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The Design of Supranational Organizations for the Provision of International Public Goods: Global Environmental Protection

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Abstract

An international environmental organization would need to be loosely structured initially with a focus on a narrow range of environmental issues. It also would need to emphasize consensus and limit the scope of its interventions to avoid defections by important participants. The benefits of such an organization include the potential for achieving more nearly optimal levels of environmental protection, cost savings from reduction of duplication and managerial economies of scale, and the strengthening of environmental interests in negotiations on the coordination of the environmental regime with other international regimes such as those focusing on trade or development.

Public goods are characterized by some degree of nonrivalry in consumption as well as difficulty in excluding noncontributors from consuming the good. These characteristics mean that private agents interacting in competitive markets will generate less than optimal amounts of such goods. In national contexts, governments may supply certain public goods, although some, such as television broadcasts, also may be supplied by the private sector. In an international setting, the provision of public goods is problematic because there is no international authority to play the role that governments have in national settings. Kindleberger notes that the primary international public good is peace, something that, historically, has been severely undersupplied.

Sovereign nation-states face a wide array of international issues where cooperation is needed to attain the best possible outcome. Two problems are inherent in this process. First, it is often difficult to identify and articulate national consensus on these issues. Second, even if national political systems generate a consen-

sus position, policymakers and politicians may understand that they could gain by misrepresenting or hiding national preferences or otherwise behaving in an uncooperative manner in their dealings with the broader international community. The purpose of this article is to explore some of the issues associated with the creation and design of organizations to overcome these difficulties.

The specific international public good that is the focus of this article is global environmental protection. One aspect of this issue that has generated an extensive literature is the potential for conflict between environmental protection and international trade liberalization (Esty; Runge, 1994; Johnson and Beaulieu; Anderson and Blackhurst; Zaelke et al.). The relationship between trade and the environment was first identified as an important issue in the 1970s (Baumol; d'Arge and Kneese). Renewed interest in this question has been stimulated by recent and anticipated trade negotiations. Many of the demonstrators at the World Trade Organization (WTO) planning meeting in Seattle in December 1999 believe that trade liberalization and environmental protection are incompatible. The apparent conflict between the international public goods of an open trading system and global environmental protection has led to wide-ranging proposals for organizational and institutional reform. For some, international trade (and everything else) should be completely subordinated to environmental rules (Krause et al.; Krause; Paden). Others call for changes in the WTO that take account of environmental problems in the pursuit of free trade (McGeorge). A different approach is to further develop international environmental institutions and organizations to ensure cooperation on environmental issues, leaving trade and other international questions to existing structures. For example, Esty has called for the establishment of a "global environmental organization" to defend environmental principles in the same way that the WTO defends principles of liberal trade (see also the lead editorial in *The Economist*, October 9, 1999). It is this idea that is the focus of this article.

The discussion is organized as follows: In the first section the public goods problem in an international context is described. In the second section the literature on the economics of international organizations is reviewed and used to develop a conceptual framework for the design of supranational institutions. This framework is used to analyze proposals to create an international environmental organization in the third section.

The Problem of Public Goods

The public goods problem can be represented by the familiar prisoners' dilemma from game theory (see Sandler). The prisoners are unable to establish an enforceable contract, so they end up following the dominant strategy of defecting from the cooperative solution. As a result, they are collectively worse off than they would have been had they been able to reach the cooperative outcome. In the case of public goods, defection is referred to as free-riding. If large numbers of individuals choose to free-ride, the public good will not be provided at all despite the fact that most of these same individuals actually would prefer to have it. Governments, the classic enforcers of contracts, can offer a way out of this dilemma by forcing everyone to contribute to the provision of the public good. Of course, those who truly would prefer not to see the public good sup-

plied may end up as "unwilling" riders (Schmid). The incentives to defect are generated by the two characteristics of public goods noted earlier, jointness or nonrivalry and difficult excludability. A pure public good, such as national defense or world peace, has both characteristics. A pure private good has neither. Between these two extremes is found a wide variety of impure public goods such as cable television broadcasts that are nonrival but from which viewers who have not paid for their subscription can be excluded or open-access common-pool resources, such as fisheries, which are rival but from which it is difficult to exclude individual users.

