

ENVIRONMENTAL PRINCIPLES AND CONCEPTS

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ENVIRONMENTAL PRINCIPLES AND CONCEPTS

INTRODUCTION

1. This paper presents a discussion of environmental principles and concepts as a companion to the paper on *Trade Principles and Concepts*. It is the broad aim of discussions on trade and environment to promote the consistency of trade and environmental policies and of the relevant principles and concepts in order to make those policies mutually supportive of sustainable development. In addition to defining and explaining the main environmental principles and concepts, this paper makes preliminary observations as to their relevance in the trade and environment context.

2. It should first be noted that international environmental law is not as well developed as international trade law, which is generally embodied in the General Agreement on Tariffs and Trade (GATT) and housed in the institutional framework of the new World Trade Organisation (WTO). International environmental law has developed more unevenly through a number of international agreements and treaties, and there is no single institution which administers this law. There are more than nine hundred agreements which contain provisions dealing with one or more aspects of the environment, ranging from sub-regional and regional to global environmental issues (1). These agreements are a fundamental source of international environmental law.

3. The 1972 UN Conference on the Human Environment in Stockholm was the consecration of a new global and cooperative approach to the protection of the environment. Since then, international environmental law has been evolving very rapidly and is not yet clearly defined. In addition to the principles or norms of international law which stem from the sources of international law listed in Article 38 of the Statute of the International Court of Justice, principles have emerged which have been qualified as soft law, as they are not legally binding and their judicial value still remains uncertain. The sources of these principles are for example: resolutions, recommendations and declarations issued by international organisations such as the United Nations Environment Programme (UNEP), the World Health Organisation (WHO) or the OECD. These have made important contributions to the development of international environmental principles. The acts adopted at the UNCED conference, particularly Agenda 21 and the Rio Declaration, have helped to form these various principles and concepts into an increasingly comprehensive set of environmental principles for guiding the international community toward sustainable development.

4. However, these environmental principles and concepts vary widely in their degree of acceptance and most are still evolving. Only a few of the environmental principles presented in this paper have been acknowledged as principles or rules of international environmental law and have become legally binding. Indeed, many of the principles and concepts referred to in this paper, such as "the user pays principle", "risk management" or "life-cycle assessment" are rather economic or scientific principles or concepts which have been used or referred to in international agreements, but have no independent legal status. In this context, these should only be considered as policy tools. The legal status of other principles, such as "sustainable development", "the polluter pays principle", and "the precautionary principle" is still a source of debate. This paper attempts to describe the main environmental principles and concepts, and to clarify their legal status when relevant.

5. Environmental principles and concepts serve several purposes, most notably: 1) legal and other implications are drawn from them by courts and tribunals in the interpretative process; and 2) they provide a basis for negotiation and elaboration of future international environmental law. In framing the debate for

international environmental policy-making, these principles and concepts have also become increasingly important for discussions of trade and environment.

SUSTAINABLE DEVELOPMENT AND RELATED PRINCIPLES AND CONCEPTS

Sustainable Development Principle

6. "Sustainable development" is widely recognised as an emerging principle of international law, although there is no generally accepted legal definition of this term. The most commonly used definition is that contained in the 1987 publication *Our Common Future* (also known as the Brundtland Report) issued by the World Commission on Environment and Development. The Brundtland Report defined sustainable development as: "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*" (2) Following that report, UNEP's 15th Governing Council described sustainable development as: "*progress towards national and international equity, as well as the maintenance, rational use and enhancement of the natural resource base that underpins ecological resilience and economic growth.*" (3) Most recently, the UN Commission on Sustainable Development affirmed international recognition of the three part paradigm that frames our understanding of sustainable development: economic, ecological, and social interdependence.

7. Sustainable development formed the cornerstone underlying UNCED in 1992 and dominated the Rio Declaration on Environment and Development. Perhaps most importantly, UNCED adopted Agenda 21, a five-hundred page blueprint detailing the "*new global partnership for sustainable development*" in the 21st century (4). UNCED not only affirmed the goal of sustainable development but, through the Rio Declaration and Agenda 21, it added meaning and substance to this principle. The following concepts, among others, may contribute towards sustainable development:

Policy Integration -- Economic, ecological, and social goals are interdependent and can be achieved only with an integrated approach:

- * **Economic Progress:** Economic development can proceed in a way that enables the achievement of full economic growth potential while maintaining the stock of assets that yield these benefits.
- * **Ecological Resilience:** Environmental protection is an integral part of the development process. Enabling the resilience of biological and physical systems is critical to our long-term economic and social security.
- * **Social Development:** Breaking the vicious circle of population growth, poverty, and environmental degradation is the key to achieving sustainable development. So too is the preservation of cultural diversity and the advancement of social justice.

Sustainable Resource Use -- Natural resource exploitation should proceed in a way and at a rate that does not lead to the long-term decline of these resources and guards against their future exhaustion.

Equity -- Natural resources should be used and shared in an equitable manner, which implies taking into account the needs of other users and also the needs of present and future generations.

Transparency and Public Participation -- Citizens should participate in environmental decision-making and have appropriate access to information and to judicial and administrative proceedings.

Biodiversity -- National and international development strategies should be developed on the premise that the protection of biodiversity is critical to the resilience of the global ecosystem, which incorporates all aspects of the biosphere including man-made environments.

8. In the interest of policy integration, references to sustainable development as an overarching policy goal are being included in trade agreements. For example, the preamble to the North American Free Trade Agreement (NAFTA) states that one of its primary purposes is to:

"Contribute to the harmonious development and expansion of world trade ...in a manner consistent with environmental protection and conservation; ...promote sustainable development; ...[and] strengthen the development and enforcement of environmental laws and regulations."

9. Similarly, the Uruguay Round Agreement establishing the World Trade Organisation (WTO) includes references to the objective of sustainable development and to the need to protect and preserve the environment:

"Recognising that their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living; ...while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development."

