to a definition is to consider what kinds of transboundary environmental damage are, or should be, outside the definition of international law. It seems safe to say that not every detrimental effect resulting from environmental factors—in the broad sense—should fall within the concept. At least four

14. *Trail Smelter Case, 1941, UN Reports of International Arbitral Awards*, 3 (1963-66) pp. 1911.

conditions appear to be necessary. First, the harm must result from human activity. It would not extend to detrimental effects caused by environmental factors that cannot be reasonably said to have been caused by human conduct. For example, many diseases caused by viruses or bacteria, although environmental rather than genetic, would not fall within the notion of environmental harm as used in international law. To be sure, in some cases there may be uncertainty as to the causal factors, but the principle is clear. Not every affliction or interference of an environmental character would be harm in the meaning of international environmental law.

A second condition is that the harm must result from a physical consequence of the causal human activity. This requirement would exclude economic consequences of a detrimental character, such as increases or decreases in commodity prices resulting from environmental interferences. A third condition applicable to international environmental law is that the physical effects cross national boundaries. The activities within a particular country or under its jurisdiction would not result in international environmental harm unless those activities actually had physical effects in another country or in areas beyond the jurisdiction of any state. Injury to the atmosphere, such as ozone depletion, or detrimental climate change, would be covered as physical effects injurious to other states.[15]

A fourth condition, rather less precise, is that the harm must be significant or substantial. This leaves room for subjective judgments, and some have questioned it as impracticable. However, a threshold condition is especially important to define legally significant harm because environmental interferences are so pervasive and numerous. It is difficult, of course, to formulate this condition as a general rule in precise terms. A proposed ILC draft would define significant or appreciable harm only as that "greater than the mere nuisance or insignificant harm which is normally tolerated."[16] This suggests a *de minimis* test only. It appears to exclude

15. See *Ottawa Statement of Legal and Policy Experts on Protection of the Atmosphere* (22 February 1989).

16. J. Barboza, *Sixth Report on International Liability*, U.N. Document A/CN4/428 (New York, NY: United Nations, 15 March 1990) p. 41.

consideration of the utility of the activity to the source state and other equitable factors that may have weight in determining liability.[17]

The foregoing limitations on the meaning of environmental harm still leave a vast area of harmful situations to be covered by international law. Some of the practical problems of regulation can be discerned by considering the categories of harm that may be dealt with by international rules. Three major kinds of harm can be distinguished.

The first and most prominent category comprises situations in which human life-support systems are harmed by substances in the environment that result from human activity. Most of the environmental problems that have received public attention fall within this category: air and water pollution, depletion of the ozone layer, toxic wastes, harmful chemicals and hazardous technology.

The second broad category includes cases in which natural resources or artifacts of value to human beings are injured or depleted by environmental interferences caused by human conduct. Notable examples are deforestation, soil erosion, oil spills and the deterioration of buildings and monuments. All of these situations are generally recognized as appropriate for international regulation.

A third category presents some unresolved issues of policy. It moves beyond a standard based on human health and well-being to the much wider criterion of preservation of the natural order. Hence, it extends the concept of environmental harm to interferences or injuries to other species, physical features of the Earth and

17. References to "significant" injury are common in international legal instruments relating to the environment. The *Restatement of U.S. Foreign Relations Law* comments that the word "significant" excludes minor incidents causing minimal damages. However, it also suggests that "in special circumstances, the significance of injury to another state is balanced against the importance of the activity to the state causing injury" (Sec. 601, comment c). In contrast, Handl favors separating the factual test of "significance" from the legal issue of obligation and liability. See G. Handl, "National Uses of Transboundary Air Resources," *Natural Resources Journal*, 26, pp. 405, 413-27. He argues that if significant harm is defined by reference to the value of the injurious conduct to the source state, it could countenance as a rule the permissibility of factually significant harm. In his view, the fact of significant harm should give rise to a presumption of illegality open to rebuttal only exceptionally, on demonstration of special circumstances indicating a need of the source state.

outer space.[18] It does so whether or not such interferences injure human beings. Proponents of this expansive approach sometimes justify their position by linking environmental protection to instrumental values, such as the long-run benefits of biological diversity to human beings or the possibility of future injury not now discernible. A different justification advanced by many groups places independent value on nature, giving moral or religious grounds for their view. International law has recognized and accepted this category of environmental harm to some extent. It has, for example, prohibited activity involving contamination of outer space. One could probably include as other examples the protection of whales and other endangered species and several nature-conservation measures. Although it is arguable that all of the foregoing examples can be linked to human interest, there are clearly independent grounds for the adoption of these measures.

Defining environmental harm leads to the related concept of risk. Regulation should be directed toward action to avert or minimize risks before harm occurs. Risk is a probabilistic concept that takes account of the uncertainties of future events as well as the variations in severity of effects. A duty to prevent and minimize risk is legally distinct from a duty to act to contain and minimize harmful effects that have already occurred. In the former, the objective requires identifying situations in terms of degree of danger and adopting rules of conduct to reduce that danger. Some international bodies have proposed general definitions of appreciable or significant risk that combine standards of probability and magnitude. They minimally serve to draw attention to two different situations: one in which a low probability of occurrence of harm is accompanied by considerable damage, and the other in which a high probability of occurrence has relatively minor, but

18. See *World Charter for Nature*, UNGA Res. 37/7 (1982), *International Legal Materials*, 22 (1983) p. 455; D. Caron, "The Law of the Environment," *Yale Journal of International Law*, 14 (1989) pp. 528-29; M. Glennon, "Has International Law Failed the Elephant?" *American Journal of International Law*, 84 (1990) pp. 1, 28-30. See also C. Stone, "Should Trees Have Standing? — Toward Legal Rights for Natural Objects," *Southern California Law Review*, 45 (1972) p. 450 (1972); *Sierra Club v. Morton*, 405 U.S. 727, 741-60 (1972) (Douglas, Blackmun and Brennan, J.J., dissenting); and *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space*, Article IX, 610 UNTS 205, *International Legal Materials*, 6 (1967) p. 386.

appreciable damage.[19] The first situation conforms to the popular perception of high risk when a disaster may result, though the chance of its occurrence is quite small. A nuclear-plant meltdown is an apt example of perception of high risk despite low probability, in contrast to the much more probable dangers spread over time, such as automobile or mining accidents. These cases—high probability but relatively little damage per incident—may also be significantly risky when the damage is cumulative.

