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*Compensation or Retaliation: Developed and Developing
Countries and the Growing Conflict Over Global
Environmental Conservation*

John Whalley

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May, 1994

[This paper joins the growing debate over whether developing countries should be compensated for achieving higher environmental management standards for global resources on their territory, but at a cost to their growth and development; or whether sanctions, including retaliatory trade measures, should be used against them if such improvements are not made. The approach used is to pull together fragments of studies that can be used in beginning to answer such questions, and extrapolate from them so as to provide initial calculations of what orders of magnitude might be involved, even if in a somewhat rudimentary manner.] The picture that emerges is of a bargaining set between the developed and developing countries over these issues that is large, and of instruments and sanctions which may prove to be surprisingly ineffective and even counterproductive in application. Claims for compensation will thus likely be large, and the possibilities for effective retaliation somewhat more constrained. The range of uncertainty involved as to the outcome is thus substantial.

Author's Acknowledgements

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**COMPENSATION OR RETALIATION:
DEVELOPED AND DEVELOPING COUNTRIES
AND THE GROWING CONFLICT OVER
GLOBAL ENVIRONMENTAL CONSERVATION¹.**

by

JOHN WHALLEY

EXECUTIVE SUMMARY

This paper joins the growing debate over whether developing countries should be compensated for achieving higher environmental management standards for global resources on their territory, but at a cost to their growth and development; or whether sanctions, including retaliatory trade measures, should be used against them if such improvements are not made. Currently the debate is between developed countries whose environmental groups place a high priority on improved management of global environmental resources, such as forests and species; and developing countries who host such resources and who argue that they should be compensated if, by adopting globally environmentally friendly policies, their growth and development is slowed.

As developing countries see it, developed countries deforested and industrialized centuries with few, if any, environmental constraints, while today, they are being asked to also institute environment management policies as they develop. They also argue that

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industrial countries have management policies of their own, such as reforestation, which they could use to help achieve the global environmental objectives which they weight highly. The contrary point of view is taken by developed country environmental groups who argue that in the present situation improving global resource management is paramount, and if economic sanctions against offending countries who mismanage global resources situated on their territory are required, they should as a final resort be used. The issue, then, is compensation for growth-retarding environmental management on the one hand, or retaliation via sanctions for failure to manage on the other.

In this paper, I discuss a number of the issues involved in this debate, and try to develop a line of argumentation as to what, if any, may be an eventual resolution. Who owns the resources; can any definitive judgment on property rights be made? How much would developed countries be willing to pay for improved management of these resources; and how much retardation in growth and development would be implied by a more pro-active environmental strategy on the part of the developing world? What, ultimately, does this imply for the use of compensation or retaliation; what are the strategies and potential payoffs for each side from their use, and how large is the bargaining set?

I argue that the data and analytical basis for answering such questions is extremely limited and the discussion here is, in large part, motivated by the importance and timeliness of the issue rather than by any claim to exact analysis. Even though we have just been through a high-level government-to-government exercise in the U.N. on global environmental management culminating in the recent Rio Summit,² there are no estimates either as to what

²The Earth Summit in Rio de Janeiro of June 1992 followed on from the earlier U.N. Conference on the Human Environment (the Stockholm Conference) in 1972. See *Financial Times*, June 15, 1992, p.7, and the *U.N. Chronicle* (1992) p.63 for a summary of earlier

compensation might be involved, and for what degree of environmental restraint; nor of what forms of retaliation could possibly be used and with what effect.

The approach used is to pull together fragments of studies that can be used in beginning to answer such questions, and extrapolate from them so as to provide initial calculations of what orders of magnitude might be involved, even if in a somewhat rudimentary manner. The picture that emerges is of a bargaining set between the developed and developing countries over these issues that is large, and of instruments and sanctions which may prove to be surprisingly ineffective and even counterproductive in application. Claims for compensation will thus likely be large, and the possibilities for effective retaliation somewhat more constrained. The range of uncertainty involved as to the outcome is thus substantial.

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I. INTRODUCTION

This paper joins the growing debate over whether developing countries should be compensated for achieving higher environmental management standards for global resources on their territory, but at a cost to their growth and development; or whether sanctions, including retaliatory trade measures, should be used against them if such improvements are not made. Currently the debate is between developed countries whose environmental groups place a high priority on improved management of global environmental resources, such as forests and species; and developing countries who host such resources and who argue that they should be compensated if, by adopting globally environmentally friendly policies, their growth and development is slowed.

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I discuss a number of the issues involved in this debate, and try to develop a line of argumentation as to what, if any, may be an eventual resolution. Who owns the resources; can any definitive judgment on property rights be made? How much would developed countries be willing to pay for improved management of these resources; and how much retardation in growth and development would be implied by a more pro-active environmental strategy on the part of the developing world? What, ultimately, does this imply for the use of compensation or retaliation; what are the strategies and potential payoffs for each side from their use, and how large is the bargaining set?

