

Chapter 3

Role of Trade Measures in Environmental Policy

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Perceived conflicts between efforts to liberalize trade and to protect the environment are driving discussion of trade/environment issues. Liberalization of trade is not a goal in and of itself but rather a means to promote prosperity through improved economic efficiency and development. As this chapter makes clear, the degree of compatibility between economic development or growth and environmental protection depends on the specific context. Partly for this reason, it is no simple matter to unravel the many factors that account for the environmental effects of different trade patterns or policies. Generalizations implying a necessary relationship between environment and freer trade—whether positive or negative—are often oversimplifications that policymakers should view with caution.

Economic development and environmental protection are both needed for improved human well-being. Ultimately, neglect of either goal-development or environmental protection-could impair the other. Environmental degradation diminishes the capacity of the planet to sustain economic development; securing a livable environment for a human population that could double by the mid-21st century requires economic development, including growth and technological change.¹ The twin aspirations for long-term economic and environmental improvement are encompassed in the term *sustainable development*. Although given various definitions, it has been described as development that:

... meets the needs and aspirations of the present without compromising the ability of future generations to meet their own needs.²

While the concept of sustainable development now receives much attention, it is difficult to translate into clear courses of action. However, if sustainable development is to be achieved-if it can

be achieved-economic growth and development need to be channeled in environmentally responsible directions. By setting environmental requirements and imposing costs on polluters, governments can guide development so as to diminish environmental degradation. Under these circumstances, growth can produce resources to support development and use of environmentally preferable technologies that can move society closer to sustainability.

The concerns of environmentalists and liberal trade advocates intersect in their attitudes toward externalities. Pollution and environmental degradation are negative externalities-costs not borne by their creators but placed on third parties and society as a whole. Because polluters do not generally bear these environmental costs, they have little incentive to minimize them. Therefore, from an environmental perspective, it is desirable to require or encourage polluters to internalize these costs—through regulations, economic incentives, or legal and social action aimed at preventing, repairing, or compensating for environmental damage.³

From the trade perspective, externalities are one of a number of market failures or distortions that diminish the welfare-maximizing force that free markets and free trade theoretically can deliver. Although it is unlikely that the General Agreement on Tariffs and Trade (GATT) would regard weak environmental regulation as a form of subsidy, environmental costs not reflected in the price of traded goods are, in principle, similar to explicit subsidies as distorters of trade. In the cases of both explicit subsidy and implicit subsidy for environmental and social costs, society bears some of the cost of production that the producing company would bear had it paid the full cost in a perfect market. In each case, that company might accrue cost advantages over rivals that do pay the full cost.

¹ George Heaton, Robert Repetto, and Rodney Sobin, *Transforming Technology: An Agenda for Environmentally Sustainable Growth in the 21st Century* (Washington DC: World Resources Institute, April 1991).

² World Commission on Environment and Development, *Our Common Future* (New York, NY: Oxford University Press, 1987), p. 43. The report, commonly called the **Brundtland Report**, includes what it calls two key concepts within the term: 1) "the concept of 'needs,' in particular the essential needs of the world's poor, to which overriding priority should be given;" and 2) "the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs."

³ As generally used in this paper, the term "regulation" encompasses not only traditional "command and control" types of regulations but also "market-based" instruments. The use of market mechanisms and other economic incentives in environmental regulations in some cases has the potential to achieve comparable or better environmental results in a more economically efficient manner than traditional regulation alone.

Advocates of freer trade therefore would favor eliminating both types of subsidies; in the case of the environment, this could encourage internalizing the costs of pollution.

But steps to internalize the costs of pollution are not always easily taken, as subsequent sections of this chapter demonstrate. There is a wide range in environmental capabilities and commitments among different nations. While freer trade and investment sometimes produce resources that might be used for environmental protection, it cannot be assumed that this will happen in the absence of regulations or incentives for improved environmental management. If the goals of environmental protection and economic development are to be made compatible, economic activity will need to be conducted in ways that diminish environmental degradation.

At times, trade restrictions may be needed to achieve environmental ends. However, their usefulness is limited. Usually, the root cause of environmental problems is domestic conduct. While trade can magnify the effects of such conduct, and trade restrictions can limit those effects, it is usually preferable, when possible, to employ other means (e.g., technical assistance or help with technology transfer) to encourage countries to adopt domestic regulations or incentives to effect the needed changes. Still, there may be circumstances when trade measures are a needed recourse.

This chapter discusses the compatibility of trade and environmental objectives, the pros and cons of using trade measures for achieving environmental objectives, and the special trade/environment challenges that arise with respect to developing nations. For the purpose of illustration, the chapter draws upon examples from specific environmental agreements that have trade provisions. Full analysis of such agreements is beyond the scope of this background paper. (The impact of environmental regulations on trade and manufacturing competitiveness is discussed in chapter 4.)

ASSESSING THE EFFECTS OF TRADE ON THE ENVIRONMENT

There has been little systematic assessment of the environmental impacts of different trade patterns or policies. The formal environmental impact statement process set up under the U.S. National Environmental Policy Act of 1969 has not been used to evaluate draft trade agreements and potential alternative actions. Most studies tend to be either highly theoretical or narrowly focused on particular cases. Generalizations made on the basis of such studies are risky. More authoritative information about the environmental impacts of trade may soon become available through the Organisation of Economic Co-operation and Development (OECD), which is analyzing trade-related environment effects in several areas (agriculture, forestry, fisheries, transportation, and endangered species).⁴

One of the few efforts to examine the environmental effects of a proposed trade regime is the U.S. interagency 'Review of U.S.-Mexico Environmental Issues' produced in connection with the ongoing North American Free Trade Agreement (NAFTA) negotiations (ch. 2).⁵ The U.S. document (which is not a formal environmental impact statement) illuminates the possible environmental effects of alternative growth and policy scenarios under NAFTA and no-NAFTA options. However, because of methodological limitations, quantitative estimates are incomplete and imprecise. The document naturally emphasizes U.S. border area effects, with very modest treatment of continent-wide or global environmental implications. Moreover, the review was undertaken before a draft NAFTA was developed; its relevance to whatever specific NAFTA text is eventually proposed remains to be determined.

In general, data and methodologies to determine unambiguously if NAFTA, GATT, or other regimes are net contributors to or detractors from environmental quality are lacking. Liberalized trade might offer benefits and harm simultaneously, and trade-offs are likely. There can be circumstances in which freer trade and environmental improvement are

⁴ The results of these analyses had not been released when this report went to press. Ch. 2 discusses OECD's trade/environment activities in more detail.

⁵ Interagency Task Force coordinated by the Office of the U.S. Trade Representative, "Review of U.S.-Mexico Environmental Issues," Washington DC, February 1992. Reportedly, the Mexican and Canadian Governments are engaged in similar exercises, but these had not been released as of mid-March 1992.

complementary. There can also be circumstances in which trade hastens environmental degradation.

Insofar as it helps make societies wealthier, liberal trade might encourage steps for environmental protection. As wealth increases, societies may give more priority to environmental improvements. For example, a study comparing sulfur dioxide and smoke levels in several cities with differing income levels found levels of these pollutants rising as per capita income rose to \$5,000; then, the pollutant levels declined as per capita income rose, up until about \$15,000 per year, after which per capita emissions began to rise.⁶ Such a result may occur from increased demands for environmental protection leading to passage and enforcement of environmental protection laws and increased environmental investment. Another possible explanation is that more prosperous countries may prefer less pollution-intensive industries; whether this would be a net environmental benefit would depend on the extent to which polluting processes were diverted elsewhere.

Liberalizing trade and investment might speed international diffusion of environmentally preferable production technologies. Such cleaner technologies not only reduce the pollution associated with production, they often offer improved energy and materials efficiency, accruing further environmental and productivity gains. There is some limited empirical evidence suggesting that in Latin America, relatively open economies are more likely to adopt cleaner production technologies than are more closed economies.⁷ Such a result may be due to the need of export-oriented industries in developing countries to meet more stringent product standards and customer demand in developed country markets (e.g., dioxin-he paper). Open economies may be more receptive to imports of innovative foreign technologies that are cleaner and more efficient than older production processes. In some cases, multinational firms might bring technologies that meet

corporate or home country standards which are more stringent than local requirements.

But it is not inherently true that economic improvements arising from freer trade will translate automatically into environmental improvements. As the scale and rate of economic growth increases, environmental degradation may outpace environmental gains made through the use of environmentally preferable technology.⁸ After all, the industrialized nations (those that have experienced the greatest growth and that account for most of the world's trade) are the largest contributors to many environmental problems. The United States, for example, contains 5 percent of the world's population but accounts for 20 percent of global warming potential and 20 to 30 percent of emissions of major ozone-degrading compounds CFC-11 and -12.⁹ Larger and more open markets for tropical timber products may hasten harvesting of tropical forests in developing countries-whether or not adequate safeguards are in place to encourage reforestation or other environmentally preferable practices.

The activity of increasing trade itself varies in its environmental effects. For example, truck traffic across the U.S.-Mexico border may expand from 1.8 million commercial vehicle crossings in 1990 to 8 million in 2000, with concomitant increases in air pollution, noise, and congestion, even in the absence of NAFTA.¹⁰ However, elimination of regulations that ban U.S. trucks in Mexico and restrict Mexican trucks in the United States might avoid some of these impacts by obviating return trips by empty trucks and removing the environmental risks associated with transfers of hazardous cargo.¹¹

A frequently aired concern is that industries may relocate from countries with strict environmental regulation (e.g., many developed nations) to countries with weaker regulation or enforcement in order

15 Gene M. Grossman and Alan B. Krueger, "Environmental Impacts of a North American Free Trade Agreement," paper presented at a conference on U.S.-Mexico Free Trade Agreement, sponsored by the Mexican Secretariat de Comercio y Fomento Industrial, Oct. 8, 1991.