Legal systems are pure public goods. This is true within a country and applies equally to international law. Runge (1990) has shown that efforts to liberalize international trade constitute an international public good that is likely to be plagued by free-rider problems. For many national governments, the best arrangement would be to protect politically powerful national industries while the governments of all other countries remain committed to free trade. Protectionism, according to this account, is a form of free-riding. The same kind of reasoning would apply to institutions to regulate such environmental problems as global warming. If all other countries reduce their emissions of greenhouse gases, a free-rider would be able to realize the benefits of reduced global warming without experiencing the costs of changing its use of fossil fuels. For international public goods, provision in optimal amounts is problematic because of the lack of international authority to backup any agreements reached. International organizations are often imperfect substitutes for governments that have legislative, policing, and enforcement powers.

One approach to the study of international public goods is based on the concept of international regimes (Keohane; Young, 1989, 1993). According to Young (1993), "regimes are social practices based on constellations of rights and rules that govern interactions among the occupants of recognizable roles defined with reference to more or less distinct issue areas" (p. 245). International regimes may include some kind of international organization charged with various functions related to the operation of the regime (Young, 1993). Thus the international trade regime would have the WTO at its center but also would include regional trade agreements, public and private associations involved in trade (chambers of commerce, the United Nations Conference on Trade and Development, the Organization for Economic Cooperation and Development), and all relevant commercial law whether administered by national, regional, or international organizations. The international environmental regime lacks a centralized equivalent to the WTO but includes a large number of organizations, treaties, and other institutions aimed at resolving environmental conflicts and protecting environmental resources. In 1993, the United Nations Environmental Program (UNEP) listed 171 international environmental agreements, most of which had secretariats or other types of organizational structures. Both the trade and the environmental regimes can be thought of as institutional structures designed to solve particular international public goods problems in the absence of a world government. The existence of complex international regimes does not ensure that the world community will be able to achieve desirable levels of cooperation. The incentives for individuals and governments to free-ride are great, and it is often difficult to detect and punish such behavior.

The Design of Supranational Institutions

Two issues must be addressed in considering the design of supranational organizations and regimes aimed at overcoming these problems in the provision of international public goods. The first is the feasibility of creating such structures, and the second is the optimal form of the institutional arrangement. The first issue can be characterized as a two-level game (Putnam). The first level of the game takes place in domestic political settings where various interests vie for influence on the shape of the set of possible international agreements (the win set). The second level involves international negotiation to discover the institutional arrangement that lies in the intersection of all the national win sets. The feasibility issue arises because it may be impossible for national political leaders to articulate a level-one consensus or because national win sets do not intersect.

The feasibility of establishing an international organization thus is strongly influenced by domestic considerations and perceived possibilities for beneficial initiatives at the international level. Cauley et al. suggest that the likelihood of forming nonmarket structures to handle the public goods problem depends on the number of participants, the kinds of expectations ("conjectures") participants have regarding the behavior of the others, and the anticipated costs of creating the organizations. The greater the number of participants, the greater is the difficulty of controlling free-riding. Expectations about the behavior of the other participants reflect strategic considerations. Cauley et al. show that when participants expect free-riding, they probably will be unable to solve the public goods problem. If participants can be assured that others are cooperating, very different expectations may arise. Runge (1992) has argued that the problem of public goods provision is often better represented as an assurance problem than as a prisoners' dilemma (see also Sandler). Institutions for providing assurance that cooperative behavior is the norm increase the likelihood of discovering cooperative solutions to the public goods problem. Finally, high anticipated costs can prevent agreement.

If a supranational organization appears to be feasible, the second issue is the form of such an organization. For Sandler and Cauley and Cauley et al., form is represented by the degree of integration (tightness) of the participants in the agreement. The degree of integration ranges from none (noncooperative Nash equilibria) to complete cooperation or collusion. In general, both the costs and benefits of the organizational structure, relative to the noncooperative situation, increase with the degree of integration. For any feasible arrangement, the benefits have to be greater than the costs (Frattiani and Pattison). In the case of international public goods, benefits may include provision of the public goods if, in the absence of cooperation, the public good would not be provided at all due to the expected free-riding. Otherwise, the benefits of cooperation would be reflected in the more nearly optimal level of provision of the public good compared with the noncooperative situation.