10. Finally, it should also be noted that the Treaty establishing the European Community (EC Treaty)(5), provides in its article 2:

"The Community shall have as its task... to promote throughout the Community ... sustainable and non-inflationary growth respecting the environment,..."

Ecological Interdependence

11. During the past three decades, scientific understanding of the ecological interdependence of the planet's resources has increased dramatically, leading to the consensus that degradation to certain resources can have implications for the continued functioning of other resources and of the planet as a whole. For example, the preamble to the Rio Declaration begins, *"Recognising the integral and interdependent nature of the Earth, our home..."* Acknowledgment of the ecological limits and connectedness of the planet's biological and physical systems underlies agreements to protect threatened and endangered species, conserve biodiversity and prevent ozone depletion and climate change. The concept of *"ecosystem"* underlies the Biodiversity Convention which defines it as: *"a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit."* The first two recitals of the Biodiversity Convention also refer to *"the intrinsic value of Biological Diversity"* and *"the importance of Biological Diversity for evolution and for maintaining life-sustaining systems of the biosphere"*.

12. Many international agreements, declarations and resolutions also reflect a broader understanding of human reliance and dependence on the environment (6). For example, the 1983 World Charter for Nature acknowledges in its preamble that: "*Mankind is part of nature and life depends on the uninterrupted functioning of natural systems which ensure the supply of energy and nutrients.*" Although the purely biocentric approach, which values nature irrespective of its utility to humans, was rejected at UNCED, there is implicit recognition in many environmental instruments of the dependence of humankind on nature and the environment for continued survival.

Intergenerational Equity and Intragenerational Equity

13. The concept of "*intergenerational equity*" recognises each generation's responsibility to be fair to the next generation by leaving a legacy of wealth no less than they themselves had inherited. Meeting this goal implies emphasising the sustainable use of natural resources for subsequent generations and avoiding any irreversible environmental damage. The concept of intergenerational equity has been important since the 1972 Stockholm Conference, where the first principle of the Stockholm Declaration provided that: "*Man ... bears a solemn responsibility to protect and improve the environment for present and future generations.*" (7)

14. After being repeated in other environmental declarations and agreements including the 1980 UN resolution on the Responsibility of States for the Protection of Nature for the Benefit of Present and Future Generations (8), intergenerational equity was reaffirmed at UNCED as a central component of the shift to sustainable development. Principle 3 of the Rio Declaration states that: "*The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.*"

15. The concept of "*intragenerational equity*" recognizes that the lessening of economic inequality in the current generation must be seen as a primary goal of development rather than as a secondary or separate process. In the Brundtland Report, equity is seen chiefly in terms of alleviating poverty in the developing world where the links between environmental stress and hunger are so apparent. Nonetheless, in some developed nations, relative poverty is a significant and growing economic and social problem, and the relationship to environmental stress is becoming more apparent.

Common but Differentiated Responsibilities

16. The concept of "*common but differentiated responsibilities*" refers to the shared responsibilities of countries for the protection of shared resources, with the caveat that these responsibilities may be different depending on the contribution of the country to the environmental problem and its capability for addressing the environmental problem. In other words, developed countries will be asked to carry more of the immediate burden of achieving sustainable development on a global basis, because they may contribute more to environmental degradation and they have greater financial and technical resources. As stated in Principle 7 of the Rio Declaration:

"The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command."

17. The concept of differentiated responsibility is reflected in most international environmental agreements which, like many trade agreements, provide for special and differential treatment of developing countries. The guiding principles of the 1992 United Nations Framework on Climate Change (Climate

Change Convention) ask developed countries to take the lead in combating climate change and its effects, while giving full consideration to the needs and special circumstances of developing countries:

"The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration."

18. All major environmental treaties in recent years have included provisions providing financing, technical assistance and/or technology transfers to developing countries. The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) includes several provisions to ease the effects of its trade provisions on less developed parties: 1) they may delay for ten years their reduction and elimination of controlled substances; 2) they may receive financial and technical assistance through the Montreal Protocol Multilateral Fund and the Global Environment Facility; 3) parties may exceed their production limits in order to supply less developed parties during the phase-out period; and 4) parties are to facilitate access to alternative substances and technologies for less developed parties. Under the 1992 Convention on Biological Diversity (Biodiversity Convention) a special funding mechanism was created entitled the Global Biodiversity Conservation Fund (GBCF), which also promotes technology transfers. A Global Environment Facility was created in 1990 to provide incremental funding to developing countries in four project categories: 1) reducing the risk of global climate change; 2) preserving biodiversity; 3) preventing further depletion of the ozone layer; and 4) protecting international waters.

Shared or Transboundary Resources

19. The concept of "*shared or transboundary resources*" refers to resources that do not fall wholly within the territorial jurisdiction of one country, but straddle common political borders or migrate from one territory to another. Examples of resources which may be shared or transboundary include river basins, enclosed and semi-enclosed seas, watershed areas, marine living resources, and migratory wildlife. Most environmental agreements for the management of shared resources contain the general obligation for the harmonious utilisation of such resources among countries based on co-operation, notification and consultation (9).

20. The concept of shared or transboundary resources is to be considered alongside the principle of "*permanent sovereignty*", a basic principle of international law. Traditionally, natural resources located wholly within national boundaries have been considered to be within the jurisdiction of national laws. In 1962, the United Nations General Assembly declared that the right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people of the nations concerned (10). The principle of permanent sovereignty over natural resources has been reaffirmed in many multilateral agreements, international declarations, and resolutions. For example, the UNESCO Convention for the Protection of the World Cultural and Natural Heritage, while obliging countries to cooperate in protecting certain cultural and natural heritage sites, emphasises full respect for the sovereignty of countries on whose territory the sites are located (11). More recently, the 1992 Biodiversity Convention affirms that countries have

sovereign rights over their natural resources and the authority to regulate access to genetic resources through national legislation.