It can hardly be expected that any of the abstract conceptual definitions of risk could contribute much to identifying specific risks or measures to prevent and minimize them. To achieve more helpful assessments of risk, more data on causal linkages are needed. This calls for scientific and technical information on a large scale. Building on such information, legal regulation could address specific risks and provide quantitative and qualitative standards that could support rules of prevention and restraint. Several of the international agreements dealing with air and river pollution do just that.[20] Another legal technique for risk identification would involve the listing by a competent international body of activities and substances that present a higher-than-normal probability of causing transboundary injury. The ILC has moved in this direction. Its rapporteur has proposed identifying hazardous activities as those that involve handling of dangerous substances, using hazardous technologies or introducing dangerous genetically altered organisms.[21] Such lists would not replace treaties concerned with a particular class of hazardous activities. They would, however, enable general international environmental law to identify classes of high-risk activities that demand due diligence and a standard of care beyond those ordinarily applicable in other cases.

The assessment of risk in political and personal life cannot be entirely separated from value judgments concerning the cost of measures to reduce the risks. Conduct involving substantial risk of

19. See Barboza, pp. 5-12.

20. See for example, *Convention on Long Range Transboundary Air Pollution, 1979* (in force 1983), *International Legal Materials*, 18 (1979) p. 1442.

21. Barboza, pp. 11-12.

environmental harm may be perceived as less hazardous in societies that place great value on the activities that would have to be given up to minimize the risk. For example, an impoverished community is likely to place high value on pesticides that help increase food production, while it would minimize the environmental risk involved in their use. Indeed, the reluctance of many developing countries to reduce ozone-depleting substances or cut down on fossil fuels is evidence of what we may call a relativistic conception of significant risk. It obviously presents a challenge to a legal system based on generally applicable rules and state sovereignty.

The Qualified Duty of Prevention in Light of Conflicting Interests

All of the texts proposed as formulations of general or customary international environmental law include the obligation of states to prevent and minimize harm and appreciable risk. This obligation is generally perceived as the centerpiece of the desired legal regime. It is nearly always a qualified obligation, a duty to take "appropriate" measures and to employ such means "as may be practicable."[22] These phrases and similar qualifications remind us that prohibitions of environmental risk cannot be absolute. To require governments to ensure that no significant transboundary injuries occur is to impose an impossible task. Wastes, toxic emissions and accidents are an avoidable part of human activity. Frontiers cannot be sealed against their consequences. Nor are societies prepared to give up the benefits of economic and social activity because some environmental injury may result. However, by asserting a general obligation to prevent and minimize such injury, the states collectively express their common concern, and make it plain that transboundary environmental damage is not exclusively within the sovereign authority and domestic jurisdiction of states. However, the qualifications leave room for considerations of appropriateness and practicability, terms flexible

22. See Article 8 of ILC draft articles. Barboza, paragraph 311; sec. 601 of the *Restatement.*

enough to allow for exceptions based on non-environmental interests.

Yet even as qualified, the proclaimed obligation can be expected to have some influence on official actions. Governments threatened by environmental injury will invoke the obligation in international agencies and in diplomatic exchanges. The lawyers for governments and nongovernmental entities that are adversely affected by transborder emissions will assert that the obligation is binding customary law in proceedings before judicial and administrative bodies. It is likely that cases will be brought to the International Court on that basis, and it is even more likely that non-state victims will rely on the obligation in national courts. From a lawyer's standpoint, the duty of prevention and mitigation is envisaged in terms of its nonfulfillment and therefore as a ground for reparation to those injured. To the extent that such claims are successful, they will shift some costs of transboundary pollution and other harm from the foreign victims to the states of origin. This may be an important incentive for such states and others to take effective preventive measures.

However, legal remedies for individual cases of transborder damage do not go very far in meeting the more complex issues raised by costs and countervailing interests. Most legal formulas proposed by experts recognize in various ways that obligations of preventive action must yield to other interests under some circumstances. For example, one "model" text proposes that preventive measures need not be taken if the overall cost and loss of benefits from such measures exceed the benefit that the preventive action produces in the long run.[23] Consequently, in lieu of such preventive measures, the responsible state would be obliged to provide compensation to the injured state. Some legal commentators have objected to transforming a duty of prevention to a duty of compensation.[24] They contend that the basic obligation to avoid inflicting

23. See Barboza, Article 11.

24. See, for example, G. Handl, "Liability as an Obligation Established by a Primary Rule of International Law", *Netherlands Yearbook of International Law*, 16 (1985) pp. 49, 57-63; and P.M. Dupuy, "The International Law of State Responsibility: Revolution or Evolution?" *Michigan Journal of International Law*, 11 (1989) pp. 105, 112-18.

harm on other states should only be waived when necessary to protect a state against a grave and imminent peril. Many environmentalists oppose a "balance of interests" test that would weaken the obligation to take preventive action against manifest polluting activity, but it is difficult to maintain a draconian position. Even one strongly opposed to exceptions based on cost and utility grounds has stated that "in principle, the source state is obliged to take only those pollution control measures which in the circumstances of the case it can reasonably be expected to adopt."[25] It seems almost certain that this proposition will prevail in customary law.

To go beyond that obligation into more definite rules and limits can probably only be done through negotiated treaties. Governments, on the whole, regard treaty rules as more appropriate than customary law for environmental matters. Treaties can be drafted for specific problems and obligations more precisely defined. As a result, about 140 multilateral treaties on environmental issues have been concluded as of 1990.[26] They establish specialized regimes, providing generally for collaboration in obtaining information, assessing dangers and consulting on measures to be taken. They rarely prohibit activity as such. In some cases, they impose quantitative limits on emissions or other conduct.

One example that merits reference is the *European Convention on Long Range Transboundary Air Pollution* and three protocols under that convention.[27] They are designed to meet the threat of acid rain, a widespread and destructive form of pollution in Europe. The convention itself mandates no precise reduction in emissions of the injurious acid-rain chemicals, that is, sulfur dioxide and nitrogen oxide. It provides for research, consultation and, in general language, a commitment to limit and gradually reduce air pollution as far as possible. Reporting of emissions is required, and a network of monitoring stations has been estab-

25. Handl (1985) p. 59.

26. U.N. Environment Program, *Register of Treaties and Other Agreements* (New York, NY: United Nations, 1989).

27. "Convention on Long Range Transboundary Air Pollution 1979; Protocol for Long-Term Financing of Monitoring, 1984," *International Legal Materials*, 24 (1985) p. 484.

lished in Europe. Subsequently, three protocols to the treaty were concluded. One protocol committed the parties to make a 30 percent across-the-board cut in sulphur dioxide emissions from 1980 levels.[28] A second protocol was aimed at reducing nitrogen oxide emissions based on "critical loads," which reflect the harmful effects on specified sensitive elements of the atmosphere.[29] The two protocols call for national and European monitoring arrangements, but parties are free to choose their own abatement strategies. The treaty and protocols exemplify a step-by-step approach toward goals of reduction. This is the pattern that probably will be followed in other situations.