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II. THE COMPENSATION/RETALIATION DEBATE

As environmental issues have moved ever more centrally onto the policy agendas of so many countries around the world, so global environmental concerns have grown rapidly. Twenty years ago, the focus was on such issues as pesticide use, and acid rain contamination across countries; today it is on carbon-burning, CO₂ emissions, and global climate change; the ozone layer and global policies towards CFCs; deforestation and impacts on atmosphere; species loss and the value of the gene pool as a global resource.

Because the effects at issue in these new debates span the globe, discussion of them has already generated a substantial amount of tension between those countries hosting environmental resources, and those who see themselves as suffering from a decline in their quality. Many of the environmental resources whose management is at issue, such as forests³ and species, are concentrated in developing countries, and the more vocal and environmentally concerned groups are in developed countries. International conflict in this area thus seems set to grow further in the years ahead.

In the developed world, the position generally is that these resources should be better protected, both because of their global communal use, and a seeming acceleration in their decline: disappearing rain forests are the lungs of the earth; the gene pool is an evaporating reservoir of biodiversity for mankind. But in the developing world, the situation is seen differently by many, especially where the main focus is on growth and development. In their

³Forests were an especially contentious issue at the Earth Summit in Rio, but participants were only able to agree to a document containing 15 non-binding principles on forest management and conservation. These principles have no legal commitment. Developing countries managed to include a prohibition against developed country import bans of unsustainable forest products.

view, the developed countries deforested two hundred years ago and grew and industrialized, using up their own environmental resources and discharging carbon and other emissions into the upper atmosphere, long before present-day environmental concerns were high profile. Developing countries see themselves as now being asked by currently rich but previous polluters to restrain their own growth and development, and help preserve global environmental resources largely in response to developed country concerns.⁴ Developing countries thus argue that while preservation of global environmental resources is a worthy cause, they should nonetheless be compensated for environmental restraint through monetary assistance as allowance for foregone growth and development.⁵ While few numbers have been advanced to support such claims, the presumption is that the amounts involved would be substantial.

The developed countries, on the other hand, argue that the environmental resources at issue represent global or communal resources; and that anyway with stretched financial resources they would not be able to make transfers of the size which the developing world may have in mind. Instead, they argue that environmental conservation is in the interest of both the developing and developed worlds, and if developing countries fail to act, it may

⁴An article in *Asiaweek* during the Earth Summit captured this sentiment well, "The South considers it unfair to be forced to stop unsound practices that the North itself had employed in its climb to affluence. Particularly rankling are pressures to conserve forests from Western nations who have shorn their own woods." *Asiaweek*, June 12, 1992, p.25.

⁵Malaysian Prime Minister Mahathir has been particularly outspoken on this issue. At a conference of developing countries hosted by Malaysia prior to the Earth Summit, he argued that "It is the rich who must be prepared to sacrifice their progress in the interest of our development." *Financial Times*, April 28, 1992, p.4.

become necessary to use other kinds of measures including trade restrictions as a way of ensuring sound environmental management.

Much of this emerging global environmental conflict now threatens to reopen the schism between developed and developing countries which grew in the 1960s, following the creation of the United Nations Conference on Trade and Development (UNCTAD). Then the conflict between developed and developing countries focused on trade and aid flows, and such issues as how special and differential treatment in trade regimes could help developing countries grow. Somewhat paradoxically, at the very time that many of the earlier North-South conflicts over trade have become more muted (although they have by no means disappeared), environmental concerns threaten to widen an otherwise narrowing divide between developed and developing countries.

Who Owns the Resources?

The question of who owns global environmental resources is both one of the key and most contentious elements in the debate, and has already generated sharp divisions along North-South lines.⁶ Developing countries argue that environmental resources such as forests and species located on their territory belong to them, citing as a precedent the fact that developed countries depleted similarly located resources and deforested as they grew and raised their own standards of living. If they are now asked to restrain deforestation and

⁶This was clear at a pre-Earth Summit conference of developing countries in spring 1992. Prime Minister Mahathir stressed the North had been responsible for the majority of global environmental ills and should "clean up its own backyard instead of laying claim to the environmental resources of the South." *Financial Times*, April 30, 1992, p.4.

improve environmental management, and hence retard their growth and development on account of developed country environmental concerns, they should be compensated in some way because they own the resources and have rights to use and exploit them. They seek the same growth and development that the developed world achieved before them, and hence compensation for adopting environmentally restraining policies which they regard as growth-restraining should be paid.⁷ Were sanctions to be used against them to coerce them into compliance, they argue that they have rights to open trade under Part IV of GATT, and trade sanctions for environmental reasons violate these rights.⁸ Compensation, not retaliation, is in their judgment the only way to proceed, given what they see as a clear delineation of their property rights.