7 Nancy Birdsall and David Wheeler, "Openness Reduces Industrial Pollution in Latin America: The Missing Pollution Haven Effect," prepared for the World Bank symposium "International Trade and the Environment" Washington, DC, Nov. 21-22, 1991.

8 H. E. Daly and John B. Cobb, Jr., *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future* (Boston, MA: Beacon Press, 1989).

9 U.S. Congress, Office of Technology Assessment, *Changing by Degrees: Steps To Reduce Greenhouse Gases*, OTA-O-482 (Washington, DC: U.S. Government Printing Office, February 1991), p. 3.

10 interagency Task Force, "Review of U.S.-Mexico Environmental Issues," op. cit., pp. 174, 177-78.

11 Ibid.

to avoid costs associated with environmental compliance.¹² This is called the "pollution haven" effect. For instance, differences in environmental regulations may have been a factor leading to decreased employment in California and increased Mexican activity in the wood product coatings industry.¹³ But, in general, there is little evidence that large-scale shifts in industrial investment and relocation to pollution havens have occurred.¹⁴ (See ch. 4 and app. E for more extensive discussion.)

Debate also exists about the most effective approaches to apply trade measures for environmental purposes. For instance, the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) restricts trade in endangered and threatened species, and in products derived from them (such as elephant ivory). CITES bans trade in species threatened with extinction (those listed under app. I of CITES) on the premise that trade prohibitions will destroy markets for endangered species and thus their commercial appeal. It is further argued that blanket bans prevent the problem of illicit wildlife trade from being disguised as legal trade. Others have argued that such bans can be ineffective and may even hasten species extinction by raising the price and profitability of banned products in the underground market while removing economic incentives for long-term sustainable management of species.¹⁵ Advocates of this latter view argue that well-managed exploitation of threatened and endangered species (e.g., controlled elephant hunting) is more likely to promote species preservation and sustainable development because it offers long-term financial and material benefits to the governments, communities, and people controlling the species' fate. In the case of elephant ivory, there is evidence that trade bans are effective. Since 1989, when CITES enacted the ivory trade moratorium,

elephant tusk prices have decreased from about \$100 per kilogram to between \$2 and \$3 per kilogram.¹⁶ Poaching has been reduced greatly and elephants have been observed to return to areas where poaching had previously occurred.¹⁷ The March 1992 meeting of CITES members in Kyoto, Japan reaffirmed the ivory trade moratorium, rejecting requests by several southern African countries to reinstate limited ivory trade. Some trade controls would seem to be needed to protect species. Improved monitoring, reporting, and data might help clear up some uncertainties about compliance with agreements.

As discussed later in this chapter, GATT trade rules, as currently interpreted, have the potential to affect both unilateral and multilateral environmental policies. The tuna/dolphin dispute arising from the tuna import ban imposed pursuant to the U.S. Marine Mammal Protection Act suggests the potential for conflict between GATT and unilateral environmental laws with trade provisions. Although no challenge has yet been made, a country's effort to implement trade measures pursuant to a multilateral environmental agreement might someday be challenged in GATT.

Significant environmental problems also occur in activities not fully covered by GATT. Agriculture is only partly covered by GATT's discipline, although Uruguay Round negotiations may change this. GATT now allows domestic subsidies and, in the case of agriculture, permits export subsidies (i.e., subsidies contingent on export) as well.¹⁸ This has enabled the United States, Japan, and the European Community to spend billions of dollars annually on farm commodity supports while avoiding GATT conflicts. A GATT waiver also allows U.S. import restrictions to be imposed by the President in some

¹² See, for instance, Daly and Cobb, op. cit., pp. 209 and ff., cited in Stewart Hudson, "Trade, Environment, and the Pursuit of Sustainable Development" prepared for the World Bank symposium "International Trade and the Environment" Washington, DC, Nov. 21-22, 1991.

¹³ U.S. Congress, General Accounting Office, *U.S.-Mexico Trade: Some U.S. Wood Furniture Firms Relocated From Los Angeles Area to Mexico*, GAO/NSIAD-91-191 (Gaithersburg, MD: U.S. General Accounting Office, April 1991); Ann M. Lesperance, "Air Quality Regulations and Their Impacts on Industrial Growth in California, Based on Census Data: A Case Study of the South Coast Air Quality Management District Rule 1136 and the Wood Products Coatings Industry," master's degree thesis, University of California, Los Angeles, 1991.

¹⁴ H. Jeffrey Leonard, *Pollution and the Struggle for the World Product* (New York, NY: Cambridge Press, 1988); Lyuba Zarsky, "Trade-Environment Linkages and Sustainable Development" report to the Environment Planning Branch, Australian Department of Arts, Sport, Environment, Tourism, and Territories (Melbourne, Australia: Nautilus Pacific Research, October 1991).

¹⁵ "Saving the Elephant: Nature's Great Masterpiece," *The Economist*, July 1, 1989, pp. 15-17.

¹⁶ Mark Pagel and Ruth Mace, "Keeping the Ivory Trade Banned," *Nature*, vol. 351, May 23, 1991, pp. 265-66.

¹⁷ Ibid.; Peter Aldous, "African Rift in Kyoto," *Nature*, vol. 354, November 21, 1991, p. 175.

¹⁸ However, both domestic subsidies and agricultural export subsidies can be countervailed by importing countries (see annex to ch. 2, discussion of subsidies).

circumstances; import controls are in effect for certain sugar, peanut, cotton, and dairy imports. Some other practices that may appear to violate GATT (e.g., Japan's ban on rice imports) have not been stopped.

Farm subsidies and trade protection can provide strong incentives to intensify agricultural production or to extend agriculture onto lands less suitable for cultivation, often to the detriment of the environment. These incentives could encourage overapplication of fertilizers, pesticides, irrigation, and mechanical tillage; concentration of livestock leading to overgrazing and improperly handled animal waste; and cultivation of marginal lands. They may also discourage crop rotations and other environmentally preferable practices. Environmental results of overly intensive agriculture include water and air pollution; degradation of soil resources; damage to wildlife, fisheries, and natural ecosystems; and, ironically, given reliance on pesticides, increased vulnerability to pests and disease.¹⁹ On the other hand, subsidies for conservation (e.g., conservation reserve land set-asides) can have environmental benefits when appropriately structured and implemented. Amendments under consideration in the Uruguay Round at GATT, while calling for reductions in agricultural subsidies, would exempt some conservation subsidies.²⁰

Protection of agriculture by developed countries can also have unintended effects for the environment of developing countries. Despite some special preferences, many developing countries have limited access to developed country agricultural markets. They are also affected by developed country sales of surplus agricultural goods at prices below unsubsidized production costs. Both depress world prices for agricultural commodities and reduce the foreign exchange that developing countries can earn, preventing them from profiting from their comparative advantage (cheap labor) in their labor-intensive agricultural sector. To meet needs for investment and debt service, developing countries might then become more dependent on extractive activities like

mining and logging that, particularly in the absence of effective regulation, can have large adverse environmental impacts. Furthermore, less developed countries often lack the means to conduct such extractive activities with the environmental precautions that might be taken in some developed countries.

But the net environmental effect of lifting the current system of agricultural subsidies is difficult to determine. Even if subsidies encourage practices that produce adverse environmental impacts, removing the subsidies and opening markets would not automatically be entirely positive from an environmental standpoint. Decreased environmental impacts from lower pesticide use in Europe or Japan, for example, would need to be evaluated against the possibility of greater pesticide use accompanying more production in developing countries with weaker regulations, weaker enforcement, and less applicator training. Inappropriate application might lead to more serious environmental or health impacts than in countries with stricter standards, stronger enforcement, and more training.

As with agriculture, trade restrictions against labor-intensive manufactures can have negative environmental implications. Since less developed countries often lack the resources to compete in capital-intensive industries, they rely heavily on labor-intensive industries and natural resource extraction activities (agriculture, logging, and mining). By limiting earnings possibilities in labor-intensive industries, restrictions on labor-intensive manufactures can increase developing country reliance on extractive activities.

Other trade restrictions could have similar effects. For instance, countries may charge higher tariffs on semi-finished or finished goods than on raw materials to encourage domestic value-added activities. This is called tariff escalation. GATT does not favor or disfavor tariff escalation; it simply directs members to negotiate mutually agreeable tariff schedules, subject to the most-favored-nation rule (see annex to ch. 2). Tariff escalation on tropical forest products or

¹⁹ The discussion above draws upon several sources, including: GATT Secretariat, "Trade and Environment," op. cit., pp. 32-34; T.T. Phipps and K. Reichelderfer, *Agricultural Policy and Environmental Quality* (Washington, DC: Resources for the Future, 1988); T.T. Phipps and K. Reichelderfer, "Farm Support and Environmental Quality at Odds?" *Resources*, spring 1989, pp. 14-15; Paul Faeth, Robert Repetto, Kim Kroll, Qi Dai, and Glenn Helmers, *Paying the Farm Bill: U.S. Agricultural Policy and the Transition to Sustainable Agriculture* (Washington, DC: World Resources Institute, March 1991); National Research Council, *Alternative Agriculture* (Washington DC: National Academy Press, 1989).