21. However, the principle of permanent sovereignty is not absolute. There is indeed a need for the co-operative regulation and management of resources that are shared by different countries (e.g., rivers or migratory wildlife). There is also the recognition that humankind has a common concern regarding some resources (e.g. protection of biodiversity) or activities (e.g. emissions of greenhouse gases) which might otherwise be considered wholly within the province of one country. As knowledge of the ecological interdependence of the planet broadens, the principle of "*permanent sovereignty*" over natural resources is slowly being conditioned to reflect the concept of "*shared or transboundary resources*."

22. The extent to which trade rules should take into account the concept of shared or transboundary resources is being considered in the WTO Committee on Trade and Environment. Environmental measures which contravene basic trade principles, such as national treatment and most-favoured nation, may be justified under the exceptions of Article XX of the General Agreement on Tariffs and Trade (GATT). These provisions are intended to allow measures "*necessary to protect human, animal or plant life or health*" or "*relating to the conservation of exhaustible natural resources*," but do not specify whether they refer exclusively to humans, animals, plants and natural resources within the territory of the country taking the measure, or whether they also cover resources shared among nations or pollution crossing national boundaries. Whether trade measures taken alone, or jointly by countries in the context of multilateral environmental agreements, to safeguard shared or transboundary resources would qualify for an exception under these provisions continues to be the subject of debate.

Harm Prevention

23. The notion that countries must ensure that activities within their jurisdiction or control do not damage the environment of other countries through "*transboundary spillover effects*" is a customary principle of international environmental law. The obligation to prevent transboundary pollution evolved from the Trail Smelter Arbitration Between Canada and the United States. In that case, fumes from a Canadian smelter were damaging US citizens and property. After the two countries agreed to arbitration, the US-Canada International Joint Commission concluded that: "*no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another.*" (12) Principle 21 of the 1972 Stockholm Declaration and Principle 2 of the 1992 Rio Declaration similarly state:

"States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."

24. The 1974 OECD Recommendation on Principles Concerning Transfrontier Pollution (13) states that "*countries should endeavour to prevent ... and to reduce, and as far as possible eliminate any transfrontier pollution ...*". Domestic environmental regulations and rules, such as those setting acceptable pollution levels, providing for environmental liability, access to courts, or similar substantive and procedural rules, should apply equally regardless of whether the pollution affects domestic resources or transboundary resources. These principles state: "*Polluters causing transfrontier pollution should be subject to legal or statutory provisions no less severe than those which would apply for any equivalent pollution occurring within their country....*" This demonstrates, once again, that the principle of permanent sovereignty is not absolute but rather subject to a general duty not to harm the interests of other countries through transboundary pollution or resource degradation.

Global Commons

25. The concept of "*global commons*" refers to those areas beyond the limits of national jurisdiction such as the high seas, Antarctica, outer space and the ozone layer. Although the global commons are open for legitimate, peaceful and reasonable use by all nations, they cannot be appropriated by any one nation. Countries should cooperate in the conservation and sustainable utilisation of the natural resources of the global commons, and, in the purest application of this concept, should share in the economic wealth of those areas. Most recently, the concept of global commons has been applied to the protection of Antarctica and the decision to make that continent essentially the equivalent of a global park, with very limited rights for exploitation, at least over the next fifty years (14).

26. However, the concept of "*global commons*" has been controversial when applied to resources which are of interest to the international community but not strictly outside national jurisdictions, such as within the context of preventing climate change, preserving biodiversity or protecting endangered species. Here, the concept of global commons may come into direct conflict with the principle of permanent sovereignty over natural resources. The compromise reached in the Biodiversity Convention and the Climate Change Convention is that there are certain "*common concerns*" of humankind. This implies that, in some cases, what would otherwise be activities or resources within the sovereign control of individual nations may require some type of cooperative management. Although this provides the conceptual framework for international environmental management, operationalising the concept of "*common concerns*" must be done on a case by case basis. This concept raises the same questions as does the concept of shared resources with regard to possible exceptions to trade rules.

27. The 1982 Law of the Sea Conference generated a new conceptual framework for addressing resources in the global commons. It used the term "*common heritage of mankind*," which was first related to the protection of certain cultural or natural landmarks and outer space. For example, the 1967 Outer Space Treaty provides that the exploration and exploitation of the relevant areas shall be carried out for the benefit and in the interests of all countries and that these areas shall be the province of all humankind (15). Seeking to institute a common management regime for the deep sea-bed, the U.N. Convention on the Law of the Sea similarly states (16):

"The Area and its resources are the common heritage of mankind. No state shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources.... All rights in the resources of the Area are vested in mankind as a whole ... the Authority shall provide for the equitable sharing of financial and other economic benefits derived from activities in the Area...."

The term "common heritage of mankind" is often used in a broad sense by environmentalists, although the definition of this term for legal purposes must be restricted to the meaning it was attributed in the two conventions mentioned above.

International Co-operation

28. "*International co-operation*", widely acknowledged as a customary principle of international law, relates to the legal obligation of countries to cooperate with other countries in cases of transboundary and global environmental concerns. Virtually every international environmental agreement has provisions requiring co-operation in generating and exchanging relevant information, partly for monitoring the domestic implementation of international environmental obligations. For example, countries are obliged to report on their efforts to: curb wildlife trade for the Convention on International Trade in Endangered Species (CITES); reduce greenhouse gas emissions for the Climate Change Convention; reduce levels of

ozone-depleting substances for the Montreal Protocol; and conserve biological diversity for the Biodiversity Convention.