A suggested improvement in the system calls for ambient air-quality standards that would fix the allowable concentrations of a pollutant in the atmosphere on the basis of which emission limits can be set for different sources.[30] Another suggested approach is to require states to apply "the best available technology" to the sources of pollution.[31] A third and more ambitious improvement would be an international fund paid for by all states proportionally to their share of transboundary emissions.[32] While such a fund would promote the goal of reduction by allocating costs of pollution sources that had long externalized such costs, it may be difficult to win approval of the less developed countries to bear the costs. Arrangements for a type of burden sharing that recognizes the disparity in income would surely be necessary to obtain acceptance by most states.

The two multilateral treaties for protecting the ozone layer—the *Vienna Convention* of 1985[33] and the *Montreal Protocol* of 1987[34]—

28. "Protocol on Sulfur Dioxide," *International Legal Materials*, 27 (1988) p. 698.

29. "Protocol on Nitrogen Oxides," *International Legal Materials*, 28 (1989) p. 212 .

30. See A. Fraenkel, "The Convention on Long-Range Transboundary Air Pollution," *Harvard Journal of International Law*, 30 (1989) p. 447.

31. R. Hahn and K. Richards, "Internationalization of Environmental Regulation," *Harvard Journal of International Law*, 30 (1989) p. 421.

32. *ibid.*, pp. 435-38.

33. "Vienna Convention for Protection of the Ozone Layer, 1985," *International Legal Materials*, 26 (1987) p. 1516.

34. "Montreal Protocol on Substances that Deplete the Ozone Layer, 1987," *International Legal Materials*, 26 (1987) p. 1591.

established a regime for monitoring, assessment, validation and cooperation. The protocol imposed limits on ozone-depleting chemicals, including a 50 percent cut in chloroflourocarbons (CFCs).[35] This is now considered inadequate to meet the problem, and a total phase-out by the end of the century has been proposed. The *Montreal Protocol* includes exceptions for developing countries and for "industrial rationalization." Moreover, it allows under-quota countries to sell their entitlement to production. The *Vienna Convention* tackles the problem of compliance by providing for fact finding and compulsory dispute settlement. The *Montreal Protocol* takes a further step with provisions for trade sanctions against violators. The protocol won approval because the danger of ozone depletion was supported by particularly strong evidence.[36] Moreover, the immediate costs of reducing the ozone-depleting materials are not very great for the wealthier countries. However, the exceptions for developing states, especially China and India, are a serious loophole. Efforts to address this problem by providing these countries with technology and other aid have been proposed but not assured as yet.

The most complex and challenging of all environmental problems is presented by the increase in the so-called "greenhouse gases" and the global warming caused by them.[37] Most significant from the standpoint of regulation, these causes of climate change result from the growth of population and of economic wealth. They are the products of industrialization, energy use and manyother features of an improved quality of life.[38] They are the consequences of normal striving of peoples and the result of a multitude of decisions every day by individuals, enterprises and governments. The costs of prevention are incalcula-

35. See V. Nanda, "Stratospheric Ozone Depletion," *Michigan Journal of International Law*, 10 (1988) p. 482.

36. See J. Kindt and S. Menefee , "The Vexing Problem of Ozone Depletion in International Environmental Law and Policy," *Texas International Law Journal*, 24 (1989) p. 261.

37. For a comprehensive account, see D. Fisher, *Fire and Ice*, (New York, NY: Harper and Row, 1990).

38. W.D. Nordhaus, "Greenhouse Economics," *The Economist*, 316, no. 7662 (7 July 1990) pp. 21-24.

ble; significant reductions in the causes would require vast changes—and sacrifices—in everyday life.

The other side of the problem is that the predicted global warming, while not free from uncertainty, would probably lead to such extraordinary environmental changes as to threaten many societies.[39] These global changes involve the interaction of both the physical ecosystem and the human socioeconomic system. Changes in either system cannot take place quickly, even if there were agreement to act. As summed up by one writer,

> The momentum in the systems as a whole already guarantees some atmospheric change, however great that change turns out to be and whatever policies are put in place. But this momentum also means that delaying action will extend the effects further into the future and with greater magnitude. Effective irreversibility becomes an inherent and unavoidable aspect.[40]

A key factor working against quick political and legal action is that the costs and benefits of future consequences appear much more uncertain than the near-term costs and benefits of specific action today.

Though it is clear that the problem cannot be solved, or even significantly reduced by one country's actions, it is also evident that common global policies are not readily achievable without trade-offs. Developing countries will resist giving up economic growth because of a problem created by wealthy countries. Even if they had the will to do so, they would require more technology, capital and expertise. Some countries may even anticipate gains from warming and changes in rainfall, or they may conclude that the drawbacks of warming would be less burdensome than the costs of prevention. Indeed, even the wealthy countries are likely to weigh the present and relatively certain costs more heavily than the uncertainties of the future.[41]

This brief indication of an enormously complex problem is sufficient to show that the role of international law can only be

39. See Fisher.

40. E. Skolnikoff, "The Policy Gridlock on Global Warming," *Foreign Policy*, 79 (Summer 1990) pp. 77-92.

41. *ibid.*, pp. 82-83.

auxiliary to the political, technical and psychological aspects of a solution. It would indeed be fatuous for international lawyers to believe that the general obligation of states to prevent and minimize risks of harm could in itself significantly move the problem of climate change toward solution. However, international law may make a positive contribution in several ways. On one level, the general recognition of an obligation of prevention and reduction has a role to play in promoting popular movements and state action. It would help to focus governmental attention on the common interest and the commitments required. It may provide an impetus for governments to agree on measures that offer present benefits, such as conservation of energy or reduction of subsidies to environmentally harmful activities.

International law also has a place in the building of international structures for research and assessments of risk. A step-by-step approach will require international treaties and a degree of authority in international agencies. Means of inducing compliance, along with dispute-settlement provisions, are appropriately dealt with by international law techniques. Just as private law is concerned with meeting possible contingencies in business, international treaties could provide for action in the event that developments require it. Such contingent legal arrangements would be especially appropriate for the threat of global warming.

Finally, law has a potential role in creating mechanisms to meet environmental objectives by means other than commands and prohibitions. Techniques such as effluent charges, tax credits, banking or marketing of under-quota emissions, as well as various fiscal and pricing schemes have been increasingly used in national regulation.[42] They may also be applied in transnational or global agreements. To do so, legal arrangements on an international basis would be necessary. Trust funds for conservation, debt-for-nature swaps and cooperative schemes for contributions by both affected and source states are some of the measures that involve international legal craftsmanship. International law could be utilized, not

42. "Survey: The Environment," *The Economist*, 312 , No. 7618 (2 September 1989) pp. 1-18 (following p. 52). See also World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987).

only as a set of prohibitions and commands, but also as a process of coordinating positive acts and promoting helpful incentives. These are often the most practical ways of achieving prevention and mitigation of environmental injuries.