²⁰ GATT Multilateral Trade Negotiations, The Uruguay Round, Trade Negotiations Committee, "Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations," GATT Dec. MTN.TNC/W/FA, Dec. 20, 1991 [referred to as the "Dunkel draft"], pp. L.20 (paragraph 8), L.28, L.13 (paragraph 1), L.17 (paragraph 10).

metal goods may discourage establishment of downstream industries in developing countries and increase reliance on extractive activities. On the other hand, badly conceived schemes for encouraging domestic value added in developing countries can exacerbate resource degradation through inefficiency.²¹ And, in the absence of effective environmental management, increased earnings from downstream processing might spur even faster extraction of raw materials without adding environmental safeguards.

In sum, liberalized trade has the potential for both positive and negative environmental impacts. Trade's effect on the environment depends on the context—what regulatory and other restrictions apply to the production and use of traded items, how stringently regulations are enforced, and how trade-generated revenues are used.

USE OF TRADE MEASURES

Just as there is disagreement on the effects of trade on environment, there is also disagreement about when trade measures (i.e., trade restrictions) are an appropriate means of pursuing environmental goals. This issue is under study in various forums (see ch. 2). The answer in any given case will depend on, among other things, the expected environmental benefit, the expected effect on trade, and whether alternative, less trade-restrictive means are available to reach the environmental goal.

Trade measures (especially import restrictions), and the threat of such measures, can potentially further environmental goals in various ways. They can help *convince* a country to join an international environmental agreement or to behave according to certain environmental norms; *deny* a country economic gain from failing to follow such norms; *prevent* a country's actions from undermining the environmental effectiveness of other countries' efforts; and *remove the* economic incentive for certain

environmentally undesirable economic activity. Often the same measure has effects in two or more ways.²²

An example is CITES, which as mentioned above seeks to preserve certain listed endangered and threatened species by prohibiting or restricting trade in them. In this case it seems that trade restrictions can be effective. When the demand for such species comes from export markets, prohibiting trade will reduce the commercial incentive to harvest listed species. (To some extent demand is already reduced by laws in many countries banning or restricting domestic trade in such species.) Another example is the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, expected to come into effect mid-1992. The Convention seeks to prevent the environmentally improper disposal of hazardous wastes; to that end, among other things, it bans export of hazardous waste where improper disposal would appear to be a likely result (e.g., wastes sent to countries lacking adequate regulations or the technical capacity for proper disposal).²³ Here too it seems that trade restrictions could be effective as trade itself contributes to the environmental problem.

However, when trade is not an intrinsic part (or is a minor part) of the initial problem, trade restrictions designed to alter economic incentives could be an inefficient and costly way to address environmental problems.²⁴ While empirical evidence is limited, trade restrictions that apply at a later point cannot always be counted on to filter back to remedy the conduct at issue; among various types of trade restrictions, those aimed most closely at the offending conduct may be more effective.

The difficulty of determining how trade restrictions work in a given case and the possible advantage of targeting such restrictions closely to the conduct at issue are both illustrated by the debate surrounding proposals to restrict trade in tropical timber. Some groups have called for bans on imports

²¹Robert Repetto, *The Forest for the Trees.? Government Policies and the Misuse of Forest Resources* (Washington, DC: World Resources Institute, 1988).

²²For another statement on the different ways in which trade restrictions can work see the United States "'Discussion Paper for OECD Joint Session of Trade and Environment Experts," dated Feb. 7, 1992. The U.S. interagency process that generated this paper is discussed in ch. 2.

²³The Basel Convention is discussed in Mary Tiemann, Library of Congress, Congressional Research Service, *Waste Exports: U.S. and International Efforts To Control Transboundary Movement*, IB89123, Feb. 26, 1992.

²⁴Economic theory suggests that this would likely be the case. In economic terms, excessive pollution is caused by a failure to internalize environmental costs, which is a market distortion. It is normally more efficient to correct that distortion directly (e.g., by environmental regulations or incentive mechanisms) than to try to correct its effect with another distortion (trade restrictions). For an analysis of the use of trade distortions to remedy domestic market distortions, and a discussion of why trade distortions would often be inefficient, see W.M. Corden, *Trade Policy and Economic Welfare* (Oxford: Clarendon Press, 1974).

or exports of commercially harvested tropical timber products,²⁵ especially raw logs. Those supporting a ban believe it might help protect the vast genetic diversity found in tropical ecosystems, maintain the forests' carbon fixing capacities, and safeguard the land tenure of indigenous peoples. However, others (including the GATT Secretariat) believe a general ban on logs from tropical forests would have little effect.²⁶ Over 80 percent of tree cutting in developing countries is due to fuel wood harvesting and land-clearing for agriculture and ranching.²⁷ Tropical timber exports (either as logs or processed timber) account for only 1 percent of trees felled in developing countries, according to the GATT Secretariat.²⁸ A total ban on trade in all products made from tropical timber might reduce forest conservation incentives by depressing the market value of the primary forest. A ban just on log exports would increase processed wood exports; developing country sawmills using less efficient technologies and practices could waste more timber than more efficient mills in importing countries. Rather than a ban, opponents to trade restrictions suggest that a more effective approach to reduce deforestation would be to, in the words of the GATT Secretariat, "promote employment and income growth for rural people in those countries" by such measures as domestic economic reforms and access to foreign markets.²⁹

Proponents of tropical timber trade restrictions—who are not all proponents of bans-counter by noting that some countries are much more affected by export timber demand than aggregate statistics suggest (Malaysia and Indonesia account for over 75 percent of tropical timber exports³⁰), certain land-

forms are more vulnerable to damage from logging than others, and commercial logging operations catalyze agricultural land-clearing by making new forest areas accessible to settlement.³¹ One proposal calls for importing countries to limit imports to producers that can certify their use of sustainable forest management techniques.³² It is argued that this kind of restriction would increase the value of sustainably harvested tropical timber and thus increase incentives for conservation. Replacing the restriction with a labeling scheme, by which imports would all be permitted but customers would be informed of how the wood was harvested, would lessen the chances of a conflict with GATT. The effectiveness of such labeling would depend in part on the environmental awareness and opinions of customers.

It can also be hard to know *when* to apply trade measures for environmental purposes. If trade measures are intended to counter specific conduct by firms operating in other countries, it can be difficult to determine whether that conduct actually occurred. As the U.S. General Accounting Office recently found, monitoring and reporting about compliance with international environmental agreements generally is spotty.³³

Under what circumstances are trade restrictions appropriate? The answer is not simple, and many factors could be considered, including some that could be unique to the specific case. Several factors are explored below, using for purposes of illustration the Montreal Protocol on Substances That Deplete

²⁵ P. Anderson, "The Myth of Sustainable Logging: The Case for a Ban on Tropical Timber Imports," *The Ecologist*, vol. 19, No. 5, September/October 1989.

²⁶ GATT Secretariat, "Trade and Environment" advance copy, February 1992, P. 28.

²⁷ B. Johnson, *Responding to Tropical Deforestation: An Eruption of Crisis—An Array of Solutions* (Washington, DC: World Wildlife Fund and Conservation Foundation, 1991).

²⁸ GATT secretariat, Op. Cit.

²⁹ Ibid.

³⁰ Zarsky, op. cit., Table 5, p. 64, derived from German Bundestag (ed.), *Protecting the Tropical Forests: A High priority International Task*, report of the Enquete Commission, "Preventive Measures to Protect the Earth's Atmosphere," Bonn, Germany, 1990.

³¹ World Rainforest Movement, *Rainforest Destruction: Cause, Effects & False Solutions* (Penang, Malaysia: Jutaprint), p. 51, cited in Carlos Alberto Primo Braga, "Tropical Forests and Trade Policy: The Cases of Indonesia and Brazil," draft prepared for the World Bank symposium "International Trade and the Environment," Washington, DC, Nov. 21-22, 1991, p. 8.

³² Zarsky, op. cit., P. 70.

³³ U.S. General Accounting Office, *International Environment: International Agreements Are Not Well Monitored* (Gaithersburg, MD: January 1992).

the Ozone Layer.³⁴ The Montreal Protocol commits signatories to gradually phase out the consumption of certain "controlled substances." These are certain chlorofluorocarbons (CFCs), halons, and other chemicals that, when released into the atmosphere, deplete the Earth's ozone layer.³⁵ In addition to this underlying environmental measure, the Protocol has various trade provisions. The agreement currently commits signatories to ban the import of controlled substances from nonparties. Starting in January 1993, signatories are expected to have banned the export of controlled substances to nonparties. They are also to ban imports from nonparties of certain products containing controlled substances (such as refrigerators containing CFCs).³⁶ The agreement also calls for consideration of the feasibility of what could be called a process ban. Member countries are to determine the feasibility of banning imports from nonmembers of products that do not contain controlled substances but were produced using them (e.g., computer chips produced using CFCs as a cleaning solvent). For the first group of chemicals (those in the Protocol's Annex A), this determination is to be made by January 1994.³⁷ In all of these cases, trade would nevertheless be permitted if the nonmember could show that it is following the same phaseout schedules and trade restrictions that members are required to follow.³⁸

The discussion below focuses on six factors that might be helpful in evaluating the relative appropriateness of trade restrictions. (The following section considers whether such trade measures might be inconsistent with GATT.) One consideration only touched on below is that countries have different environmental priorities (which are often correlated with differences in wealth and technical know-how),

without which there would be much less reason for trade measures. The final section of this chapter will explore how those differences can affect the desirability and effectiveness of trade measures, and what alternative measures might be taken in light of those differences to reach environmental goals.

1) The conduct at issue has global environmental effects. Use of controlled substances by nonmember countries degrades the environment for all. Member countries therefore have a stake in trying to limit such use. The argument here is particularly strong because the link between CFC emissions and ozone depletion, with its potential for health effects, is widely accepted by the international scientific community.³⁹

2) The trade measures are matched (though not completely) by domestic measures. As well as restricting trade, the members are phasing out their own use of controlled substances. Without the domestic measures, the trade restrictions might seem protectionist. Even as it is, the agreement might be seen as containing a protectionist element. For example, imports of CFC-containing refrigerators from nonmembers could be totally prohibited while some amount of domestic production is still allowed until completion of the phaseout schedule.