29. In application of this principle, countries are further asked to respect the concept of "*prior notification*" which obliges nations planning an activity to transmit to potentially affected nations all necessary information sufficiently in advance so that the latter can prevent damage to its territory, and, if necessary, enter into consultation. The acting nation is not necessarily obliged to conform to the interests of affected nations, but should take their concerns into account. This concept has been reiterated in various declarations and conventions, frequently including a requirement that the consultations be "*in good faith and over a reasonable period of time.*" Principle 19 of the Rio Declaration confirms this idea: "*States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect.*" This was based on Principle 6 of the 1978 UNEP Rules on Shared Natural Resources which states:

"It is necessary for every State sharing a natural resource with one or more other States:

(a) to notify in advance the other State or States of the pertinent details of plans to initiate, or make a change in, the conservation or utilization of the resources which can reasonably be expected to affect significantly the environment in the territory of the other State or States; and

(b) upon request of the other State or States, to enter into consultations concerning the above mentioned plans."

30. In some cases, simple notification and consultation has not been deemed sufficient and acting countries may be required to obtain the "*prior informed consent*" of other governments. Thus, for example, a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes that seeks to export hazardous wastes must inform the importing country of the nature of the wastes and receive the written consent of that country. Similar recommendations apply for exports of domestically-banned chemical substances as contained in the London Guidelines for the Exchange of Information on Chemicals in International Trade (17).

31. In the trade and environment context, this procedure has been particularly applicable in the case of international trade in hazardous wastes and dangerous chemicals, where exporting countries are required to receive the consent of the importing countries. Some, however, feel that even this procedure of "*prior informed consent*" is not sufficient to prevent the environmental harm which may be caused by some traded products and advocate that exports of these products should be totally banned and that more restrictive procedures are needed generally for trade in domestically-prohibited goods. Recently, the Parties to the Basel Convention decided to prohibit exports of hazardous wastes from OECD member states to non-OECD members for the purpose of final disposal and, as of 31 December 1997, for the purpose of recycling or resource recovery.

POLLUTER PAYS PRINCIPLE AND RELATED PRINCIPLES AND CONCEPTS

Polluter Pays Principle

32. The Polluter Pays Principle was initially adopted in the early 1970s when strict environmental regulations were first being introduced in OECD countries, and complaints about high costs and negative effects on competitiveness were beginning to emanate from industry. The OECD governments were being pressured to help industry cover the costs of complying with these new regulations or to impose similar costs on imports through compensating import levies. There was widespread concern that both environmental subsidies and environmental tariffs would proliferate and cause severe problems for the trading system. The 1972 OECD Recommendation of the Council on Guiding Principles concerning International Economic Aspects of Environmental Policies (18) included recommendations not to subsidise the environmental costs of industry, except in limited cases, and not to use trade remedies or import duties to compensate for these costs. These recommendations, which were intended to guide government responses to the competitive effects of environmental regulations, have been largely maintained for the last twenty years. The EC Treaty, provides that "*the polluter should pay*" principle is one of the basis of Community policy on the environment (19). Also, Principle 16 of the Rio Declaration relating to the internalisation of environmental costs makes reference to the Polluter Pays Principle.

33. The "*Polluter Pays Principle*", essentially a principle of economic policy rather than a legal principle, states that the polluter should bear the expenses of carrying out pollution prevention measures or paying for damage caused by pollution. As expressed in the 1972 OECD Guiding Principles on the International Economic Aspects of Environmental Policies, it reads:

"The principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment is the so-called 'Polluter Pays Principle.' This principle means that the polluter should bear the expenses of carrying out the above mentioned measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the costs of these measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies that would create significant distortions in international trade and investment." (20)

34. In the OECD context, the Polluter Pays Principle is a non-subsidisation principle, meaning simply that governments should not as a general rule give subsidies to their industries for pollution control. It is intended to guide the allocation of costs between the government and the private sector in paying for domestic pollution or protecting their national environments. It concerns *who* should pay for environmental protection, not *how much* should be paid. Guidelines for implementing the Polluter Pays Principle, which gave exceptions where governments might extend pollution control subsidies, were specified in the follow-up Recommendation on the Implementation of the Polluter Pays Principle adopted by the OECD Council in 1974. (21)

35. According to the 1974 OECD Recommendation, government assistance for pollution control might be given: 1) to ease transition periods when especially stringent pollution control regimes are being implemented; 2) to stimulate the development of new pollution control technologies; and 3) in the context of measures to achieve specific socio-economic objectives, such as the reduction of serious interregional imbalances. To avoid the abuse of these government subsidies, it was further specified that any assistance granted under the OECD exceptions should be given for a fixed amount of time in a clearly defined programme and should not create significant distortions in international trade and investment. The OECD interpretation of the Polluter Pays Principle was adopted later by the European Community, which allows

environmental subsidies to facilitate the implementation of new environmental standards if this assistance does not exceed 15 per cent of the investment and is granted only to firms in operation for two years (22).

36. The WTO Agreements include similar rules on environmental subsidies which closely follow the OECD interpretation of the Polluter Pays Principle. In the Agreement on Subsidies and Countervailing Measures, environmental subsidies are placed in the non-actionable category along with subsidies for research activities and subsidies to disadvantaged regions. Under these rules, environmental subsidies can be used to promote the adaptation of facilities which have been in operation for two years, if they are: limited to 20 per cent of the costs of adaptation; directly linked and proportional to the planned pollution reduction; and available to all firms which can adopt the new equipment or processes. The WTO Agreement on Agriculture also states that environmental subsidies in agriculture are exempt from the subsidy reduction commitments in the rest of the agreement, if such payments are part of a clearly-defined government programme and limited to compliance costs.

Internalisation of Environmental Costs

37. The concept of "*internalisation of environmental costs*" implies that market prices should reflect the environmental costs of the production and use of a product in terms of natural resource utilisation, pollution, waste generation, consumption, disposal and other factors. The internalisation of environmental costs has been a focal point of environmental economics. It underlies the conceptual and analytical work in such areas as resource pricing, use of economic instruments in environmental policy, calculation of environmental costs and benefits, and green accounting methods.