Sandler and Cauley suggest that the optimal form of organizational arrangement is found by maximizing the difference between benefits and costs. The costs related to provision of international public goods through supranational structures include decision-making costs, information and communication costs, enforcement and policing costs, and interdependency costs (Sandler and Cauley; Cauley et al.). Decision-making costs arise from the need to reach agreement on

the form and functioning of the organization. In particular, the kind of decision rule (simple majority, supermajority, unanimity) adopted can lead to greater or lesser costs of negotiation and bargaining. Clearly, a decision rule based on unanimity would require more time and effort in reaching agreement than a simple majority vote. One of the reasons the Uruguay Round of trade negotiations took such a long time to complete (1986–1994) is the requirement that agreements be approved unanimously.

Information and communication are needed to make decisions and to operate the institutions. In addition, mechanisms to police and enforce the agreement must be established to provide participants with the assurance that others are complying with the decisions taken. Finally, in international settings, there may be political costs associated with loss of national sovereignty as the international organizations assume control of some of the functions previously carried out by national governments. All these costs rise with the degree of integration, the intrusiveness of the decision rule chosen, and the number of participants. It has been argued that the Law of the Sea agreement was so tightly structured that it was bound to provoke opposition from countries such as the United States, where the political costs of the agreement simply appeared to be too high (Sebenius).

In addition to the benefits of international public goods that would not be supplied in the absence of international cooperation, international organizations may generate other benefits for participants. Efficiency gains due to scale economies in the provision of the public good, the greater amount of information made available through the supranational structures, and increased political prestige for those who participate in the agreement are examples. As with costs, these benefits increase with the number of participants and the degree of integration. For international public goods such as environmental protection, it may be the case that only a very inclusive agreement involving many nations will be able to generate substantial benefits. In this context, the role of hegemonic powers can be very important. Active leadership by the United States, the European Union, and Japan generally ensures that multilateral trade negotiations eventually will bear fruit. On the other hand, U.S. opposition to the Law of the Sea agreement has significantly reduced its effectiveness (Sebenius). The degree of integration reflects the ability of the international arrangement to force compliance, so the greater the level of integration, the more likely it is that free-riding will be controlled.

Sandler and Cauley refer to the degree of integration as “tightness” and argue that the marginal benefits of supranational organizational structures diminish as tightness increases, whereas marginal costs increase with tightness (see also Sandler, pp. 144–164). These properties ensure that the difference between benefits and costs is maximized where marginal benefits equal marginal costs. In the case of international public goods, diminishing marginal benefits and increasing marginal costs seem intuitively reasonable. For example, the benefits provided by NATO may increase as additional countries join, but the addition to the benefits provided by adding Hungary to an alliance that includes the United States, the United Kingdom, Germany, and France may be small. In contrast, marginal organizational costs can be expected to increase as the institutions become more comprehensive and complex.

One problem with this type of representation is that there may be thresholds beyond which the public good will be supplied but below which it will not. This

problem can be handled by assessing the feasibility of providing the public good before attempting to derive the optimal organizational structure (see Sandler and Cauley). Many of the conceptual models used to evaluate the likelihood of forming supranational organizations are based on simple situations involving only two countries. When they are extended to the case of many countries, additional layers of complexity arise. For example, Cauley et al. show that there are fixed costs of forming nonmarket linkages between each participant in the agreement and argue that the benefits of each linkage have to be greater than these fixed costs for that linkage to be viable. If organizational effectiveness depends on a large number of linkages, the fixed costs could preclude agreement.

In summary, decisions to establish supranational organizations must take account of the kinds of benefits and costs associated with such arrangements as compared with the noncooperative equilibrium. A necessary condition for the viability of such structures is that the benefits be greater than the costs. However, this condition is far from sufficient. International agreements require commitments from sovereign nation-states that may have very different objectives. In addition, the nature of the benefits and costs varies with the institutional arrangements under consideration. The critical factors in designing such organizations include the degree of integration, the number of participants, and the type of decision rule adopted. In the next section the conceptual framework outlined above is used to consider the feasibility and design of an international environmental organization (IEO).