The Duty to Inform, Assess and Consult

The duty of a source state to inform others of impending harm to them or of significant risk of such harm is an obvious corollary of the general obligation to prevent and minimize transboundary harm. Notification would surely be an appropriate measure when a state has reason to believe that an activity or event in its jurisdiction may cause a significant risk of transboundary harm. After the Chernobyl nuclear disaster in 1986, the Soviet government was strongly criticized by other governments for its failure to give timely notice of the accident and the transborder injuries likely to occur.[43] The Soviet leaders subsequently declared that they should have supplied such information. The International Atomic Energy Agency (IAEA), the competent international organization, called on states to give timely warning of accidents or operational difficulties in nuclear facilities that threaten transborder environmental damage.[44]

The general approval of a duty to inform expressed in the wake of the Chernobyl accident would undoubtedly extend to other comparable events—to grave accidents or other catastrophes within a country that create appreciable risk of serious danger outside of its territory. This is probably the least controversial principle of general international environment law. However, the degree of risk that requires notification to others cannot be determined by a

43. See A. Kiss, "L'accident de Tchernobyl et ses consequences au point de vue international," *Annuaire francaises de droit international*, 32 (1986) p. 139. For a detailed critical account of the lack of timely Soviet action after the Chernobyl accident, see Z.A. Medvedev, *The Legacy of Chernobyl* (Oxford: Basil Blackwell, 1990).

44. The IAEA moved quickly after Chernobyl to adopt the Convention on Early Notification of a Nuclear Accident, *International Legal Materials*, 25 (1980) p. 137). It quickly entered into force. See A. Adede, *The IAEA Notification and Assistance Conventions in Case of a Nuclear Accident* (London: Graham and Trotman, 1987). In 1986, the Soviet Union immediately notified the IAEA of an accident on a nuclear submarine. See *International Legal Materials*, 25 (1986) pp. 1369, 1394.

general formula. Several situations need to be considered. The first and easiest to resolve is the accident—the discrete harmful event that has a high probability of causing extraterritorial injury. Nuclear meltdowns, oil spills and bursting dams are examples.

A second category would include the construction of facilities such as nuclear reactors and chemical plants that would have disastrous effects in the event of an accident or failure to exercise due diligence. It would also include the handling, production or transport of dangerous substances such as flammable and corrosive materials, carcinogens and ecotoxic substances. An ILC proposal also included dangerous microorganisms and dangerous genetically altered substances.[45] The stated aim is that specific lists of these kinds of dangerous substances should be adopted in international texts as annexes to the ILC principles. Such specification would give more determinate answers to the question of appreciable risk.

A quite different type of situation is presented by activities that are not dangerous because of accidents but which over time produce harmful effects as a result of their normal operation. Factories that produce acid deposits or sewage disposal that results in water pollution are cases in point. A situation of this kind is presumably covered by the articles in the 1982 *Law of the Sea Convention* which provide that when states have reasonable grounds for believing their planned activities may cause substantial pollution or harmful changes to the marine environment, they should assess the potential effects and publish the results or notify the competent international organizations.[46] Although state practice in this regard is not extensive, legal commentators and some governments consider this obligation to notify to be customary law.[47]

What of the normal, day-to-day events and activities that cumulatively and gradually result in transboundary environmental interferences? I have referred to examples throughout this article:

45. See Barboza, paragraphs 15-17.

46. See articles 204, 205, 206 of the Law of the Sea Convention (1982) in *International Legal Materials*, 21 (1982) p. 1261.

47. See *Restatement*, section 603.

fossil-fuel energy, destruction of forests, production of low-level exhaust fumes and many other common and beneficial activities. Is there an embryonic principle that such activities should be the subject of reports and studies that would lead to possible remedial action? One might discern signs of this in international and regional collaboration to gather data and assess the consequences on human health and well-being.[48] This is not quite the same as a specific legal duty owed by one state to another. However, it does constitute a series of undertakings by groups of states, at times pursuant to treaties or informal agreements, to provide information on potential sources of danger. These undertakings are usually carried out through international organizations or by scientific bodies associated with such organizations.[49] The nascent law is to be found mainly in the interstices of such organized fact-finding and assessment activities.

Apart from this, however, affected states are likely to claim that they are entitled to warning and data resulting from harmful activities of a source state. As I indicated earlier, this right would probably be recognized in the case of disasters such as the Chernobyl or Sandoz accidents.[50] However, it becomes highly contro-

48. The *Vienna Convention on Protection of the Ozone Layer* and the *Convention on Long Range Transboundary Pollution* provide for cooperation of the parties in providing data and in conducting studies regarding the pertinent environmental dangers. The Council of the OECD has a *Recommendation on Principles Concerning Frontier Pollution* which declares that: "Prior to the initiation in a country of works or undertakings which might create a significant risk of transfrontier pollution, this country should provide early information to other countries which are or may be affected—and should invite comments."

49. The U.N. Environment Program conducts a Global Environmental Monitoring System in collaboration with scientific bodies devoted mainly to air and water quality. Many other informational and assessment activities are carried out by the specialized agencies of the United Nations and by scientific and conservation organizations. See UN Secretary-General Report, *Progress Made Towards Sustainable and Environmentally Sound Development*, UN Document A/44/339 and addenda, (1989). See also L.K. Caldwell, *International Environmental Policy* (Durham, NC: Duke University Press, 1984) pp. 91-96; and A. Kiss, *Droit international de l'environment*, (Paris: A. Pedone, 1989) pp. 307-36.

50. One legal scholar supports this right as derived from general principles of law in the sense of Article 38 (1)(c) of the Statute of the International Court. He denies that it can be regarded as customary law because state practice does not show that notification is practiced from a sense of legal obligation. See D. Partan, "The Duty to Inform in International Environmental Law," *Boston University International Law Journal*, 6 (1988) p. 113.

versial if claimed as a right in regard to a planned development. The principal reason for concern is that if a potentially affected state would have a basis to assert its interest in a shared resource—for instance, a watercourse or the "shared" atmosphere—it would probably claim a right either to prevent the planned activity or to receive compensation for the harm it would entail. This is no small matter since in many situations important development activities such as hydrological projects, land reclamation, chemical plants and waste disposal could have adverse effects on neighboring states.[51] While a duty to notify need not entail a duty to consult, the facts themselves could provide a basis for a legal claim by the affected state. The claim of the source state to its sovereign right to develop its own resources would be confronted by the counter-claim of the affected state that its resources, albeit shared, would be damaged or depleted.[52]

Thus both claimants would find support in the emotionally charged principle of sovereignty over natural resources, but that principle could not itself determine the solution. On the procedural level, solutions could be reached through negotiation or, like *Trail Smelter*, through third-party adjudication. Generally, more effective procedures for information, consultation and equitable solutions are to be found through joint bodies of the states concerned, such as the commissions set up by states sharing common water resources.[53] The International Joint Commission set up by Canada and the United States in 1909 to deal with problems of boundary waters has been notably successful as a mechanism for facilitating exchange of data on potential harm and for ensuring adequate assessment and consultation on environmental and resource prob-

51. The *Restatement* reporters regard the duty to notify and consult as "accepted" in regard to activities likely to cause significant injuries in another country, as long as "inordinate delays in development projects" are not caused by notification and consultation (*Restatement*, Sec. 601, reporters' note 4).