3) The trade measures are multilateral, with broad support. The Montreal Protocol now has 79 members. While membership is not universal (GATT has over 100 members), it is large, and accounts for the bulk of the production, consumption, and trade of controlled substances. A unilateral trade restriction might strike other countries as less justified and more susceptible of abuse (see ch. 5).⁴⁰

³⁴ The Montreal Protocol is based on the March 1985 Vienna Convention for the Protection of the Ozone Layer. The Montreal Protocol was signed in September 1987 and was amended by the London Revisions in June 1990. The amendments, which accelerated the phase out schedule, added new substances for control, and set up a fund to help developing countries comply, were to go into force by January 1, 1992, provided they were ratified by 20 countries. As of March 27, 1992, only 19 ratifications had been received; the amendments will take effect 90 days after the 20th ratification is received. (See London Revisions, Article 2). While the London Revisions were not in force as this report went to press, for convenience references to the Montreal Protocol denote the text as amended by the London Revisions.

³⁵ As the term is used here, "consumption" occurs when a controlled substance is incorporated into a product or otherwise used. For example, putting chlorofluorocarbons (CFCs) into a refrigerator when it is manufactured would constitute consumption, while buying or disposing of such a refrigerator would not.

³⁶ See Montreal Protocol, Article 4, paragraphs 1 through 3 bis.

³⁷ Montreal Protocol, Article 4, paragraphs 4, 4 bis.

³⁸ Ibid., Article 4, paragraph 8.

³⁹ See, for example, *Scientific Assessment of Ozone Depletion: 1991*, sponsored by the World Meteorological Organization, United Nations Environment Programme, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, United Kingdom Department of Environment, preprint, Dec. 17, 1991, n.p.

⁴⁰ Some years ago the United States imposed a unilateral ban on imports of CFC-containing aerosol products. However, that ban was nondiscriminatory because domestic production of those items was also prohibited.

4) There are positive efforts and incentives to encourage adherence by reluctant countries. Some developing countries have been reluctant to sign the Protocol because of the possibility it could interfere with their development plans or cause economic hardship. However, the Protocol grants developing countries slower phaseout schedules.⁴¹ Also, a multilateral fund was set up to help developing countries comply, both by paying for technical assistance and by reimbursing some incremental costs.⁴² While these efforts might not be enough to satisfy some developing countries, they are at least a step toward encouraging their participation.

Also, formal membership in the Protocol is not necessary to escape trade restrictions. It is enough if a country shows that it is abiding by the Protocol's norms. So countries that did not join because of political or other considerations can still be brought under its wing.

5) The trade measures are related to the conduct at issue. The trade measures concern the very products that have undesired environmental effects. At least on the surface, it seems reasonable to restrict trade in products whose manufacture or use cause the environmental harm at issue; even if another country does not change its behavior, the measures may do some good. (This possibility is explored in item 6 below.) In contrast, trade sanctions in products unrelated to the environmental problem would have value only if countries changed their behavior as a result, and might be considered unduly punitive.

6) How crucial are the trade restrictions to achieving the environmental goal? This is a fundamental question, since to the extent trade measures are not needed to achieve the environmental goal, they would not seem justified on environmental grounds (though they might still be justified on economic or competitiveness grounds, see ch. 4). However, in practice this question is difficult to answer. To answer this question confidently, one would have to examine the patterns of production, trade, and consumption in industries involving controlled substances. This would be beyond the scope of this background paper. The

analysis below is hypothetical, illustrative of the kinds of considerations involved.

On one level, the trade measures could penalize nonmembers to some extent, and therefore could be an incentive to join. In this way, the restrictions might further the goal of preventing ozone layer depletion. However, trade restrictions tend to irritate the target countries, and it is possible that other measures more to their liking could also induce membership. Because the agreement already has two such measures to attract developing countries (slower phaseout schedules and a fund for technical and financial assistance), it could be argued that the agreement does not rely excessively on trade sanctions.

Also, a restriction on imports of products containing controlled substances (which is not yet in effect), and a restriction on imports of products made using controlled substances (whose feasibility has not yet been determined), could be needed in the future to remove a disincentive to joining. Without such restrictions, firms in nonmember countries might be able to sell (for example) CFC-containing refrigerators, or computer chips made using CFCs as a solvent, in member country markets while local producers could not. If CFC use made refrigerators or chips cheaper, the nonmember country would have a competitive advantage. Thus, countries (or their industries) could profit by refusing to join.

Moreover, these two trade restrictions could contribute to the Protocol's objective even when they do not induce a country to join. If imports of products containing or made with a process using CFCs were to remain permitted, and if use of those chemicals made the products cheaper, then manufacturers in nonmember countries might capture a large share of the world market for the products in question. Then, the world as a whole might continue consuming CFCs at a high rate, despite the bans in effect in member countries. On the other hand, under some circumstances these two trade restrictions might not be needed. If the ban on exports of controlled substances is effective, and if it is hard for nonmember countries to produce CFCs on their own,⁴³ then manufacturers in those countries might

⁴¹ Montreal Protocol, Article 5. In response to new scientific evidence, the phaseout schedules for both developing and developed countries were accelerated in the London Revisions. In the future, additional scientific evidence might induce the parties to accelerate the schedules further, and it is possible that some or all of the developing country preferences could be removed.

⁴² Ibid., Article 10. An interim fund already has \$200 million (see box 3-B).

⁴³ The agreement also prohibits the export to nonmembers of technology for making and using controlled substances. Ibid., Article 4, paragraph 5.

not have access to CFCs in the first place, in which case they could not make products containing CFCs or use CFCs in manufacturing processes. Another consideration is that the yet-to-be promulgated process ban (the ban on imports of products made using controlled substances) could be difficult to enforce, because it would require determining at the border the process by which goods were made, which might leave no trace on the product itself.

This discussion of trade measures under the Montreal Protocol is meant only to suggest the kinds of considerations that might apply. While the Montreal Protocol gives one paradigm for trade measures, there are several others, including those of CITES and the Basel Convention. The overall question of when trade measures are appropriate to reach environmental goals is only now being studied. One analysis tentatively suggests eight guiding criteria for when trade measures are appropriate to secure international environmental objectives. According to this analysis, trade measures should:⁴⁴

1. Only be used in situations involving international externalities (e.g., transnational pollution or degradation of international common property resources);
2. Only be used when inducement or compensation type agreements are clearly unavailable or not effective;
3. Only be used when market type responses are clearly unavailable or not effective (i.e., product labeling or direct consumer action);
4. Only be used when there is strong evidence that the trade measure will be effective at accomplishing the environmental objective;
5. Only be used when there is clear evidence that the environmental benefit exceeds the abatement cost;
6. Only be used when the countries imposing the trade measures undertake appropriate protective measures themselves;
7. Be used with a presumption in favor of multilateral rather than unilateral application; and

8. Be used with a presumption that they are more acceptable if an international norm for environmental protection exists.

The first factor (translational versus localized pollution) is discussed in box 3-A. The second factor (use of inducement- or compensation-type agreements) is discussed later in this chapter and in box 3-B. The seventh criterion (the favoring of multilateral over unilateral measures) is discussed further in ch. 5.

More work would be needed in domestic, foreign or international forums (see chs. 2 and 5) to determine whether these or other specific criteria sufficiently encompass both environmental and trade concerns to make them suitable as guidelines.⁴⁵ Some such criteria or guidelines would help narrow the potential for trade/environment conflicts. But if, as seems plausible, trade measures likely will be necessary or desirable in some cases, the question arises of whether such measures are likely to conflict with GATT.

Trade Measures and GATT

Whether particular trade measures would conflict with GATT is hard to predict, in part because many pertinent issues have not been addressed directly in decided cases. However, analysts have identified at least three GATT provisions that environmentally oriented trade measures could violate: the most-favored-nation and national treatment rules, and Article XI, which generally prohibits import and export restrictions other than tariffs (see the annex to ch. 2).⁴⁶ If any of those provisions are violated, GATT consistency would then normally depend on whether the trade measure falls within any of the exceptions in Article XX (see the annex to ch. 2).

While several types of trade restrictions might be contested at GATT, the discussion below will focus on one type in particular: a "process restriction," or a restriction on imports of a product because of the process used to make the product. How GATT might

⁴⁴ Charles S. Pearson and Robert Repetto, "Reconciling Trade and Environment: The Next Steps," December 1991 (prepared for the Trade and Environment Committee of the Environmental Protection Agency's National Advisory Council on Environmental Policy and Technology).

⁴⁵ These forums include the U.S. Government interagency task force, the Trade and Environment Committee of the Environmental Protection Agency's National Advisory Council on Environmental Protection and Technology, OECD, and GATT's Group on Environmental Measures and International Trade (see table 2-B and discussion in ch. 2).

⁴⁶ These free provisions are identified in the United States "Discussion Paper for OECD Joint Session on Trade and Environment Experts," dated Feb. 7, 1992. Also, OECD has done some work identifying possible GATT conflicts, though that work is not publicly available. One characteristic of the Basel Convention and the Montreal Protocol that is problematic under GATT is that nonmember countries are subject to different trade rules than member countries.

Box 3-A—The Global-Local Continuum

One difficulty in addressing trade/environmental disputes is the wide range of opinions about the nature, severity, and political responsibility for specific environmental problems. The rationale for using trade measures to achieve environmental objectives depends in part on how such problems are viewed by different countries. The breakdown below illustrates some of the possibilities.