Designing an International Environmental Organization

The question posed in this part of the article is whether an IEO as described in several proposals (Esty; Runge, 1994) could be designed to defend environmental principles in the way that the WTO defends liberal trade principles. In analyzing the advantages and disadvantages of an IEO, it is first necessary to define the alternative that forms the basis for comparison. The current environmental regime is characterized by moderate cooperation and numerous decentralized organizations charged with handling widely differing environmental issues. Esty characterizes the current situation as a prisoners' dilemma that generates significant free-riding resulting in less than optimal amounts of global environmental protection (see also Hoel). In contrast, Carraro and Siniscalco argue that stable, beneficial arrangements on environmental protection can arise spontaneously despite the apparent noncooperative structure of these interdependencies. If true, this would mean that only limited supranational structures would be needed to protect the environment because nations will see that it is in their interests to voluntarily contribute to the provision of the public good. This conclusion does not seem tenable, however, given that significant environmental degradation is occurring. For example, overfishing has become such a problem that several Canadian and New England fisheries have almost been destroyed (Economist Survey, May 23, 1998, p. 8). Most of the evidence would seem to suggest that the alternative to further efforts to institute international cooperation would be a Nash equilibrium in which significant environmental destruction would continue to occur, although some environmental protection would end up being supplied through specific agreements and limited amounts of unilateral efforts.

Some authors favor restructuring the WTO as an approach to global environmental protection (McGeorge). Others point to the environmental side agreement to NAFTA as a possible model for reconciling trade and environmental issues (Runge, 1994; Johnson and Beaulieu). Bhagwati has noted that environmental questions will be prominent in future multilateral trade negotiations in the context of the WTO and the same will be true for regional trade talks. This does not mean, however, that attempting to use the trade regime as a vehicle for solving global environmental problems is a good idea. Anderson (1992) and Runge (1992) have shown that using trade policies to achieve environmental objectives is likely to be ineffective in controlling free-riding and could seriously undermine the primary purpose of the WTO, which is to promote principles of liberal trade. On the other hand, in an extensive exercise in second-best analysis, Rauscher shows that there may be cases where trade barriers are appropriate for environmental protection if first-best environmental policies are unattainable. For the purposes of the following discussion, strategies to resolve global environmental issues through modification of international trade institutions will not be considered.

A stylized image of an IEO can be developed from Esty's discussion. He argues that an "overarching" environmental organization is needed because the current global environmental regime is allowing substantial irreversible environmental damage to occur. Economists favor the institution of such mechanisms as tradable pollution permits, pollution fees, and other "market-oriented mechanisms" to control pollution in national settings (see Bojö et al., pp. 92-111). Esty embraces such initiatives as fees, permits, and other types of property rights regulation at the international level but notes that some form of global authority will be needed if they are to be made effective (p. 79). He recommends an organizational structure that would defend a relatively small set of environmental principles such as a principle that the agents responsible for negative environmental externalities should bear the costs of their actions (the "polluter pays" principle) or the principle that pollution prevention is to be preferred to pollution treatment. The "global environmental organization" he proposes would pull together the current decentralized system of treaties and agreements and such organizations as the United Nations Environmental Program (UNEP) or the United Nations Commission on Sustainable Development (CSD), both of which Esty considers to be too narrowly focused (pp. 90-91).

In defining this organization, Esty relies heavily on analogies with the WTO and other international organizations. He notes that the International Labor Office (ILO) is an interesting model in that it involves private-sector business and labor organizations as well as governments (p. 95). WTO voting rules that emphasize consensus but tend to allow substantial scope for hegemonic leadership are offered as a useful model for an international environmental organization (p. 95). Esty argues that this organization could serve as a forum for discussion of environmental issues, encourage countries to harmonize their environmental legislation, serve as a clearinghouse for data and information on environmental questions, monitor agreements, and administer a fund aimed at resolving global environmental problems. There is little discussion in Esty's proposal of enforcement of negotiated environmental conventions. He does note that the idea of levying carbon taxes and other intrusive measures probably would encounter resistance from sovereign nations and suggests that a way around this is to use funds

contributed by member states to subsidize efforts to implement sound environmental regulations (p. 84). Finally, he suggests that such an organization probably would need to concentrate initially on the most pressing problems, with the expectation that the scope of the organization would expand over time (p. 81).