52. Support for international obligation of notification is supported by several international lawyers. See Handl, *American Society of International Law Proceedings*, 8 (1980), pp. 223-24; D. Magraw, "Transboundary Harm," *American Journal of International Law*, 80 (1980), pp. 305, 327-29.

53. Schachter, pp. 71-73.

lems associated with boundary waters.[54] While such joint commissions work best when relations between the states are generally friendly, they are even more necessary in less favorable conditions. Many have been established in such cases, often through assistance and pressure from international development agencies. As in so many other situations, a bare legal obligation to inform and notify other countries of transborder impact is implemented only through continuing joint or multinational mechanisms staffed by scientific and technical personnel.

The international agencies established on a global or regional basis have gradually achieved a major role in providing warning and environmental impact assessments covering a broad range of environmental threats.[55] Their studies have been accepted as persuasive; they have continuous consultation through expert bodies, and they often act as a confrontation mechanism through which governments can consider specific dangers brought to their attention by international secretariats and scientific bodies. Although such tasks are not primarily the concern of international lawyers, the procedures and institutional agreements are part of the international legal system. The technical secretariats operate in a framework of delegated authority, the governments enter into commitments, and norms and rules evolve, sustained by practice. In these ways, the "soft" obligations to notify, assess and consult are given concrete effect and harden into patterns of behavior accepted as rules of conduct.

Liability and Compensation

International liability is an essential, though troubling, concept in regard to transborder environmental injury. The Stockholm conference recognized its importance, but despite lengthy negotiations, the participating governments could not agree on a general

54. See L.M. Bloomfield and G.F. Fitzgerald, *Boundary Waters Problems of Canada and the United States* (Toronto: Carswell, 1958) pp. 39-40.

55. See references in note 49 to U.N bodies. See also S.P. Johnson, "The Environmental Policy of the European Communities" (1989); "OECD Council Recommendations 1989," *International Legal Materials*, 28 (1989), pp. 1314, 1320; "The Declaration of Brasilia, 1989," *International Legal Materials*, 28 (1989) pp. 1303, 1311.

formulation. They did undertake to "develop further the international law of liability and compensation" for transborder environmental damage. Since that time international bodies have sought to formulate general principles and procedures. International legal scholars have contributed many analytical and policy studies to this end; governments, however, have moved cautiously. They have concluded only a few multilateral agreements prescribing principles of liability and compensation in regard to particular activities. State practice has been sparse and international adjudication rare. *Trail Smelter* remains the landmark arbitral decision.

The most sustained official effort has been the undertaking of the ILC entitled "International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law." Started in 1978, this project did not initially address environmental injury, but that subject turned out to be the main concern of the reports and of the proposed articles. These articles—still in draft as of 1990—have been presented as "basically residual" to be applied *faute de mieux* to cases not covered by specialized agreements.[56] In fact, such specialized agreements of a multilateral nature have rarely provided for state liability, and I do not anticipate that the number of such special liability regimes will appreciably increase.[57] Even when conventions have provided for a special regime governing some activities, they have not included liability provisions for compensation by states.[58] The apparent reluctance of governments to adopt liability agreements, save in exceptional cases, indicates that if international claims for reparation are made, the legal principles applied will be drawn from general customary law influenced by the ILC draft articles or

56. Barboza, paragraph 48.

57. The 1972 *Convention on International Liability for Damage Caused by Objects Launched into Outer Space* (*International Legal Materials*, 10, p. 250) is the only multilateral convention open to all states that imposes full liability directly on launching states. The other conventions that provide for "strict liability" do so in respect to the private operator and some of them provide that the operator's state is liable on a subsidiary basis if the operator or his insurer cannot pay. See, for example, *Vienna Convention on Civil Liability for Nuclear Damage, 1963*, 1063 UNTS I-16197, *International Legal Materials*, 2 (1963) p. 727.

58. Neither the *Convention on Long Range Transboundary Pollution* nor its Protocols have liability provisions. This is also the case for the *Convention* and *Protocol on Protection of the Ozone Layer*.

derived from municipal-law principles that are common to several countries. It is not unlikely that the case law will be found predominantly in national courts rather than in international bodies. For this reason, too, some municipal-law rules and concepts on liability will be transplanted into international law on transborder environmental injury.

From the standpoint of protecting the environment, liability is rightly viewed as secondary to preventive and mitigating measures. However, its role in a regulatory system is not minor. Its most obvious function is to shift the loss from an innocent victim to the responsible causal agent, as a matter of equity or corrective justice. But it also has its pragmatic side insofar as the imposition or threat of liability induces the responsible actor to prevent or reduce the risk of harm. This may not be the result in all circumstances; much depends on the willingness and the ability of the responsible party to bear the costs or to shift them elsewhere. From an economist's point of view, "internalizing the costs" of environmental damage tends, as a rule, to further more efficient use of resources. Still another function of liability—perhaps its most important—is as a means of enforcement, a practical way to vindicate rights that have been violated. Imposing liability gives teeth to rules of prevention and mitigation. Moreover, it provides a basis for dispute settlement to resolve claims and counterclaims.

These various objectives not only justify an effective liability structure in general, but they are also pertinent to the choice of particular rules and conditions of liability.[59] For example, heavy liabilities may be imposed as a deterrent, even though the victim may be over compensated. Alternatively, a low ceiling may be placed on compensation to facilitate insurance and certainty of payment. The choice of dispute-settlement procedures cannot ignore practical factors, including the costs of protracted proceedings. The *Trail Smelter* case, for instance, involved about six years of fact finding and scientific studies in

59. An enlightening analysis of the role of liability in relation to accidents is found in G. Calabresi, *The Cost of Accidents: A Legal and Economic Analysis* (New Haven, CT: Yale University Press, 1970). Calabresi examines the trade-offs necessary to meet the diverse goals of justice, loss spreading and deterrence, both general and specific.

addition to lengthy hearings. In this respect, *Trail Smelter* would not be a model for future acts. It reminds us that if international liability is to perform an effective role, the conditions and procedures for determining responsibility have to avoid the heavy transaction costs of international governmental adjudication.[60]

This leads us to the principal conceptual or doctrinal issue in the discussion of liability for environmental injury. That issue, put in broad terms, is whether states should be held to a standard of strict or "objective" liability, irrespective of fault in regard to transborder environmental injury caused by activities in their territory. Such strict liability would constitute a major departure from the classical international law of state responsibility under which responsibility, including liability for compensation, arises only when a state has violated international law. In the accepted terminology, the rule of conduct violated is the primary norm.[61] The rules concerning responsibility, including the imputability of an act to the state and the obligation to make reparation, are characterized as secondary norms. If an obligation to compensate an injured state is not dependent on a wrongful act, that obligation is then a primary norm.