Global and Transborder Environmental Problems

Some environmental problems (ozone depletion is perhaps the most conspicuous example) are global in nature—activity in one location can affect the Earth's environment as a whole. Some other problems, while not necessarily global, have impacts that cross national borders (e.g., sulfur dioxide emissions in one country contributing to acid rain in another).

On a common-sense level, other countries have a greater stake in a problem when it affects their own environment or the global commons. If pollution (or some other form of environmental degradation) extends beyond a country's borders, the polluting country may have less incentive to minimize that degradation than if all of the damage was contained domestically. Other countries may try to influence the polluting country to pollute less; when they succeed, global welfare may benefit.

Sometimes, countries will adopt international environmental agreements with trade provisions, such as the 17 agreements referenced in table 2-1. Multilateral agreements can have extensive, but seldom universal, support among trading partners; for example, while 79 countries have agreed to curb emissions of chemicals that deplete the Earth's ozone layer under the Montreal Protocol, there are over 100 members of GATT. There are also numerous bilateral environmental agreements, some of which have trade implications. However, countries sometimes take unilateral action to address a problem they think justifies trade measures, a step that can prompt resentment of others.

Localized Environmental Problems

The justification for influencing environmental conduct abroad is more difficult when the conduct appears to have only local effect. In this case, one country's lax environmental regulations might not pose an environmental problem for other countries. The level of regulation that serves one country's interest can differ markedly from what serves other countries' interests. Differences in industrial makeup can affect priorities in environmental regulations. Geographic and climatic conditions can influence the way in which air pollution disperses. Some ecosystems are more vulnerable to damage than others when exposed to similar kinds of pollution.

However, the line between local and nonlocal effects is inevitably arbitrary. Locally used toxic substances can be transported far from their points of origin. For example, pesticides, polychlorinated biphenyls (PCBs), lead, and dioxins are found in Arctic regions, including potentially hazardous levels of PCBs in the breast milk and blood of Inuit people in northern Quebec.¹

Changes in the State of Knowledge

Another complication for trade/environmental policy is that, as scientific knowledge grows, actions once thought to have only local effect can become global problems in time, while other problems thought to be quite serious may come to be seen as less so. Activities as diverse as driving a car, using an electrical appliance, raising cattle, and cutting down trees are now widely viewed as contributing to global warming potential, a concern that hardly existed two decades ago. At the same time, some policies taken on the basis of precaution may need reevaluation as additional information is developed. For example, the U.S. Environmental Protection Agency is reevaluating dioxin standards. Stringent standards to control human exposure to dioxin were established in the mid-1980s. With increasing understanding of how dioxin works at the molecular level, some experts believe that certain U.S. dioxin standards need reevaluation. Recent research also suggests to some scientists that dioxin is a less potent carcinogen than suspected when initial standards were set. However, other adverse health effects may occur from low levels of dioxin exposure, thus complicating the reevaluation effort.² Risk analysis, to weigh risks against economic costs, is often proposed as a way to balance the costs and benefits of environmental regulation; others believe prudence dictates precaution.

¹ Curtis C. Travis and Sheri T. Hester, "Global Chemical Pollution," *Environmental Science & Technology*, vol. 25, No. 5, May 1991, pp. 814-819. Travis and Hester refer to E. Dewailly et al., *Bulletin of Environmental Contamination and Toxicology*, vol. 43, 1989, pp. 641-46.

² David J. Hanson, "Dioxin Toxicity: New Studies Prompt Debate, Regulatory Action," *Chemical & Engineering News*, vol. 69, No. 32, Aug. 12, 1991, pp. 7-14; Leslie Roberts, "Dioxin Risk Revisited," *Science*, vol. 251, Feb. 8, 1991, pp. 624-626; "Year-Long Reassessment Shows High Non-Cancer Threats of Dioxin," *Superfund Report*, March 25, 1992, p. 16.

Box 3-A—The Global-health Continuum-Continued

Response to Risks

Governments vary in their response to environmental risks. Even affluent countries in recession find that immediate economic needs often take precedence over longer term environmental objectives, so that, for example, the employment and economic activity of a polluting industry is more readily viewed as outweighing environmental costs. For poorer countries, struggling to meet the population's basic human needs, the choices are often more stark. In principle, a country's preferred tradeoff of environmental and other goals would normally involve at least some level of environmental regulation; yet in some cases pollution has not been effectively regulated at all.

The environmental degradation now apparent in Eastern Europe and the independent states of the former Soviet Union provide some conspicuous examples of the latter. In some cases, well-known and readily available technologies for abating gross pollutants were forgone by Communist decisionmakers in pursuit of increased production. Despite official claims of environmental concern, the Ceaucescu regime in Rumania in some cases sought to develop industries to produce hazardous chemicals with few safeguards for the environment or workers; some of the chemicals were banned or highly regulated in the West.³ Also, in what is now the Czech and Slovak Federal Republic, poor environmental regulation and enforcement have contributed to high levels of PCBs, lead, and other toxic materials in human tissue; frequent occurrence of respiratory disease in children; and, it is claimed, expected average lifespans that are low by Western standards (but similar to that of other Eastern European states).⁴

Industrial countries may neglect environmental and health concerns in the face of other national priorities. For instance, throughout much of the Cold War, U.S. defense facilities, including the nuclear weapons complex, operated with little environmental regulatory oversight. The result has been massive environmental contamination and potentially serious threats to health and the environment.⁵ And industrial countries can also be shortsighted in evaluating environmental risks: waste disposal regulations that seemed adequate at the time have left the United States with a hazardous waste problem of massive proportions.⁶

³ H. Jeffrey Leonard, *Pollution and the Struggle for the WorldProduct* (New York, NY: Cambridge University Press, 1988), pp. 150-153.

⁴ Bedrich Moldan and Jerald L. Schnoor, "Czechoslovakia: Examining a Critically Ill Environment," *Environmental Science and Technology*, vol. 26, No. 1, January 1992, pp. 14-21.

⁵ U.S. Congress, Office of Technology Assessment, *Complex Cleanup: The Environmental Legacy of Nuclear Weapons Production*, OTA-O-484 (Washington, DC: U.S. Government Printing Office, February 1991).

⁶ U.S. Congress, Office of Technology Assessment, *Superfund Strategy*, OTA-ITE-252 (Washington, DC: U.S. Government Printing Office, April 1985), pp. 5-17.

treat such restrictions is analyzed below, again using an example from the Montreal Protocol. In the future, the members of the Montreal Protocol might decide to ban imports from nonmembers of products made using certain substances that when released deplete the ozone layer. By using this example, OTA does not mean to suggest that a conflict between GATT and the Montreal Protocol is imminent or likely. Indeed, even the feasibility of such a ban is not due to be determined until January 1, 1994 for the first group of chemicals (those in the Protocol's Annex A); and for reasons mentioned earlier in the chapter, the members may decide that such a ban is either unnecessary or not feasible. Also, assuming such a ban did go into effect, the Montreal Protocol with the ban might at that time have enough support to receive a waiver of GATT's requirements, which

requires a majority of GATT's members and two-thirds of those voting.⁴⁷

The Montreal Protocol example is used to represent not a current controversy, but a general type of trade provision and GATT conflict that could be important. The management of important global environmental problems might require control over widely used processes. As discussed in the annex to chapter 2, trade restrictions based on those processes would likely often be prohibited by GATT unless they fit the Article XX exceptions.

While Article XX explicitly permits bans of imports made with prison labor, it does not have a similarly explicit exception based on the environment. Article XX has two paragraphs that might apply to many environmental measures. Paragraph (b) relates to measures 'necessary to protect human,

⁴⁷ GATT Article XXV.

animal or plant life or health,” and paragraph (g) relates to measures for ‘the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.’

At first glance, both of these provisions might seem to apply to the Montreal Protocol’s process ban. Restrictions on imports of products made by using ozone-depleting chemicals could be necessary to stop release of those substances. Use of such substances in any country would deplete the ozone layer as a whole; that in turn would increase ultraviolet radiation exposure, resulting in harm to human health (e.g., increased incidence of skin cancer) and possible damage to animal or plant life as well, as specified in Article XX(b). Also, the ozone layer is a global resource that would be severely compromised by release of these chemicals. Thus, trade measures would conserve an exhaustible natural resource as specified in Article XX(g). Further, the trade measures would be accompanied by domestic restrictions on consumption of ozone-depleting chemicals, as referred to in Article XX(g).⁴⁸

However, Article XX has been interpreted narrowly,⁴⁹ and it is questionable whether these Provisions would be interpreted so as to permit the process-based trade restrictions envisioned in the Montreal Protocol. The recent GATT panel report⁵⁰ in the tuna/dolphin dispute arising from the ban on tuna imports taken pursuant to the U.S. Marine Mammal Protection Act (MMPA) is an example.⁵¹ While this report has not yet been adopted as an

official GATT decision (see ch. 2), it does suggest how panels in future cases might reason. At issue was the U.S. ban on imports of tuna caught on the Eastern Tropical Pacific by foreign fishing fleets found to have incidentally killed more dolphin than permitted under MMPA. The United States argued that this ban was justified under paragraphs (b) and (g) of Article XX in order to protect dolphin. However, the panel stated that those paragraphs cannot be used to justify trade restrictions based on another country’s internal regulations.⁵² Otherwise, the panel wrote:

Each contracting party could unilaterally determine the life or health protection policies [or conservation policies] from which other contracting parties could not deviate without jeopardizing their rights under the General Agreement.⁵³

This reasoning suggests that the process-based trade restrictions envisioned under the Montreal Protocol might not be covered by Articles XX(b) or XX(g), because they, too, would be based on other countries’ internal regulations. However, the panel’s reference to *unilateral* action leaves open the possibility that trade measures under agreements with broad multilateral support (such as the Montreal Protocol or CITES) might be more acceptable.