The first question raised by this proposal is whether such an organization would be feasible in the sense that its aggregate benefits would be greater than the aggregate costs at the same time that the benefits to individual nations would be seen as greater than the costs they would incur in participating in the organization. Note that the requirement that the net benefits for each individual nation have to be positive is ambiguous. As pointed out by an anonymous reviewer, it is often the case that the politically powerful determine whether to participate in international agreements, particularly in nondemocratic regimes. If these individuals perceive that they will not benefit from an agreement, they may refuse to participate even if net national benefits are positive. The aggregate benefits of an international environmental organization would be any increases in environmental protection beyond what can be attained under current arrangements. Costs would include direct administrative and operating costs as well as costs associated with procuring and distributing information, enforcement, policing, and loss of autonomy. Information concerning the effects of various practices on the environment, the costs of alternative solutions to environmental problems, and a host of other questions would be needed and could be costly. Some of this information is already being collected, so the increase in cost over the current situation may not be great.

The most visible costs of an IEO would be the direct administrative costs. Scott suggests that cooperative agreements are costly to administer primarily because of different beliefs about the distribution of benefits and costs among the participants and different sets of information on which to base judgments. Ensuring that all participants have access to the information they need to make informed decisions on rules and the functioning of the organization could be costly given the uncertainty associated with many global environmental problems. For example, economic studies have produced widely varying estimates of the costs and benefits of alternative strategies for preventing global warming (Schmalensee; Weyant). Many feel that lack of scientific understanding and uncertainty concerning both physical and economic impacts of greenhouse gas emissions mean that it would be premature to undertake draconian measures to reduce them (Nordhaus; Poterba). Deciding which of the competing sets of information should be taken as the basis for discussion could be controversial, and this adds to organizational costs because of the time and effort required to reach agreement.

To get some sense of the size of potential costs and benefits, it is informative to refer to figures first suggested in the context of the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992. This conference addressed wide-ranging development issues as well as questions on the global environment. Two international environmental treaties (global climate change and biodiversity) were opened for signature at the Rio Summit, and two other documents, the Declaration of Rio de Janeiro and AGENDA 21, were adopted after a great deal of preparatory work (Robinson). Estimates presented at the Rio Summit indicated that about \$540 billion dollars per year would be required to accomplish the AGENDA 21 program, with \$125 billion per year to be

supplied by high-income countries as development assistance and the rest coming from the private sector and developing countries themselves (Sitarz, p. 310). Of the \$125 billion in concessional assistance, about \$15 billion would be devoted to global environmental issues, with the rest targeted at sustainable development programs in developing countries (Robinson). It is also estimated that \$750 million would be needed to "strengthen international institutions" (Robinson, p. 678). The budget for UNEP is about \$30 million per year, and the Global Environmental Facility (GEF), established to assist developing countries with environmental projects, operates a fund of about \$2 billion (Esty, p. 87). For comparison, total world GDP in 1997 was about \$30 trillion, U.S. GDP was \$7.7 trillion, and the total value of world trade was \$5.4 trillion (World Bank). On the other hand, official development assistance from OECD countries in 1997 was \$48.3 billion, far less than the \$125 billion called for in the AGENDA 21 program. Private financial flows at market rates were \$128.5 billion in that year (OECD).