There is no doubt that in principle, a state that violates a rule of international law by an activity involving transborder injury is liable to make reparation and to compensate the injured state. There is no dispute about this. The main controversy is whether liability should be imposed for lawful acts, that is, in the ILC's terminology, for the injurious consequences of acts not prohibited by international law.

The arguments for strict liability—for obligation to compensate as a primary norm—find support in the tort and civil liability law of national legal systems. Those systems have long recognized that compensation need not be tied to condemnation of the activity

60. See S.E. Gaines, "International Principles for Transnational Environmental Liability," *Harvard International Law Journal*, 30 (1989) pp. 311, 338-39.

61. This terminology has become common usage among international lawyers following its adoption by the International Law Commission in its work on state responsibility. See Report of the ILC of its 25th Session, *Year Book of the International Law Commission*, 2 (1973) p. 169, paragraph 40.

as unlawful.[62] Regimes of strict liability began with activities considered dangerous, even if conducted with care. The injured party did not have to prove negligence or other fault. Courts and legislatures considered that, since the source of the activity benefits from it, it should bear the cost of injury. Moreover, the source was clearly in a better position to manage and reduce the risks. In many countries, such strict liability has been widely extended to acts involving environmental harm or risks, even if the activity was not abnormally dangerous or ultra hazardous. It was considered advantageous that liability internalized the costs of harm and provided an incentive to reduce the risks.[63]

These domestic-law precedents influenced arguments for strict liability on the international level. Several international lawyers placed emphasis on new technologies perceived as ultra hazardous or abnormally dangerous,[64] such as nuclear energy, toxic chemicals, outer-space objects and oil tankers. They argued that strict liability is necessary in cases of disastrous accidents, such as a large oil spill, nuclear fallout or a chemical explosion. The difficulties that injured victims would have in proving that the accident originated through negligence would usually be so great as to render compensation chimerical.[65] The so-called "private-law treaties" relating to nuclear uses and oil tankers address this problem by imputing liability to the "operator," without requiring fault; in case the operator cannot pay, the state is liable.[66] Beyond

62. See Gaines, pp. 321-22.

63. For an economic analysis in support of deterrence as a practical goal of tort liability, see W. Landes and R. Posner, *The Economic Structure of Tort Law* (1987) pp. 9-13.

64. See W. Jenks, "Liability for Ultra-Hazardous Activities in International Law," *Recueil des Cours*, 117 (1966) p. 99; L.F.E. Goldie, "Liability for Damage and the Progressive Development of International Law," *International and Comparative Law Quarterly*, 14 (1965) p. 1189.

65. J. Kelson, "State Responsibility and Abnormally Dangerous Activities," *Harvard International Law Journal*, 13 (1972) p. 243. In some national jurisdictions, the courts have shifted the burden of proof to the "source" actors, requiring them to show why they should not be liable. See Gaines, pp. 334-35.

66. See, for example, "Vienna Convention on Civil Liability for Nuclear Damage, 1963," *International Legal Materials*, 2 (1963) p. 727; and "International Convention for Civil Liability for Oil Pollution Damage, 1969," *International Legal Materials*, 9 (1970) p. 45. These provide for strict liability of the "private" actor subject to a ceiling on the amount of compensation. The state of the operator is liable if the operator cannot pay.

these limited treaties, governments have been reluctant to claim liability. The failure of affected states to claim liability on the part of the Soviet government in the Chernobyl disaster or on the part of Switzerland for the Sandoz fire, both in 1986, show that strict liability, even in accidents involving abnormally dangerous substances, is not easily accepted.[67]

The reluctance of governments to accept strict liability for permissible activities has troubled the ILC for the last decade. While a much-cited precedent, the *Trail Smelter* case has not been followed in actual practice. Though municipal law had decoupled liability from wrongfulness in regard to some areas of environmental damage, especially ultra hazardous acts, governments were not ready to do so as a general principle on the level of international liability. To achieve a politically acceptable solution, the ILC has moved toward a "soft" regime of strict liability. Basically, a state of origin would be obligated to compensate an affected state for appreciable harm caused by physical consequences of activities in the state of origin.[68] This would apply to activities that are internationally lawful; the harm "must in principle be fully compensated."[69]

However, the broad obligation of compensation would be softened by two important qualifications. First, the reparation would be decided by negotiations between the state of origin and the affected state. Second, the states are to be guided by criteria of an equitable character in determining the reparation. The compensation would be reduced if "owing to the nature of the activity and circumstances of the case," it would be equitable for the parties to share the costs.[70] For example, the state of origin might show that it had incurred substantial expenses in order to reduce transboundary damage over and above costs necessary for domestic protec-

67. See Dupuy, pp. 115-16. Although victim states did not lodge claims against the Soviet Union or against Switzerland, some governments maintained in meetings after Chernobyl and Sandoz that the "polluter-pays" principle should be upheld. See G. Handl, "Transboundary Nuclear Accidents," *Ecology Law Quarterly*, 15 (1988) pp. 203, 226-27.

68. Barboza, Article 9.

69. *ibid.*, Article 21.

70. *ibid.*, Article 23.

tion.[71] Or it might show that the affected state had benefited significantly in some respects from the activity in question such as an importing state benefiting from oil-tanker traffic. Other equitable factors could be the limited ability of the state of origin to take preventive measures or the relative needs of its population. Thus, the aim of the negotiation would be to achieve a balance of interests, taking into account criteria of equity. A list of factors relevant to balancing interests is included in the ILC's proposed articles,[72] but it notes that the diversity of circumstances may require consideration of other factors as relevant in the particular case.[73]

In sum, the ILC proposal would impose strict liability for all significant transborder injury but leave it to the states concerned to decide reparation in each particular case on the basis of equity and balance of interests. The hard core would be the obligation to negotiate in good faith concerning compensation; refusal to negotiate would constitute an international delict. The soft side would be the freedom to disagree, especially on the basis of conflicting views as to equities and the balance of interests. No enforcement provisions are included, though of course a recalcitrant state refusing even to negotiate would be guilty of delictual conduct and therefore subject to the secondary norms of state responsibility.

It is not unlikely that the ILC draft articles will be adopted by the commission as a recommended basis for either an international convention or simply to guide states. It seems rather improbable that they will actually become a binding treaty, but they may well be a model for specialized treaty regimes and bilateral agreements regarding specific areas of environmental harm. It may not be difficult for governments to accept the articles as a qualified form of strict liability applicable to well-defined activities involving a significant risk of transborder injury. A further step toward a harder core of obligation would be compulsory conciliation or arbitration in cases where the negotiation failed to achieve agreement. The obligation to negotiate seriously and in good faith could

71. *ibid.*, commentary paragraphs 44-51.