The panel in the tuna/dolphin case had a second reason for its decision. It stated that paragraph (b) of Article XX applies only to life or health “within the jurisdiction of the importing country,” and paragraph (g) applies only to production or consumption of natural resources “within [the] jurisdiction” of

⁴⁸ It could be argued that the domestic “consumption” to be restricted under Article XX(g) is the destruction of the ozone layer (the exhaustible natural resource) not of the ozone-depleting substances. However, the restriction of domestic consumption of ozone-depleting substances also acts to restrict domestic consumption (destruction) of the ozone layer.

⁴⁹ Pierre Pescatore et al., *Handbook of GATT Dispute Settlement* (Ardsley-on-Hudson, NY: Transnational Juris Publications, 1991). This handbook indexes all dispute resolution panel reports that were adopted by the GATT Council from GATT’s creation through part of 1990. It indexes nine cases as involving or relating to Article XX (see page marked “Index 2/2”). Of these, two cases (Nos. 20, 65) do not appear to contain a ruling on Article XX’s applicability; of the rest, six (Nos. 50, 54, 66, 67, 74, 79) found that Article XX did not apply, and only one (No. 52) found that it did. The case finding that Article XX applied concerned Article XX(d), which does not pertain to environmental matters. Article XX(b) was not ruled on; in two cases (Nos. 50, 66) Article XX(g) was found not to apply. Those two cases are summarized in app. A; they are titled “United States-Prohibition of Imports of Lima” (a 1982 case not to be confused with the tuna/dolphin dispute arising from the U.S. Marine Mammal Protection Act) and “Canada-Measures Affecting Exports of Unprocessed Herring and Salmon,” respectively. Some of these panel reports express the opinion that panels should interpret Article XX narrowly.

One panel report adopted in 1990 is not included in this compilation. In that case, the decision found that Thailand’s restriction of cigarette imports could not be justified under Article XX(b) (see app. A). Also of interest is the panel’s report, not yet considered by the Council for adoption, in the tuna/dolphin case, discussed below. The panel reported that Articles XX(b) and XX(g) did not apply to a U.S. import ban against Mexican tuna.

⁵⁰ “United States—Restrictions On Imports of Tuna,” Report of the Panel, GATT Dec. No. DS21/R, Sept. 3, 1991. The case’s history and status is discussed in the beginning of ch. 2; the panel’s reasoning is discussed in the text below.

⁵¹ Public Law 92-522, as amended, notably by Public Laws 700-711 and 01-627.

⁵² Fishing by a vessel in international waters is governed by the domestic laws of the vessel’s flag country.

⁵³ *Ibid.*, paragraphs 5.27, 5.32.

the importing country.⁵⁴ Since the dolphin to be protected were outside the United States, neither case applied. Arguably, the import ban contemplated under the Montreal Protocol would be judged to pass both of these tests, at least when enforced by a nation below a threatened part of the ozone layer, because life and health in that country could be affected, and ozone depletion could occur in the air space over that country. However, given Article XX's history of narrow interpretation, and the reluctance of GATT panels to change or extend the interpretation of GATT law, it is not clear that a GATT panel would consider paragraphs (b) and (g) to apply.

The panel had yet a third reason for its decision, in the case of paragraph (b). The panel found that the United States' action was not "necessary" as required by paragraph (b) because the United States could have tried other approaches to protecting dolphin, notably negotiating an international agreement to limit dolphin catches.⁵⁵ It is not clear how hard a country would have to try to negotiate an agreement before trade restrictions could be justified as necessary. A developing country might challenge trade restrictions under the Montreal Protocol on the ground that more incentives to join should have been offered, although members of the Protocol could respond that the incentives offered were sufficient to attract many other developing countries. The panel also found that the particular scheme for calculating a foreign country's number of permitted dolphin kills—under which the foreign fleet could not know its limit for a particular year until the year was over—put a particular burden on trade, and that this burdensome scheme was not "necessary" under Article XX(b).⁵⁶ That consideration would not apply to the Montreal Protocol.

Article XX(b)'s necessity requirement had been interpreted before. In a case involving Thailand's restriction of cigarette imports, the panel's report, adopted by the GATT Council, stated that the requirement is satisfied only if "there were no alternative measure consistent with the General

Agreement, or less inconsistent with it, which Thailand could reasonably be expected to employ to achieve its health policy objectives."⁵⁷ While this standard on the surface might seem reasonable, it could be difficult to frame measures that could withstand second-guessing in hindsight about what alternative measures could have worked as well.⁵⁸ In the case of the Montreal Protocol, a nonmember country might for example argue that if a gradual phaseout of domestic consumption of controlled substances is sufficient to meet environmental goals, than imports of products containing controlled substances need not be totally banned at the outset; a phaseout schedule should suffice for them too. Apart from how it has been interpreted to date, the plain meaning of the word "necessary" could be a significant hurdle for measures to be justified under Article XX(b). In the case of the Montreal Protocol, one could argue as described above that certain trade restrictions are needed to prevent use of controlled substances from simply migrating to other countries instead of decreasing. (In general, a case of necessity might be more easily made the closer trade is to being the cause of the environmental problem.)

In sum, it is possible but by no means certain that another panel would distinguish trade measures under the Montreal Protocol as sufficiently different from the tuna/dolphin case to justify a different result. It also bears noting that subsequent panels could decide that the panel in the tuna/dolphin case was mistaken. As mentioned, the panel report in the tuna/dolphin case has not yet been adopted as an official GATT decision (the case's status is discussed in the beginning of ch. 2); even if it is, GATT panels are not strictly bound to follow decisions in previous cases. The tuna/dolphin panel's reasoning has been criticized. According to one analyst, the historical derivation of the text in paragraphs (b) and (g) of Article XX suggests that they were in fact intended to cover import bans based on processes used abroad—for example, bans on matches made using phosphorous and on seals hunted in the water.⁵⁹

⁵⁴ "United States-Restrictions on Imports of Tuna," Report of the Panel, op. cit., paragraphs 26, 31.

⁵⁵ "United States—Restrictions on Imports of Tuna," Report Of the Panel, op. cit., paragraph 54-28.

⁵⁶ Ibid.

⁵⁷ This case is discussed in app. A. The quoted language is from paragraph 75 of the panel's report.

⁵⁸ This "least restrictive means" standard also comes up in ch. 4 in connection with proposed Uruguay Round amendments regarding domestic environmental regulations; the issues are further discussed there.

⁵⁹ Steve Charnovitz, "Exploring the Environmental Exceptions in GATT Article XX," *Journal of World Trade*, vol. 25, No. 5, October 1991, pp. 37, 39, 44-45, 52-53.

However, dispute resolution panels are normally reluctant to extend GATT law by interpretation to accommodate new circumstances, preferring to leave that task to GATT's legislative process. The GATT panel in the tuna/dolphin case voiced this reluctance, noting that GATT's legislative process could:

Address international environmental problems which can only be resolved through measures in conflict with the present rules of the General Agreement.⁶⁰

Given this institutional conservatism and GATT's history of narrowly interpreting Article=, there is significant doubt as to whether process-based trade measures such as those contemplated under the Montreal Protocol would pass muster under GATT if challenged.

In the future, process-based import restrictions could arise in other contexts, such as, for example, greenhouse gas (GHG) emissions-whether applied unilaterally or multilaterally.⁶¹ Since GHG emissions occur with all fossil fuel use, most industrial production, and many activities associated with agriculture and forestry, it is possible that regulation of trade in a wide range of goods and services may eventually be proposed to achieve reduction in GHG emissions. Trade restrictions might arise in other environmental contexts as well. Many environmental issues are now under discussion internationally. As mentioned in chapter 2, the UN Conference on Environment and Development (UNCED) and related discussions may address many different questions, such as transboundary air pollution, forest use and management, pollution of the oceans, biodiversity, and waste management. It is possible that some of these discussions will lead in time to subsequent international agreements that contain trade measures. These measures might be patterned after those in the Montreal Protocol, CITES, or the Basel Convention, or might be of a different type.

How will GATT judge when to permit trade measures for environmental purposes? It seems likely that some trade measures will be deemed to violate some of GATT's specific provisions.⁶² Then, whether a measure violates GATT would depend on whether any of Article XX's exceptions apply. While one cannot say with certainty, it appears likely that Article XX will tend to be interpreted narrowly. This could at times make it harder for nations to achieve environmental goals; certain trade measures necessary or desirable to that end might be hard to maintain in the face of GATT opposition, and GATT concerns might make it harder to adopt such measures. Also, GATT concerns might induce countries framing international environmental agreements to forego trade provisions that would help to enforce the agreements or otherwise make them more effective. Of course, Article XX might be amended to apply broadly in environmental matters. However, it might be difficult to enlarge Article XX's scope without also making it easier for nations to erect protectionist barriers through trade measures that they claim are needed for the environment.⁶³ To satisfy both trade and environment goals, it could be necessary to develop guidelines to help determine when trade measures are appropriate for environmental purposes.

What might those guidelines be? What use should be made of the six factors discussed above in connection with the Montreal Protocol, or the eight somewhat overlapping criteria listed thereafter? Should the amount of trade disruption be somehow weighed against the environmental risk, and if so will a GATT dispute resolution panel be able to perform such a task? Should trade restrictions be permitted based on a country's nonmembership in an agreement (as opposed to a country's actual environ-

⁶⁰ "United States—Restrictions on Imports of Tuna," Report of the Panel, *op. cit.*, paragraph 6.4. Similar sentiments have been voiced before. See "United States—Taxes on Petroleum and Certain Imported Substances," Report of the Panel adopted June 17, 1987, paragraph 5.2.6 (case is discussed in app. A); "EEC—Regulation of Imports of Parts and Components," Report of the Panel, adopted May 16, 1990, L/6657, paragraph 5.28.