Some of these cost estimates are difficult to interpret. The estimate of \$540 billion in needed expenditure per year is both a cost and an indication of the size of the benefits. At about 1.8% of world income, expenditures of this size would seem to be somewhat unlikely. Current public and private flows for all purposes from the industrialized countries to the low-income countries amount to only about \$175 billion, and it is unlikely that developing countries would be able to make up the difference out of their own resources. The authors of AGENDA 21 clearly feel that investments of this magnitude will prevent much greater environmental losses. On the other hand, the organizational costs identified are fairly modest, as is the UNEP budget. If these estimates are taken as reasonably accurate, the direct costs of existing international organizations appear to be relatively small, and this is likely to be the case for an IEO as well, particularly if it is based initially on existing structures such as UNEP. However, these are not the only costs that enter into the determination of the feasibility of the proposed organization. To the extent that the IEO is effective and international conventions on environmental protection are enforced, the costs associated with losses in autonomy or national sovereignty could be perceived by many governments as quite large. It is significant that numerous national delegations to the preparatory conferences for the Rio Summit expressed opposition to the creation of new environmental institutions (Robinson, p. 690). Members of the international community have different environmental goals, as reflected by the differing needs and aspirations of industrialized and less developed countries. Environmental protection is often seen by economists as a normal good in that demand for such efforts rises as incomes increase (Sandler, 1997). In many low-income countries, protection of environmental amenities is seen as less important than promoting economic growth and raising living standards. This contrasts with the values attached to the environment in wealthy countries. These differences could mean that the respective win sets on environmental issues do not intersect.

However, the existence of such agreements as the Convention on International Trade in Endangered Species (CITES) show that cooperation between low-income and industrialized countries is not impossible. Less developed countries may see the costs of an IEO as quite large but be willing to participate if wealthier countries offer compensation or some other kind of incentive. Carraro and Siniscalco show that the gains from partial cooperation can be used to finance transfers

that induce others to join international coalitions. The idea of paying low-income countries to participate in environmental agreements is not without precedent. For example, the Montreal Protocol on Substances that Deplete the Ozone Layer includes a multilateral fund that will offer grants and loans to developing countries to help them finance the provisions of the agreement (Széll). In addition, the Kyoto Protocol to the United Nations Framework Convention on Climate Change provides for financial assistance from industrialized countries aimed at encouraging low-income countries to adopt technologies that generate lower greenhouse gas emissions as well as to protect rain forests that act as carbon sinks (United Nations). Some transfers of this nature can be seen as a redefinition of property rights that would enhance institutional efficiency. Zilberman points out that developing countries receive few benefits from pharmaceutical products developed from rain forest organisms and thus have little incentive to preserve the rain forest. In this case, financial transfers may amount simply to payments for what rightfully belongs to developing countries.

The differing environmental perspectives of developing and industrialized countries are not the only source of costs related to national sovereignty. The belief that dispute-resolution provisions in both the NAFTA and Uruguay Round trade agreements constituted an infringement of national sovereignty led to fierce political opposition to these agreements in the United States. One way to reduce concerns over national sovereignty in an IEO may be to borrow the notion of subsidiarity that has become a cornerstone of policies in the EU (Dietz et al.). Subsidiarity calls for policy initiatives to be carried out at the administrative level that is most appropriate for the issue being addressed. Thus local land-use policies and zoning laws should be administered by local and regional authorities rather than by EU bureaucrats in Brussels. On the other hand, broad policies related to the coordination of transportation within the EU, for example, require higher-level intervention. Subsidiarity is particularly relevant for the management of environmental issues. There are many types of environmental problems, some of which are primarily local, whereas others require global action. In the spirit of subsidiarity, an IEO could limit the scope of its activities to environmental problems that are truly global (protecting the ozone layer, global warming), while local and regional issues are left to national and regional organizations. The distinction between local and global is often arbitrary, but it is likely that a working definition could be derived so that, for example, the world's oceans would be considered part of the global commons, while acid rain in Europe would be seen as a European problem best left to regional organizations and purely national questions such as policies on mining would be left to national governments. The GEF appears to have made just such a distinction, targeting its funding at projects to protect the global climate, biodiversity, the ozone layer, and common property water resources (Esty). Dividing responsibility for the different types of environmental issues between national, regional, and global organizations may help to assuage fears that an IEO would violate national sovereignty. On the other hand, U.S. opposition to the Kyoto Protocol shows that concerns about infringements of national sovereignty can come into play even when an agreement pertains to a truly global issue.