38. Environmental costs, largely related to the provision of public goods like fresh air and clean water, are often unaccounted for in market transactions and are commonly referred to as "*externalities*." Since it is difficult to quantify such externalities in terms of monetary values (due partly to the absence of obvious units of environmental measurement), industry and government planners rarely include environmental externalities in the decision-making process. Accordingly, market failures associated with environmental externalities are widespread. Attempts are being made to attach a realistic value to environmental goods and services and thereby help "*internalise*" environmental costs in the prices of goods. Increasingly sophisticated methods are being developed to estimate the environmental costs and benefits associated with natural resources and other environmental assets. One approach relies on contingent valuation methods to assess societal willingness to pay for environmental benefits and/or to accept environmental degradation.

39. Another approach is based on the concept of "*total economic value*" which attempts to assign use and non-use values to environmental assets, including: 1) direct use values, 2) indirect use values, 3) existence values and 4) option values. For example, forests, wetlands and wildlife have direct uses related to the goods they provide, such as fuelwood or fish, and the recreational services they provide, such as hiking or tourism. The indirect use value of an environmental asset relates to its functional role in supporting economic activity and can be measured in terms of the benefits derived from its contribution to the avoidance of environmental damage. For example, forests and wetlands provide both atmospheric and microclimatic support functions, and endangered species play an indirect role in maintaining biodiversity. Existence values relate to the benefits derived from the mere knowledge that an environmental asset exists and plays a role in maintaining ecosystems. Option values are associated with the future environmental contributions of a resource and the needs of future generations. New accounting systems would include in calculations of gross national product (GNP) the costs of environmental protection efforts as well as the savings yielded by preventing ecological damage and preserving these different environmental values.

40. Although it is sometimes related to the Polluter Pays Principle, the concept of internalisation of environmental costs concerns how to measure environmental costs and benefits and *how much* should be paid to cover environmental costs. It is a far more complicated concept than the Polluter Pays Principle, which concerns who should pay and leaves the exact amount to be "*decided by public authorities to ensure that the environment is in an acceptable state.*" The concept of internalisation of environmental costs is not easily put into practice, although frequent mention is made of increased use of economic instruments as in the Recommendation of the Council on the Use of Economic Instruments in Environmental Policy (23) and in Principle 16 of the Rio Declaration:

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

41. Environmental taxes, charges, tradeable permits and other economic instruments, if well designed, can help move market prices more closely towards full environmental costs. To date, however, they have not been widely implemented and are generally used in conjunction with environmental regulations. Governments have found it difficult to measure environmental costs and benefits and to internalise these costs and benefits at the national level. Even more difficult is how to internalise environmental costs at the international level for resource use and degradation of shared and transboundary resources and the global commons. Reflecting environmental benefits that accrue from the conservation of shared and transboundary resources, including living marine resources, in market prices at the international level is also extremely difficult. Although some advocate that the trading system should promote the internalisation of environmental costs, it is not clear how trade rules or trade instruments would accomplish this task relative to environmental policy instruments. Trade reforms could remove import barriers or subsidies which distort prices and contribute to market failures and externalisation of environmental costs and benefits. A related proposal maintains that trade rules should not unnecessarily inhibit environmental policies from promoting the internalisation of environmental costs and benefits.

User Pays Principle

42. The "*User Pays Principle*" centres around the idea that the user of a public facility, or consumer of a public good, pays for the environmental good or service or the damages which may arise from that use. Theoretically, a user fee equivalent to the total use value would be charged for use of an environmental resource. An example is a fee levied on visitors to national parks, where different uses of the park incur different fees and the charges ensure that the costs of use are borne by the person using the public good. In terms of the environment, anyone who benefits directly or indirectly from the environment would pay a cost related to the level of the benefit received. In the case of inexhaustible environmental goods such as habitat areas, game parks and forests, users might be encouraged to pay for the existence of the resource. Similarly, the consumption of exhaustible resources might be regulated on a user pays basis. The User Pays Principle is part of the overall internalisation of environmental costs, which involves consumers paying directly for use of environmental assets as well as having producer costs passed through to product prices. The application of this principle may also contribute to an increased awareness by consumers of the price or value of the resources they use or consume.

43. At the international level, attempts are being made to extend the User Pays Principle to shared resources and the global commons. Approaches might include an estimation of "*user fees*" based on the estimated cost of maintaining various natural resources of global significance. In other words, a user fee might be based on how much individuals need to pay to maintain the existence of rainforests which produce oxygen, provide carbon sinks or act as crucial habitats for biodiversity. One estimate, for example, has arrived at a user fee of US\$8 per adult in the OECD countries for the maintenance of the Amazon regional

forests, given an existence value of US\$3.2 billion. The User Pays Principle underlies approaches in international environmental policy where countries possessing resources or assets of common concern to mankind, such as genetic resources or rainforests, would be compensated for the environmental services they provide. International markets could perhaps be developed for the exchange of these environmental services or limited markets could be established under international environmental agreements for this type of "trade in services" based on tradeable permits, debt for nature swaps and joint implementation approaches.

PRECAUTIONARY PRINCIPLE AND RELATED CONCEPTS

Precautionary Principle

44. The "Precautionary Principle" evolved from the recognition that scientific certainty often comes too late to design effective environmental policy responses; it thus recommends action in responding to potential environmental threats instead of waiting for absolute scientific proof. Formulations of the Precautionary Principle vary widely, but as stated in Principle 15 of the 1992 Rio Declaration:

"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."