⁶¹ The European Community is planning legislation to reduce GHG emissions, though it is not yet contemplating trade measures (See BOX 2-A).

⁶² on likely exception concerns trade restrictions mirrored exactly by domestic regulations, such as a ban on importing products that are prohibited domestically. When such regulations concern only the product's own characteristics, rather than the process by which the product was made, it is likely that the import ban will be considered under GATT to be not a trade measure but an internal regulation, which normally would be permitted as long as it was not discriminatory (see the annex to ch. 2). This situation is discussed further in ch. 4.

⁶³ Some in the trade policy community also are concerned that, if imports may be restricted due to the environmental practices used in their production, it would be hard to prohibit import restrictions based on other characteristics of the production process (such as wages and health benefits paid to workers). These restrictions too could be used as a cover for protectionism. The possible abuse of trade restrictions in the name of environment is discussed further in chs. 4 and 5.

mental conduct)?⁶⁴ For a trade measure to be “necessary” under Article XX(b), how hard must a country first try to negotiate an environmental agreement that would make trade measures unnecessary? While there is sometimes early warning about environmental problems, it can take many years before international consensus develops that a problem merits action. Sometimes a threat of trade measures might be needed to prompt timely action. How would a GATT panel decide whether that were so in a given case? Questions such as these have prompted the trade and environment policy communities to ask whether GATT should be amended to provide clearer guidance, and whether GATT’s institutional structure will be adequate for making the kinds of judgments that may be needed. These questions are discussed in chapter 5.

ENVIRONMENT/TRADE AND DEVELOPING COUNTRIES: THE NORTH-SOUTH DEBATE⁶⁵

The industrialized countries are the major contributors to many environmental problems, such as stratospheric ozone depletion, and (despite their often extensive environmental protection efforts) have major domestic environmental problems. (See discussion earlier in this chapter and box 3-A.) Moreover, per capita pollution and resource use is generally much higher in developed countries than in developing countries. For several reasons, however, the countries of the North, along with growing numbers of developing country citizens, are seeking stricter environmental regulation by governments in the South. Unless developing countries participate, some global environmental problems (such as ozone depletion or greenhouse gas emissions) will be very difficult to remedy. For example, efforts to protect the ozone layer would be jeopardized if developing countries were to deploy CFC-containing refrigerators in their efforts to enhance living standards. In

other cases, the South’s own development efforts can have global impacts—such as the biodiversity loss that can accompany the destruction of tropical forests or reefs. Developed countries also worry about competitive impacts of lax environmental standards in developing countries.

Many developing country governments see the North’s environmental concerns as self-serving or paternalistic and even a potential assault on sovereignty. From their perspective, the North, which has prospered from a development path that has involved extensive environmental degradation, is asking the South to divert resources needed for development to environmental protection. Instead, many developing countries, in the preparatory meetings for UNCED, have sought for the developed countries to pick up most or even all of the added costs for environmental protection, and for the creation of a new “green fund” not administered through current multilateral assistance agencies. The South also has called for a “supportive international economic environment” to promote developing country growth and development through such means as market access, terms of trade, and transfer of technology on preferential and noncommercial terms.⁶⁶

There has been general agreement that developing countries need financial help to achieve sustainable development. But there is deep division about specific levels and mechanisms. The developed countries vary in their willingness to pick up the costs, or to add to the current preferences given to developing countries. However, the United States and most other countries of the North generally envision gradual or modest increases in assistance, using current bilateral and multilateral funding mechanisms. (See box 3-B.) These sensitivities and issues, much in evidence at UNCED preparatory meetings, form part of the context of North-South environment/trade questions.

⁶⁴ Discrimination against nonmembers could adversely affect the United States. The United States could face restrictions on exports of recyclable hazardous waste because of its delay in ratifying the Basel Convention. “Talks Aimed at Continuing U.S. Hazardous Waste Exports Stall, But Hope Remains,” *Inside EPA*, Jan. 17, 1992, p. 14; “International Business Group Urges Congress To Act on Waste Export Treaty,” *Inside EPA*, Jan. 24, 1992, p. 15.

⁶⁵ The terms “North” and “South” are commonly used shorthand for developed and developing countries. Use of the terms is not intended to imply that countries’ wealth or state of development follows geographic lines; neither is it meant to imply that developed and developing countries form monolithic camps.

⁶⁶ For example, at a preparatory meeting for UNCED in 1991, China and the Group of 77 (a loosely organized group that includes most developing countries) proposed a negotiating text calling for an environmental fund to cover the “full incremental costs” of environmental measures without reallocation of developing country resources and “new and additional funding” rather than use of existing bilateral or multilateral development assistance. (As cited in UN General Assembly, Preparatory Committee for the United Nations Conference on Environment and Development Third Session, Geneva, Aug. 12–Sept. 4, 1991, Aug. 28, 1991, China and Ghana draft decisions: Financial Resources. A/Conf.151/PC/L.41.)

**Box 3-B—Financing Sustainable Development and Environmental Measures
in Developing Countries**

No one really knows how much it will cost to address the environmental needs of the developing world. The Secretariat for the UN Conference on Environment and Development (UNCED), in estimating total costs for implementing the Conference's multifaceted agenda, estimated that about \$15 billion (possibly more if conventions on climate change or biodiversity are adopted) would be needed for global environmental issues (defined to include only ozone depletion, climate change, biodiversity and oceans). Another \$750 million per year could be needed to strengthen the capacities of international institutions. These figures pale against the Secretariat's overall estimate of the resources needed to implement UNCED's agenda: between \$500 billion and \$625 billion a year through the end of the century. Most of this appears to be for accelerated and sustainable development in developing countries.

The aggregate estimate is rough, and may be much overstated. The UNCED Secretariat, in releasing the estimate, cautioned that there could be substantial overlap among categories. For example, a major effort to achieve UNCED's agenda item for sustainable livelihoods might require infrastructure investments also counted in other agenda items (such as for human settlements, health, energy, reforestation, water systems and sanitation and education). Some part of these investments (reforestation, for example) might be considered environmental.

The lion's share of the total costs would be borne by the private sector or developing country governments as part of their development plans. However, the Secretariat estimated that \$125 billion per year in donor country aid and concessional financing could be needed to catalyze developing country activities. This would be a substantial increase over current levels of development assistance.

Official development assistance (ODA) for *all* purposes by countries that are members of the Organisation for Economic Co-operation and Development averages around \$50 billion per year. This amounts to about 0.35 percent of those nations' combined gross national product (GNP). An increase to 1 percent of GNP would produce \$150 billion per year, according to the UNCED Secretariat, which notes that industrialized nation defense expenditures (in some countries amounting to 5 or 6 percent of GNP) are decreasing.¹ An increase to 1 percent would fall most heavily on the United States, which spends roughly 0.20 percent of GNP on ODA. (Among OECD countries, the United States ranks 13th in per capita aid; in absolute terms, Japan and the United States are the largest donors.)

Current Levels of Environmental Assistance

The amount of current assistance provided to developing countries for environmental projects is only a small part of total development assistance. However, bilateral and multilateral development assistance programs increasingly have environmental criteria and requirements—mostly to reduce the environmental impacts of development within the country receiving the aid.²

Developed countries now provide some assistance to help developing countries deal with global environmental problems through the Global Environment Facility (GEF).³ Set up in 1990, GEF is a 3-year pilot program administered by the World Bank, the United Nations Environment program (UNEP) and the United Nations Development Program (UNDP). Through two closely coordinated funds—the Montreal Protocol Interim Multilateral Fund and the Global Environmental Trust Fund (GETF)—a total of \$1.3 billion in technical assistance, transfer of technologies and financial support will be provided to developing countries for qualified projects.

The Montreal Protocol fund is intended to help developing countries with low per capita emissions of ozone-depleting substances phase out or avoid use of these materials. It now has \$200 million for grants to such countries, with projects implemented by UNEP, the World Bank, and UNDP.

¹ Report of the Secretary General of the Conference, "Financial Resources and Mechanisms," Preparatory Committee for the United Nations Conference on Environment and Development Fourth Sessions, New York, NY, March 2 to April 3, 1992, Plenary Session, A/Conf.151/PC/101 United Nations General Assembly.

² As cited in *Financing New International Environmental Commitments*, Report prepared for the Committee on Foreign Affairs Of the U.S. House of Representatives and the Committee on Foreign Relations of the U.S. Senate by the Congressional Research Service, Joint Committee Print (Washington DC: U.S. Government Printing Office, 1992).

³ GEF information is from the UN Development Program, the UN Environment Program and the World Bank, *Global Environment Facility*, Report of the Chairman to the December 1991 Participant's Meeting, Part I: Main Report, November 1991, and "Global Environmental Facility" (brochure, n.d., n.p.); and GEF Administrator's Office, "Future Evolution of the Global Environmental Facility: Issues and Options," first draft dated Jan. 24, 1992.

***Box 3-B—Financing Sustainable Development and Environmental Measures
in Developing Countries-Continued***

GETF is the larger activity, with \$1.1 billion committed to help developing countries participate in solutions to global environmental problems. Projects will fall in four areas: global warming, protecting international waters, preserving biological diversity, and ozone depletion. GETF can be used to help Eastern European and other needy countries that do not meet the per capita emissions requirement of the Montreal Protocol Interim Fund to phase out their use of ozone-depleting substances. By the end of 1991, 24 countries had contributed \$800 million to a core fund. (This included contributions from several developing countries totaling \$100 million.) In addition, five countries had agreed to cofinance about \$250 million of support for related projects.