If the global benefits of an IEO are greater than the information, compensation, autonomy, and other administrative costs, and if the perceived benefits for

each participating nation are greater than its perceived costs, the IEO would be feasible. If an IEO appears to be feasible, the form, structure, and scope of the organization can be addressed. The 171 treaties, protocols, and agreements listed in the UNEP register address an extraordinarily diverse set of issues. For example, there are agreements on international common property (fisheries, forests, the ozone layer, global climate), transboundary pollution or pollution of jointly held air and water resources (acid rain), protection of wildlife (whales, migratory birds), regional management of environmental resources (the Niger River Basin, the Rhine, the Mediterranean Sea, Antarctica), hazardous substances (nuclear waste, benzene), protection of the world heritage (archaeological, artistic, historical), control of pests (desert locusts) and protection of farm animals and plant resources, and regulation of military activities. Not only do these agreements cover a large number of issues, the type of market failure addressed by the different kinds of agreements varies widely. For example, the type of externality related to marine mammal protection is different from the public goods problem associated with protecting the ozone layer. In the first case, the issue concerns whose rights to the use of marine mammals are to be supported, those who wish to consume the resource by killing it as opposed to those who wish to consume it by preserving it. In the case of the ozone layer, the issue is how to prevent free-riding on the efforts of others to protect the upper atmosphere.

The wide variety of agreements that have been reached raises an issue of comprehensiveness when considering the design of an IEO. An IEO charged with managing all these diverse agreements could become so complex that it would be extremely costly to organize and run. The principle of subsidiarity discussed earlier would have the added advantage of limiting the scope of the organization to a more manageable set of problem areas. Thus the IEO might serve as an umbrella organization to oversee agreements on greenhouse gases, ocean pollution, the Antarctic, wildlife (whales, migratory birds), world heritage sites, and hazardous materials, for example. It also might serve as a resource for scientific information that could be drawn on by organizations charged with managing river basins or controlling transboundary pollution that affects a limited number of countries. For issues that can be handled within nations, it would have no direct responsibilities. The environmental side agreement to NAFTA is consistent with this type of approach. It emphasizes the enforcement of national environmental policies by domestic institutional structures rather than assuming direct administrative responsibilities for environmental protection in the region (Beaulieu and Johnson).

The advantage of a centralized organization, even if its scope is somewhat limited through subsidiarity and respect for national sovereignty, is that there may be economies of scale that would reduce the total administrative costs compared with the present decentralized system. Esty argues that the current environmental regime is characterized by:

... confusion, duplication and incoherence. A dozen different U.N. agencies, the secretariats to a number of environmental treaties and conventions, the World Bank, regional political groups, and the world's 190 countries acting individually try to cope with the planet's environmental problems [p. 78].

This suggests that there could be efficiency gains and reduction of duplication from creating an IEO to oversee at least part of this diverse set of organizations.

However, it would still be useful for such an organization to center its activities on the defense of a limited set of basic principles. The WTO secretariat, for example, has been able to coordinate a significant number of regional trade agreements, commodity agreements, preferential trade arrangements (e.g., the Lomé Convention), free-trade areas, and customs unions alongside its primary mission to promote multilateral trade liberalization. But all these institutions derive from a common philosophical perspective that highlights the benefits of free trade and attempts to limit exceptions to its basic principle of nondiscrimination. This example suggests that a focus on a narrow range of principles may be important in defining the scope of an IEO.

The scope of an IEO is not the only design question that needs to be resolved. The benefits and costs associated with an IEO will depend on the number of participants, the degree of integration, and the type of decision rule chosen. If the IEO is designed to focus on such inherently global issues as protecting the ozone layer, it may be necessary for it to include virtually all the countries in the world. This clearly raises the organizational and operating costs. The necessary inclusiveness of such an IEO and the importance of the participation and leadership of the most powerful countries have implications for the degree of integration of the organization. Cauley et al. suggest that a loose organization would leave almost complete autonomy to the participants, whereas increasing the degree of integration reduces their independence. The more tightly the organization is structured, the more likely it is that it will be capable of controlling free-riding by the participants, thereby ensuring that a more nearly optimal level of global environmental protection is provided. This suggests that an effective IEO would have to be not only inclusive but also tightly structured. However, while tightly structured organizations would appear to be more effective at controlling free-riding, the experience with the Law of the Sea treaty suggests that an organization based on a high degree of integration could be undermined by the defections of important participants (Sebenius). Sandler suggests that many international environmental agreements, including the Montreal Protocol, have been set up initially as loosely structured conventions that subsequently were made more intrusive as the uncertainties surrounding the nature of the environmental problem were reduced. Esty recognizes this issue, arguing that the proposed organization should focus initially on the most critical environmental problems, with the expectation that its scope might expand over time.