45. The Precautionary Principle, although not yet generally recognised as a principle of international law, has become widely used in international environmental law and has been applied to areas such as general environmental management, managing hazardous wastes, preventing pollution and protecting endangered species. It underlies a number of international legal instruments, including the World Charter for Nature, the Biodiversity Convention, the Climate Change Convention and the Montreal Protocol. Also, the EC Treaty, stipulates that Community policy on the environment shall be based on the "precautionary principle" (24), among others. As expressed in the Climate Change Convention (and the Rio Declaration), the Precautionary Principle incorporates the idea of taking into account the costs of precautionary actions:

"The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost."

46. The Precautionary Principle is particularly important to the management of species and the preservation of biodiversity. Without appropriate management, living resources can quickly pass from a state of being threatened to those of being endangered and extinct. Recent living resource conventions, such as the 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and the 1990 Protocol Concerning Specially Protected Areas and Wildlife (SPAW) to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, embody the precautionary approach to environmental management. Parties are obliged to manage species of fauna and flora with the objective of preventing species from becoming threatened in any way. For example, CCAMLR uses "precautionary catch limits" in fisheries management, which advocate constraints on fishing in the absence of necessary biological data to make population assessments of a stock.

47. In recognition of the need to base policy decisions on scientific knowledge to the extent possible, most international environmental treaties include special provisions for conducting scientific research. Agreements to cooperate in international scientific research and monitoring are contained in a wide range of conventions, from those addressing marine pollution and changes in the atmosphere to those concerned with the preservation of cultural heritage sites. Although many provisions on scientific research are very general, some provide specific and detailed direction for research necessary to identify and clarify the nature and extent of environmental problems. For example, the 1985 Vienna Convention for the Protection of the Ozone Layer (which was the precursor to the Montreal Protocol) elaborated in great detail the areas needing coordinated scientific research, including issues relating to atmospheric physics and chemistry, the potential consequences of increased ultraviolet radiation on human health and the environment, and the concentrations of certain gases. The scientific evidence was a major reason for the ultimate success of the Parties in agreeing on steps to phase out ozone depleting substances.

48. One view of the Precautionary Principle is that it is a reversal of the burden of proof. That is, the polluter or resource user bears the onus of proving his activity is not harmful to the environment before he can proceed. But in operational terms, shifting the burden of proof involves practical and conceptual problems due primarily to the nature and treatment of risk and uncertainty. Unquantifiable risks must be considered in making environmental policy decisions, including technical uncertainty, ignorance and indeterminacy. Dealing with uncertainty requires decision-making strategies based on risk assessment and risk management, which may be highly specific to the country or countries making the decision. Setting national environmental standards and developing regimes for implementing environmental agreements is based partly on a balancing of environmental risk and scientific proof. The Precautionary Principle favours erring on the side of risk aversion.

49. The Precautionary Principle is applicable in the trade and environment context to both the consideration of national standards as potential trade barriers and the use of trade measures to protect shared resources and the global commons. The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) acknowledges the need for SPS measures to be based on risk assessments that take into account available scientific evidence. The SPS Agreement recommends that countries ensure their national SPS standards are based on "*scientific principles and not maintained without scientific evidence.*" In setting standards higher than international norms, countries should have a scientific justification, but full scientific proof can be tempered by a country's assessment of the level of risk and what it thinks is an appropriate standard:

"...there is a scientific justification if, on the basis of an examination and evaluation of available scientific information in conformity with the relevant provisions of this Agreement, a Member determines that the relevant international standards, guidelines or recommendations are not sufficient to achieve its appropriate level of sanitary and phytosanitary protection." (25)

50. In addition, under the SPS Agreement, if there is not sufficient scientific evidence, governments may temporarily impose precautionary restrictions while they seek further information for setting national standards. Similarly, the chapter on Sanitary and Phytosanitary Measures in the North American Free Trade Agreement (NAFTA) allows parties to act to protect human, animal or plant life or health based on available information when there is insufficient information to conduct a risk assessment.

51. Because countries may vary significantly in their assessments of what constitutes serious threats or risks to shared resources and the global commons, multilateral environmental agreements are difficult to negotiate. In particular, reaching agreement among countries concerned on efficient and adequate enforcement procedures is problematic. Therefore, designing international environmental regimes which include trade restrictions is only done when it is generally agreed that the immediate risk to the environment is severe and a precautionary approach is warranted, e.g. CITES, the Montreal Protocol. Some countries,

however, may fear that the risks are more substantial than commonly recognised or that the precautionary measures in the agreement are not being enforced. This has led, on occasion, to additional or proposed trade actions to achieve the environmental goal of the agreement. Using the Precautionary Principle as a guide to weighing such trade actions is difficult due to vast differences in national judgments of scientific proof and the appropriate level of precaution in dealing with environmental risks to shared resources. However, this raises questions as to the extent to which the Precautionary Principle and related concepts should be taken into account when determining what exceptions may be allowed under trade rules for environmental purposes.

Risk Management

52. The concept of "*risk management*," which is closely related to the Precautionary Principle, involves assessing an environmental risk or potential environmental impact and making decisions based on that assessment. The overall objective of risk management is to reduce risks to human health and the environment. The US National Academy of Sciences defines risk management as: "*The process of regulatory action, integrating the results of risk assessment with engineering data, with social, economic, and political concerns to reach a decision.*"

53. The environmental risk management process is based on four steps: (1) identifying the hazards to society or the environment; (2) estimating the extent of these hazards, including the probability of exposure and the relative toxicity of the agent; (3) ascertaining the acceptability of that level of risk; and (4) making a decision to reduce the risk to the appropriate level. This is the basic process used for setting national environmental standards. It is a lengthy and complicated process which involves taking account of relevant risks from different sources; forecasting changes in environmental quality; assessing the efficiency and effectiveness of various policy options; providing insight into risk assessment for all parties concerned; and setting protection levels for widely differing agents and locales.