72. *ibid.*, Annex, Article 17.

73. *ibid.*, paragraph 39.

also be strengthened by activity of the international organizations competent to deal with the subject matter. The ILC draft articles provide that where more than one state is affected, an international organization may intervene, if requested by a state concerned, in order to assist the states and "foster their cooperation."[74] A more robust role could be taken by the international organizations that have been charged with monitoring and protecting the environment in particular respects. A further application of strict liability, apart from negotiation, would be through private-law remedies in national courts, a subject to be dealt with in the section on enforcement.

I turn now from strict liability to more classic principles of state responsibility for wrongful conduct. The increasing concern over transnational environmental impacts has brought about a significant development of international rules and standards for activities creating risks of transborder harm. Such rules and standards range from the detailed and precise, such as standards of safety for nuclear-energy operation, to general formulas of due care and diligence. The failure to comply with such rules or standards could be international wrongful conduct giving rise to responsibility, including liability for compensation to the injured state. The ALI *Restatement of Foreign Relations Law (Revised)* adopts this position. It declares in section 601:

> A state is obligated to take such measures as may be necessary, to the extent practicable under the circumstances, to ensure that activities within its jurisdiction or control
>
> (a) conform to generally accepted international rules and standards for the prevention, reduction, and control of injury to the environment of another state or of areas beyond the limits of national jurisdiction; . . .

It then declares in section 601(3) that "a state is responsible for any significant injury resulting from a violation of its obligations under subsection 1 to the environment of another state...or to persons and property within that state."

A crucial feature of this restatement of the law is that "generally accepted rules and standards" are declared to be obligatory. This

74. *ibid.*, Annex, Article 22.

language seems to include not only general rules of customary international law and those derived from binding treaties but also standards adopted by international organizations pursuant to international conventions.[75] The intent of these comments may be to limit liability to the violation of legal obligations, but the language is far from clear in this regard. It allows for a construction under which generally accepted standards adopted by international organizations would be a basis for liability even though the standards were not binding law for that particular state.[76]

An affirmative approach to wrongful conduct would give effect to standards and guidelines adopted by international organizations not as law but as criteria of the due care or due diligence required of all states in regard to activities creating an appreciable risk of transborder injury. This would extend to the so-called "eco-standards" included in technical annexes to conventions or to operational standards of conduct for specific activities.[77] The adoption of a legally obligatory standard of due care would go beyond the *Restatement*'s apparent reference to rules and standards that are binding as a matter of customary or conventional law. Several scholars have supported the acceptance of international liability based on a contextually determined application of a due care standard.[78] The International Court's *Corfu Channel* case decision is cited in support of a due-care rule since the court found Albania liable because it knew of the risk of damage from the mines and had the capability to avert the damage.

One of the advantages of applying a due-care criterion of liability is that its application focuses on the particular circumstances of the activity causing damage in the particular case. It does not involve condemning the activity in general as unlawful. Under that standard, we would not condemn the burning of coal

75. *Restatement*, section 601, comment c.

76. *ibid.* The comment also says that a state is obligated to comply with an environmental rule or standard that has been "accepted by both it and an injured state, even if that rule or standard has not been generally accepted."

77. See Dupuy, pp. 117-18.

78. See G. Handl (1985), p. 59; Dupuy, pp. 117-18; I. Brownlie, *System of the Law of Nations: State Responsibility*, Part I (Oxford: Oxford University Press, 1983) p. 50.

as a basis of liability even though it could be shown that it contributed to acid rain or global warming.

A due-care situational criterion of liability would take into account compliance with prescriptive standards—international and scientific—as a major factor but not as the sole test. It would presumably allow for balancing the value of the activity against the foreseeable injurious consequences. A further element of significance would be to apply presumptions that shift the burden of proof from the innocent victim to the source of the injury, a procedural device that has the effect of moving fault-based liability in the direction of strict liability.[79]

Interesting as problems of liability are, we should not overlook its limitations in regard to major areas of environmental damage. Liability is a feasible mechanism when damage is identifiable, traceable to a state of origin and reasonably foreseeable by that state. It is thus appropriate for discrete accidents such as oil spills and chemical disasters. It is also applicable to specific activities that foreseeably carry risks resulting from continued activities such as sewage disposal or toxic-waste deposits. It may be appropriate for a large-scale hydrological project affecting rivers or groundwater. On the other hand, it would be difficult, and perhaps impossible, to apply liability in its normal sense to the vast number of environmental harms that result from routine economic and social life, such as the use of automobiles and air conditioners, burning coal, cutting timber and grazing cattle. These activities may create enormous damage in the aggregate over time, but they have numerous sources and are aspects of beneficial, and even necessary, features of society. The numbers of injured are countless, dispersed in many places, and the losses imposed cannot be adequately calculated or assigned. The remedy of legal liability is clearly not practicable, at least not in the commonly understood sense of claims by injured states against source states. However,

79. Japanese courts have applied negligence standards in pollution cases but have placed the burden on the defendants to show why they should not be held liable. The courts gave no weight to compliance by the defendants with government rules. See Upham, "Litigation and Moral Consciousness in Japan—An Interpretive Analysis of Four Pollution Suits," *Law and Society Review*, 10 (1976) pp. 579, 584, quoted in Gaines, p. 334.

there is room for international remedial action that would take account of the relative responsibility of states for contributing to the problems. This might be done, as has been proposed, by establishing an international trust fund to take measures of reparation and prevention in cases of global or regional problems.[80] The states most responsible for the environmental injury would bear relatively heavy costs of such funds, limited by their ability to pay. This would not be liability in its legal sense, but it would serve the aim of reparation and give weight to the responsibility of the states from which the damage emanated.

Enforcement and Remedies

The heading of this section embraces a diverse range of actions. It includes legal liability both on the international level and in domestic remedies. It also covers the self-help and other countermeasures that injured states may legitimately adopt against states responsible for unlawful acts giving rise to the injury.[81] Such measures include reprisals that would otherwise be illegal if not for the prior violation as, for example, nonperformance of treaty obligations or seizure of the offending state's assets. This may also include the much wider category of retaliatory acts known technically as retorsion, that is, action that would be permissible whether or not a prior violation had occurred. Breaking diplomatic relations, discontinuing economic aid and severing trade relations are examples of such sanctions. They could be potent means of inducing compliance with environmental law. None has actually been used in environmental matters, and it is unlikely that they will be used except in egregious cases of deliberate pollution.

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80. *The Ottawa Statement of Legal and Policy Experts* (22 February 1989) called for study of a World Climate Trust Fund to support reduction of emissions of greenhouse gases and to mitigate effects of climate change. The beneficiaries would be developing countries. The fund would be financed by contributions, user fees for activities causing climate change and fines for violations of the proposed convention on climate change.