Finally, the decision rule chosen is an important factor in the costs and benefits of an IEO. The WTO decides on the basic rules of international trade with a unanimity rule. The EU uses a system of weighted-majority voting that allows a coalition of one or two large countries plus one or two small countries to form a blocking minority. For certain decisions, the United Nations uses majority voting, whereas other cases are resolved through unanimity of a small subset of members. An IEO might follow the WTO model by requiring full consensus on the establishment of minimum environmental standards. Such an arrangement would raise the decision-making costs, although the exercise of strong leadership by a subset of powerful members could help to overcome this problem. In addition, if most of the difficult decisions stem from differences in objectives between industrialized and developing countries, the compensation mechanisms discussed earlier could soften the impact of a unanimity rule.

Based on the preceding analysis, it appears that a feasible IEO would have to be inclusive but loosely structured initially to obtain the support of sovereign nations with diverse goals and interests. A decision rule emphasizing consensus would provide assurance to participating governments that they would be able to prevent decisions that appeared highly unfavorable to their national interests. These design attributes mean that the suggested IEO might not generate enough of an increase in environmental benefits compared with the status quo regime to justify the administrative costs of the organization. Determining both the feasibility and form of an IEO would require knowledge of the increases in benefits and costs compared with the current system and the relation of these changes to the degree of integration, number of participants, and the decision rule. Because the benefit and cost schedules are not easy to identify, the preceding discussion of the design of an IEO is somewhat speculative. Nevertheless, it seems clear that a tightly structured organization would be unacceptable to many governments and that the most reasonable organizational structure would be one that relies on subsidiarity and leaves most enforcement to national institutions. It might be expected that tighter structures could be introduced as environmental understanding increases and national consensuses begin to converge.

Conclusion

Clearly, a great many more details would need to be worked out in order to decide if an IEO would be feasible and, if so, what the precise configuration ought to be. The analysis in the preceding section draws attention to the importance of defining a narrow set of fundamental principles to serve as the basis for the organization and operation of such a set of institutions. Principles such as the polluter-pays principle and an emphasis on enforcement of domestic legislation could help to provide assurance that other countries are not free-riding. As noted by Cauley et al., the development of positive conjectures about the behavior of the other participants is of great importance in reinforcing cooperation. The analysis also suggests that an IEO would have to be inclusive to be effective. This raises a serious question concerning feasibility because costs increase with the number of participants. If most of the nations of the world need to join the IEO for it to realize its objectives, some mechanisms for compensation and, perhaps, redistribution of income may be needed to overcome the resistance of developing countries more concerned with economic growth than environmental degradation. A critical design element identified in the preceding section is the choice of decision rule. If the IEO includes many countries, it may be necessary to allow substantial latitude for members to veto particular decisions. While a unanimity rule raises the costs of decision making, participation in an IEO that generates significant autonomy costs may not be forthcoming unless the decision-making process emphasizes consensus. Finally, it would be important for an IEO to be loosely structured initially to gain adherence from countries worried about their national sovereignty. Such a structure could evolve toward a more intrusive organization once more general agreement on the advantages of subjecting national policies to international supervision had been reached.

The critical issue is whether such an organization would generate sufficient benefits to offset the costs of negotiation and administration. These costs could be sig-

nificant, and it is important to recognize that large international bureaucracies can themselves be a source of inefficiency and waste. On the other hand, Esty points to a great deal of duplication and confusion in the current system. The benefits of an effective IEO would include the reduction of these costs as well as the potential for a more nearly optimal provision of global environmental protection. An added benefit of such an organization would be to put the international environmental regime on the same footing as other international regimes such as the one governing international trade. It is clear that the need for improved coordination of the trade and environmental regimes will receive increased attention in the coming years, but much of the discussion will take place at the initiative of the WTO. In addition, there are many coordination issues that involve the environmental regime and other international regimes such as those targeting international security, foreign aid and development, and human rights. A centralized environmental organization may prove more effective at ensuring a hearing for environmental interests as these issues arise than the present decentralized system.

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