54. One problem associated with environmental risk management is setting levels of risk that are acceptable both to the environment and to society. This is usually a subjective process relying on experts to determine actual risk and the political process to determine what is an acceptable risk. The extrapolation of risk from a small model to an entire society or ecosystem is a difficult undertaking with many opportunities for misjudgment. The level of risk accepted will vary with the noxiousness of the particular hazard in question, which is subject to a scientific analysis, and the risk tolerance and preferences of society, which may be more political than quantifiable. Implementation of the Precautionary Principle is so difficult largely because of the intangible nature of risk assessment and management.

55. The concepts of risk assessment and risk management are taken into account in the WTO Agreements on Technical Barriers to Trade (TBT Agreement) and on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). These agreements recommend that countries base their national environmental, safety and health standards on international standards so as to facilitate trade and reduce the possibility of standards acting as protectionist measures. However, countries may set their national standards higher than international standards "*for the protection of human, animal or plant life or health, of the environment...at the levels it considers appropriate*" (TBT Agreement) and if "*the relevant international standards, guidelines or recommendations are not sufficient to achieve its appropriate level of protection.*" (SPS Agreement). Determining the appropriate level of protection provided by a standard is to be done through "*an assessment...of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organisations*" (SPS Agreement). According to the TBT Agreement, technical regulations should not be more trade-restrictive than necessary to fulfill a legitimate objective "*taking account of the risks non-fulfilment would create*"; risk assessment should take into account available scientific and technical information. Similarly, the NAFTA affirms the

right of each party to choose the level of protection of human, animal or plant life or health it considers appropriate according to its national risk assessment.

Pollution Prevention

56. "Pollution prevention" is an environmental management approach which places emphasis on process and product changes leading to pollution reduction and/or prevention over approaches which focus on pollution control or clean-up through end-of-pipe devices. Therefore, "clean technologies", which are total systems for preventing pollution throughout the life-cycle of a product, contribute to pollution prevention. Key characteristics of clean technologies include: the use of as little energy and raw material inputs as possible per unit of product output; minimal releases to air, water and soil during fabrication and use of the product; the production of goods with reduced or no harmful components; and maximisation of the durability and lifetime of products and their re-usability or disposability.

57. Pollution prevention is related to the Precautionary Principle, as expressed in the following 1990 UNEP Governing Council recommendation (26) urging countries to adopt:

"... alternative Clean Production methods — including raw material selection, product substitution, and clean production technologies and processes — as a means of implementing a precautionary principle in order to promote production systems which minimize or eliminate the generation of hazardous wastes..."

58. The EC Treaty, stipulates in its article 130R(2) that Community policy on the environment is to be based namely on the principle that "preventive action should be taken". The preference for pollution prevention or clean production methods over other types of environmental protection approaches is also stated in a number of international environmental treaties, including the 1982 UN Convention on the Law of the Sea and the 1989 Basel Convention which itself is based on a waste minimisation approach (27). Although the Basel Convention deals primarily with the transboundary movement of hazardous wastes prior to either disposal or recycling, its provisions also require Parties to reduce the generation of hazardous wastes to a minimum. Another example is the 1991 Bamako Convention on hazardous wastes (28) which requires that:

"Each Party shall strive to adopt and implement the preventive, precautionary approach to pollution problems which entails, inter alia, preventing the release into the environment of substances which may cause harm to humans or the environment without waiting for scientific proof regarding such harm. The Parties shall co-operate with each other in taking the appropriate measures to implement the precautionary principle to pollution prevention through application of Clean Production methods, rather than the pursuit of a permissible emissions approach based on assimilative capacity assumptions".

Critical Load

59. The concept of "critical load", like the concept of "sustainable yield", is subject to much controversy and uncertainty as scientific exploration of these concepts continues. Critical load refers to an ecosystem's level of tolerance for a particular pollutant and also to an ecosystem's level of tolerance for the depletion of a particular natural resource, beyond which irreversible damage will likely occur. The UN Economic Commission for Europe has defined critical load as:

"a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to prior knowledge."

60. Loading is the rate at which a pollutant is introduced to the environment. If small loads of pollutants are added to a natural ecosystem for a limited amount of time, and depending on the size of the load and the nature of the pollutant, many ecosystems seem to have an extraordinary ability to recuperate. However, as the load or the rate of loading increases, it becomes more difficult and it takes longer for the ecosystem to recover. In some cases, the likelihood of major, irreversible changes associated with loadings increases significantly.

61. The environmental effects of loading can be divided into two kinds of problems: 1) environmental stress from incremental increases over time in pollution; and 2) the threat of ecosystem collapse associated with systematic and systemic stress. The former is often associated with toxicity levels; the latter is a more complex problem, which is illustrated in recent warnings regarding climatic feedbacks associated with climate change. With regard to the former, critical loads have been established in the case of deposit of acids in soil and the soil's ability to withstand and buffer such deposits. Although all ecosystems have the ability to absorb and deal with a certain amount of acidification, the amount of acid that can be withstood varies with each ecosystem. Soils with high lime content, for example, have a high pH level, and are capable of withstanding relatively large amounts of acid deposition. Systems with low pH, such as coniferous forests, cannot; for example, acid deposition is often associated with forest decline in Europe and North America.

62. Multilateral environmental agreements are starting to base their regulatory regimes on the concept of critical load and similar precepts. For example, the 1994 Sulphur Protocol to the ECE Convention on Long-Range Transboundary Air Pollution has used a "*critical load*" approach which mandates emissions ceilings based on the level of pollutants which particular ecosystems can tolerate. Such approaches have also been used in agreements for the management of living resources as embodied in "*sustainable yield concepts*." Here, harvesting of resources such as fish or whales is allowed up to a certain point and not beyond that which would lead to a decline in the population of the species. Examples are the Protocols to the Interim Convention on Conservation of North Pacific Fur Seals, the International Convention for the Regulation of Whaling, and the 1992 Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean. The main problem in implementing critical load approaches is obtaining agreement among countries as to what constitutes a critical level of pollutants or harvesting for a particular ecosystem. However, as scientific evidence accumulates as to critical loads of specific pollutants in specific ecosystems and unsustainable levels of harvesting of specific resources, this concept facilitates the implementation of the Precautionary Principle.