The Bush Administration, during climate change negotiations in February 1992, announced that it would commit \$75 million in new funds for developing world environmental assistance. A total of \$50 million of this would be for GEF; the remainder would be for bilateral aid for greenhouse gas inventories in the developing countries.

The decision to make a direct contribution to GEF was a change in policy by the Administration, which previously had only committed to what it called "parallel financing." This entailed counting of relevant environmental projects funded by U.S. Agency for International Development (AID) as the U.S. contribution. It plans \$150 million of AID projects for such parallel financing during the 3-year GEF pilot project. Although they do not administer the U.S. projects, GEF administrators have agreed to include U.S. "parallel financing" in its estimate of country contributions to the funds.

In addition to AID, several Federal agencies that are primarily domestic in focus, such as the Environmental Protection Agency (EPA), the U.S. Forest Service, and the U.S. Fish and Wildlife Service, provide technical assistance to developing countries for environmental purposes, generally on a reimbursable basis.

The Administration has identified some special initiatives with environmental components. As has been mentioned, President Bush's Enterprise for the America's Initiative, which aims to promote Latin American economic growth through trade liberalization, investment, and debt reduction, has an environmental component. Other activities include environmental assistance to Eastern Europe and the U.S.-Asia Environmental Partnership, launched in early 1992. Several agencies are also cooperating in an a public/private Environmental Training Institute, to provide training to developing country officials and executives about environmental issues and technologies.

The Administration's proposed fiscal year 1993 budget also calls for a near doubling of funds for the U.S.-Mexican border environmental plan (from \$103 to \$203 million). These funds are not development assistance, as they will address environmental problems that affect both Mexico and the United States; Mexico plans to commit \$460 million to border area environmental problems over a 3-year period. (U.S.-Mexico environmental issues are discussed in ch. 2.)

Countries vary considerably in their ability and willingness to adopt domestic measures to protect the environment, and in the commitment they give to specific environmental priorities. Even the highly developed and generally affluent countries of OECD vary quite a bit in the priority they give to the environment. Some newly industrialized countries, while possessing the financial resources, have been short on political commitment and perhaps also technical know-how for environmental protection, although there are exceptions (Singapore, for example, has strong environmental policies). The countries of Eastern Europe and the Commonwealth of Independent States may recognize the severity of

their environmental problems, but have few resources to address them.

The developing countries that comprise most of the rest of the world generally have limited means to deal with their serious environmental problems; they also vary in their interest and commitment. Many developing country governments believe the health and well-being of their citizens will be better served by an intense drive for economic development than by efforts to protect the environment. To these governments, the environment/development issue may still seem to be an either/or choice rather than

an effort to achieve complementary goals.⁶⁷ Some elements of government and society in many developing countries are aware that long-term economic prosperity will require improved management of environmental resources. The question is whether and how soon their views will be translated into effective policies and priorities.

Increased official aid is not the only mechanism for encouraging other countries to give more emphasis to environmental policy: several other options exist, some of which involve trade and trade measures. Some of the options that would be more palatable politically to developing countries would be less desirable from the viewpoint of developed countries, and vice versa.

As has been mentioned, trade measures are sometimes used to induce countries to change their behavior. The way in which trade measures are crafted could have important implications for their effectiveness. Such measures may be more acceptable when they are part of an international agreement. The Montreal Protocol, with its special provisions for financial assistance and support for technology transfer, is one model for encouraging developing country participation. Of course, trade measures taken under a multilateral agreement do not always have wide support; multilateral agreements can have few or many members.

In the absence of an international agreement, unilateral measures may seem justified in some cases. However, such measures are more likely to spark resentment, and might more easily run afoul of GATT, than an international agreement. (In the tuna/dolphin case, many nations made submissions criticizing the United States' unilateral trade measures).⁶⁸

Innovative financing possibilities involving the trading system have also been proposed. For example, as a step toward internalization of environmental costs, countries might agree to a system of export levies (or import levies on products from noncomplying countries) on commodities like timber. The revenues raised might then be paid into a

developing world environmental fund, or used by the developing world exporters for application of improved forest management practices or other environmentally preferable activities.

Another possibility would be to make achievement of environmental objectives a goal in bilateral or multilateral trade negotiations. As discussed in chapter 2, some contend that U.S.-Mexico environmental questions will not get the attention they deserve unless they are addressed in NAFTA itself, rather than in a track parallel to the main discussions. More generally, several bills or resolutions introduced in the 102d Congress propose to add environmental concerns to U.S. negotiating objectives in future trade discussions (see app. B). One purpose of these bills is to assure that U.S. environmental standards are not weakened in the negotiations process. (Some of the bills would also include labor standards in U.S. negotiating objectives.)

Through the give and take of trade negotiations, the developed countries of the North also could increase market access for the South's products, which would enable the South to pay for more environmental protection. As discussed earlier in this chapter, it might be possible to remove certain North-South trade barriers (such as barriers to agricultural products) in ways that might benefit the South economically and also contribute to environmental objectives if undertaken in an appropriate fashion. These measures might also benefit consumers in developed countries through lower product prices.

However, removal of specific barriers would adversely affect some U.S. industries, workers, and communities. Over the years, several types of worker or community adjustment programs have been created or proposed to deal with such adjustment problems.⁶⁹ Such programs can help. However, U.S. adjustment programs, as currently structured, are neither funded at adequate levels nor operated efficiently enough to have full effect. This is in contrast to the extensive adjustment assistance that is often available to workers in Europe or Japan when displacement occurs. Moreover, in many

⁶⁷ *Financing New International Environmental Commitments*, Report prepared for the Committee on Foreign Affairs of the U.S. House Of Representatives and the Committee of Foreign Relations of the U.S. Senate by the Congressional Research Service, Joint Committee Print (Washington, DC: U.S. Government Printing Office, 1992).

⁶⁸ "United States—Restrictions on Imports of Tuna," Report of the Panel, *op.cit.*, section 4.

⁶⁹ For a discussion of adjustment programs to respond to defense spending cutbacks, see U.S. Congress, Office of Technology Assessment, *After the Cold War: Living With Lower Defense Spending*, OTA-ITE-524 (Washington DC: U.S. Government Printing Office, February 1992).

communities, workers may have a difficult time finding new jobs of comparable quality to their lost jobs. Thus, in the absence of economic development or other public and private efforts that lead to new jobs, adjustment measures alone can be little more than a palliative. Adjustment policy in the 1990s will have to take into account the changing competitive position of the U.S. economy.⁷⁰

Even if liberalized trade and investment produce more resources that could be used for environmental protection,⁷¹ developing countries could still need financial and technical assistance and support for technology transfer in order to effectively implement environmental measures. Putting effective environmental programs in place is not a simple matter. Even governments that are committed to environmental protection may lack the requisite technical know-how, trained personnel, and administrative structures.

It seems unlikely that developed countries will double or triple their total official aid to the level said to be needed to catalyze full implementation of UNCED's agenda (see box 3-B). But, the alternative of inaction and continued environmental degradation—will also have costs. Environmental problems, if left unchecked, could in time require enormous expenditures. As developing countries grow in population and try to climb the economic ladder, poor environmental choices could not only produce relatively more impacts on the global environment but also undermine efforts to improve their standard of living. Thus, it is likely to be ever more imperative that environmental degradation in developing countries be greatly reduced.

While there is agreement in principle on the need for transfer of environmentally sound technology on

mutually agreed terms, substantial differences exist on how the terms should be defined. The North prefers technology transfer on commercial terms, although perhaps supported in part through financial assistance. The developing countries hold that the transfer of technology should be on a preferential and concessional basis. This debate has proceeded at a high level of generality, with limited consideration of specific technology availability.⁷² In some cases, technology already in use in developed countries could be readily employed in developing countries. Often, these technologies are nonproprietary.

Mechanisms for transfer will need to involve not only governments, but the private sectors of the respective countries, with opportunities for transfer occurring not just from but in some cases to developed countries. The potential for technology transfer and technology cooperation suggests that assistance is not always just an expense for a developed country; it can be an investment in developing future markets for environmental and other goods and services. Several countries with well-established environmental industries, including Germany and Japan, seem to view their foreign assistance in this way. U.S. industry is highly competitive in many sectors of the environment industry. In addition to official development assistance, several U.S. Government programs exist to facilitate commerce between U.S. firms and developing and newly industrialized countries. U.S. companies may be missing commercially attractive opportunities due to lack of information about such programs. Chapter 2 discusses some of these programs briefly, while the current and prospective market for environmental technologies and services is discussed in Appendix D.⁷³

⁷⁰ For discussion of this changing position, see U.S. Congress, Office of Technology Assessment, *Competing Economies: America, Europe, and the Pacific Rim*, OTA-ITE-498 (Washington, DC: U.S. Government Printing Office, October 1991).

⁷¹ With three-fourths of the world population, developing countries account for only one-fifth to one-fourth of all direct foreign investment. Fifteen developing countries attracted 75 percent of this investment. The World Bank, *World Development Report 1991* (New York, NY: Oxford University Press, 1991), p. 96.

⁷² Technology transfer issues are discussed in Report of the Secretary General Of the Conference, "Transfer of Environmentally Sound Technology" (Section IV, Chapter 2 of Agenda 21), A/CONF.151/PC/100/add.9, Fourth Session, Preparatory Committee for the United Nations Conference on Environment and Development, March 2 to April 3, 1992.

⁷³ Subsequent reports in this assessment will discuss technology transfer to developing countries and the possible role of U.S. industry in providing environmental goods and services.