81. See R. Bilder, "The Role of Unilateral State Action in Preventing International Environmental Injury," *Vanderbilt Journal of Transnational Law*, 14 (1981) p. 51; and E. Zoller, *Peacetime Unilateral Remedies* (Dobbs Ferry, NY: Transnational Publishers, 1984).

In some cases, environmental obligations are regarded as *erga omnes*, owed to all states. Consequently, any state, whether or not directly injured, would have the right to take countermeasures, including reprisals otherwise illegal. It is generally considered that such *erga omnes* obligations would apply to protection of the global commons, such as the high seas and very probably the ozone layer. It may be extended as a concept to the global climate, but this would probably only come about if the obligations of states were clarified by international agreement. Developments along this line of enforcement—in effect, collective sanctions—depend essentially on multilateral negotiation and a general perception that the specific environmental threat is a danger to all humanity and an "international crime."[82]

Enforcement in respect to environmental law need not—indeed, should not—be viewed solely as a matter of penalties and sanctions. From the standpoint of policy, it may be more effective to create incentives for compliance. Measures such as taxes on emissions, charges to promote energy conservation and the elimination of overt or hidden subsidies are practical means to implement policy in its broad sense.[83] A comprehensive approach would also include educational and social measures to bring about changes in group and individual behavior that would reduce environmental risks and injury.

An important element of enforcement consists of fact finding in its various aspects: scientific research, monitoring of risks, on-site investigations and assessments of costs and benefits. These activities depend in large part on international cooperation and especially on international organizations, both on the governmental and nongovernmental levels. Hence, a full account of international enforcement in its broad sense would have to include the almost countless activities of international agencies in obtaining, analyz-

82. The International Law Commission's proposed articles on state responsibility declare in Article 19 that a state may be guilty of an international crime, resulting from "a serious breach of an international obligation of essential importance for the safeguarding and preservation of the human environment, such as those prohibiting massive pollution of the atmosphere or of the seas." See J. Weiler, A Cassesse and M. Spinedi, eds., *International Crimes of State* (Berlin and New York, NY: De Gruyter, 1989).

83. See note 42.

ing and reporting information bearing on environmental injury. These activities, though not directly part of the system of international law, are supported by international agreements and treaties and by the internal regulations of international bodies. These are all properly regarded as within international environmental law. They require grants of competence and authority. This issue may be politically sensitive in view of the impact of environmental controls on resource development and sovereign rights. Moreover, conflicts of interest are obstacles to finding a common ground in compliance measures. Governments usually have to achieve an understanding as to shared benefits and burdens before they accept even such apparently neutral measures as fact finding and technical assessment.

The future trend of international compliance will probably be influenced by experience in other areas of international concern that result from internal conduct. Human rights are a pertinent precedent in this sense. Accordingly, proposals for future action in environmental matters have called for annual reports by states, an international review committee and a process for receiving and passing on communications from nongovernmental sources concerning grave violations of environmental standards.[84] Dispute-settlement procedures are also called for to consider differences between states by conciliation or arbitration. Compulsory jurisdiction of the International Court and compromissory agreements to refer disputes to the court are also advocated.[85] Some multilateral agreements already contain such provisions, and some international lawyers have made proposals that the International Court establish a special chamber for environmental disputes, in the expectation that this would lead to more use of the Court in environmental matters.[86]

Enforcement of international rules on the environment also takes place in national courts and agencies. A considerable body

84. These proposals were made by the Experts Group on Environmental Law of the World Commission on Environment and Development. They are included in *Our Common Future* (Oxford: Oxford University Press, 1987) pp. 348-51.

85. *ibid.*

86. P. J. Jessup, *The Price of International Justice* (New York, NY: Columbia University Press, 1971) pp. 61-70.

of environmental law and regulation now exists in nearly all industrialized countries and many developing states. Much of this national law has an international source in treaties and recommendations of international agencies. Many countries already require assessments of environmental impact for new development projects. Administrative agencies generally implement environmental legislation. Judicial remedies may also be available.

Insofar as states recognize an international duty to prevent or reduce transborder environmental damage, a strong case can be made for rights of redress by injured parties who are not residents or nationals of the originating state. A treaty among the Nordic countries in 1974 gave such rights to nationals of the states parties.[87] In 1976, the European Court of Justice decided that within the European Community the victims of transfrontier pollution may sue either in their own national courts or in the tribunals of the polluter states.[88] The *Restatement of Foreign Relations Law of the United States (Third)* has gone even further, declaring it to be a general rule of law that where pollution has caused significant injury to persons outside of the polluting state, that state must grant the injured person access to the same judicial remedies as are available in similar circumstances to persons within the state's jurisdiction.[89]

This desirable rule does not appear to have been followed beyond the European states mentioned, however. It may be that such equality of access depends on the coordination of national environmental policies and the harmonization of pertinent national

87. *Nordic Convention on the Protection of the Environment,* 1092 UNTS I-16770. See P.M. Dupuy "Sur des tendances récentes dans le droit international de l'environnment," *Annuaire francaise de droit international* (1974) pp. 815, 826.

88. *Bier v. Mines de Potasse d'Alsace,* 1976, *European Community Court of Justice Report* 1735. See also recommendation of Council of Organization for Economic Cooperation and Development for a regime of equal access and non-discrimination in relation to transfrontier pollution, 17 May 1977. OECD Document C (77) Annex; reprinted in *International Legal Materials,* 16 (1977) p. 977.

89. *Restatement,* section 602 (2), Comment b, and reporters' note 4.

law.[90] These goals are, in fact, on the way to realization through the international treaties and rules and standards of international organizations concerned with the environment. The ILC also noted that up to now private-law remedies "failed to guarantee prompt and effective compensation to innocent victims who, after suffering serious injury had to take proceedings against foreign entities in the courts of other states." The commission has proposed in its recent work that domestic remedies be made more readily available to foreign individuals. They would go beyond equality of access and require that the states party to the proposed convention make provision in their domestic legal systems for remedies that permit prompt and adequate compensation to be paid to foreign individuals for transboundary harm caused by activities within the state in question.[91]

Whether this goal will be generally realized in the near future is doubtful, but more partial steps in that direction are being pursued through specialized treaties and judicial decisions. In this, as in other respects, linkage between international and domestic law is crucial for environmental protection. It is a particularly apt example for application of the concept of the *dedoublement fonctionnel*, the "double role" carried out by states in applying international legal principles and also giving effect to their own national interests, expressed in their laws and regulations.[92]

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90. See Dupuy, p. 829.

91. Barboza, paragraphs 29 and 30, Annex Article 29.

92. M. Virally, "Panorama du droit international contemporain," *Recueil des cours*, Tome 183 (1983-V) p. 344.