Life-Cycle Assessment

63. The concepts of "*life-cycle assessment*" and "*life-cycle management*" mark the evolution of environmental management practices from an initial focus on end-of-pipe solutions to the development of integrated environmental approaches intended to encompass the entire "*life-cycle*" of the product. This approach is often referred to as "*cradle-to-grave*" environmental management or, within the context of rising expectations of the recycling and re-use potential of products, "*cradle-to-cradle*" environmental management. The Society of Environmental Toxicology and Chemistry defines life-cycle assessment as:

"an objective process to evaluate the environmental burdens associated with a product, process, or activity by identifying and quantifying energy and materials used and wastes released to the environment, to assess the impact of those energy and material uses and releases to the environment, and to evaluate and implement opportunities to affect environmental improvements. The assessment includes the entire life cycle of the product, process, or activity, encompassing extracting and processing raw materials, manufacturing, transportation, and distribution, use, reuse, maintenance, recycling, and final disposal."

64. An analytic tool developed by industry, particularly the chemicals sector, life-cycle assessment is intended to evaluate each stage in the life of a product, from the initial appropriation of raw materials and per unit energy and other production inputs, to product re-use, recyclability and disposal characteristics. There are three major components involved in life-cycle assessment:

Life-Cycle Inventory: The inventory component is intended to record relevant data concerning energy and materials required in the production process, as well as wastes, effluents and emissions produced. A generally-accepted goal of life-cycle inventory approaches is to quantify resources used and wastes generated in order to improve specific environmental performance characteristics. This includes identifying areas either in the production process or product design in which resource requirements can be reduced.

Life-Cycle Impact Analysis: Life-cycle impact analysis is closely associated with environmental impact assessment approaches. It is intended to assess the overall impact of a product and its production process characteristics. This may encompass human health, environmental, natural resource and other impacts.

Life-Cycle Improvement Analysis: Life-cycle improvement analysis is intended to apply the data gathered from the inventory and impact analysis stages to introduce improvements in the production process or product design, in order to reduce environmental burdens associated with energy and raw materials use and waste emissions. This stage may include both quantitative and qualitative areas of improvements, such as changes in product design, raw materials use, industrial processing, consumer use and waste management.

65. While life-cycle assessment and management techniques are still at an early stage of development, they have implications for trade as seen in the trade effects of programmes for eco-labelling, eco-packaging and recycling. Some new eco-labels propose criteria related to the point in a product's life-cycle when it is harvested, produced or processed. Although eco-labels are voluntary, they may cause market access problems for imported products which have difficulty complying with these criteria. Eco-packaging initiatives in OECD countries are setting strict rules for the take-back, recycling, reuse and/or disposal of different types of packaging and packaging materials, which may pose additional costs and burdens on imported products. Requirements for the recyclability of products or "*producer responsibility*" for the management of end-of-life products are also difficult to implement for products in international trade. As life-cycle approaches are increasingly embraced, they could have profound implications for the trading system and ways need to be found to minimise negative trade impacts.

Environmental Impact Assessment

66. "*Environmental Impact Assessment*" (EIA) is a process for examining, analysing and assessing proposed activities in order to minimise environmental degradation and maximise the potential for environmentally-sound and sustainable development. In general, the EIA process should ensure that:

(1) government authorities have fully identified and considered the environmental effects of proposed activities, as well as alternatives that avoid or mitigate environmental effects; and (2) affected citizens have an opportunity to understand the proposed project or policy and to express their views to decision-makers in advance. Since 1969, when the US enacted the first national EIA law, the National Environmental Policy Act (NEPA), environmental impact assessments have become common features of national legal systems. In addition, many international institutions, such as the World Bank and other development banks, mandate EIA procedures to evaluate the environmental impacts of projects proposed for funding.

67. Environmental impact assessments have long been important in the context of shared or transboundary resources. The 1978 UNEP Principles on Shared Natural Resources recommend that all States undertake: *"environmental assessment before engaging in any activity with respect to a shared natural resources which may create a risk of significantly affecting the environment of another State or States sharing that resources."* The UN/ECE developed a 1991 Convention on Environmental Impact Assessment in a Transboundary Context, which specifies that countries can do joint EIAs as part of their overall obligations to prevent, reduce and control significant adverse transboundary environmental impacts from proposed activities.

68. Many international environmental instruments now require some form of environmental impact assessment for projects, including the Rio Declaration in its Principle 17, the Biodiversity Convention, the World Charter for Nature and the OECD Recommendation of the Council on the Assessment of Projects with Significant Impact on the Environment (29). For example, the *Biodiversity Convention* states that the signatories shall:

"introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures."

69. Similarly, EIAs are recommended for assessing potential environmental harm to the global commons, as in the UN Convention on the Law of the Sea:

"When states have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant harmful changes to the marine environment, they shall, as far as practicable assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments."

70. Environmental impact assessment methodology has traditionally been applied to assessing the environmental effects of particular projects on physical ecosystems. More recently, attempts are being made to extend EIA approaches to assessing the potential environmental effects of policies, such as macro-economic policies and trade policies. This is often termed *"strategic environmental assessment,"* but is far more difficult to implement due to the widespread and varied effects of policies. For example, many of the environmental impacts of trade policies or trade agreements would stem from the economic impacts of these policies, which themselves are hard to predict. Still, the idea that trade policies and agreements should be subject to some type of environmental review or impact assessment is gaining consensus. This would identify the broad ecological implications of different trade approaches and what types of mitigating measures or complementary mechanisms might be put into place to minimise environmental damage. To this end, environmental reviews were conducted of the NAFTA and some countries are reviewing the environmental implications of WTO Agreements.

ENDNOTES

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