In contrast, environmental groups in the developed countries see the resources at stake as both global (i.e., communally owned) and threatened⁹. They both seek immediate action to remedy global environmental mismanagement and argue its imperative, given rapid

⁷For many in the South this is fundamentally an equity question. If Brazil is forced to take measures to slow deforestation in the Amazon, two Brazilian economists (Reis and Margulis (1991)) argue, "on equity grounds, the country [Brazil] ought to be compensated for the costs imposed by a restrained growth strategy. Compensation is required at a minimum, because developing countries like Brazil would be sacrificing growth to solve problems that are, to a large extent, the consequences of 'unbridled' patterns of growth of rich industrialized nations." p.369-370.

⁸The GATT legal aspects of this issue have been central to the recent U.S.-Mexico tuna/dolphin in which the United States imposed trade measures against Mexican exports of tuna to the U.S. (and that of five other countries) on the grounds that Mexican fishermen inflicted an unacceptably high level of incidental kills of dolphin when catching tuna in the Eastern Pacific Zone. A GATT panel in its report ruled against the United States, in part on grounds of extra-territoriality, but the report has not yet been adopted by the GATT Council. See Uimonen and Whalley (1973) for more discussion of this case.

⁹However, the Commission on Developing Countries and Global Change (1992) p.28, characterized this view from the North as "What's mine is mine, and what's yours is ours."

declines in quality. Given, to them, the seriousness of the situation, sanctions, including trade measures linked to improvements in environmental management, seem a reasonable way to proceed if countries in which such resources are located are reluctant to act. This developed-country position also reflects, in some cases, serious doubts over the effectiveness of domestic environmental measures, especially in lower income countries. Many groups thus strongly advocate programs to assist such countries implement pro-environmental policies as a key part of their approach.

But how global environmental problems are to be dealt with requires a predetermination as to who has rights to what. Do developing countries have rights to use resources in their territory to grow and develop, and hence should they be compensated for restraints on their use? Or do citizens in developed countries have rights as global citizens to an assured quality of global environmental resources which others, including those in developing countries should respect? Is there a communal right to demand actions be taken now on insurance grounds because of the risk of irreversible global catastrophe?

Some of these issues have already arisen in other and earlier environmental debates, most notably with discussion of the Polluter-Pays-Principle now endorsed by the OECD.¹⁰ In the case of the present discussion, the Polluter-Pays-Principle would recognize collective property rights on the part of the global community (most of whom live in countries other

¹⁰The OECD adopted the Polluter-Pays-Principle (PPP) in 1972 as part of the OECD Council Recommendation on "Guiding Principles Concerning the International Economic Aspects of Environmental Policies." The Guiding Principles identify various means of implementing the Principle, such as process and product standards, regulation, and pollution charges. Subsidies are specifically identified as being inconsistent with the Principle. PPP-based measures should also be consistent with the non-discrimination principle of the GATT. For more details, see OECD (1975) and GATT (1988), pp.136-166.

than those where the resources are located) to key resources such as forests, species, atmosphere, and oceans, and whose management directly affects the world's environment. It would endorse taxes or other restraining measures which internalize the global costs of environmental management on custodians of resources who mismanage them. Schemes which encourage the use of less harmful ways of managing resources use incentive-based resource transfers to countries hosting such resources, and reflect a Victim-Pays-Principle.

Hybrid or combined schemes involve countries with an interest in protecting resources making transfers to countries in which resources are located, while host countries use incentive-based measures to restrain activities which result in mismanagement of resources within their own countries. This reflects a Victim-Pays-Principle at international level, and a Polluter-Pays-Principle at national level. Such a scheme is also generally viewed as more efficient than Victim-Pays-Principle incentive schemes at the national as well as the international level.

How one chooses between a Polluter-Pays-Principle and a Victim-Pays-Principle seemingly has no basis in underlying economic analysis, since the choice is simply a reflection of a prior assignment of rights. Coase (1960) long ago pointed out the crucial role that property rights assignment can play in externality situations (with rights granted either to the polluter or the pollutee), also emphasizing the somewhat arbitrary nature of property rights assignment in many, if not most, externality cases. Property rights assignment rests on legal judgments which reflect precedent, prior determination under law, and moral argumentation. For global environmental issues, property rights almost inevitably involve conflicting claims by countries as to who has the right to do what, and are, usually not

resolved through any formalized international legal arrangements. International law is ill-developed, ambiguous, and anyway of dubious significance due to the lack of enforcement. Rather, bargaining outcomes reflecting the relative strengths of threats and counterthreats by the parties involved are the more common occurrence.

Coase also pointed out that prior bargaining between affected parties may internalize the social costs involved with externality situations, and if this is the case, any attempt to remedy the ill through either retaliation or compensation could even make matters worse. This argument is clearly most relevant in externality situations with small numbers of polluters and victims, and in such cases where externalities are already internalized, imposing an externality correcting tax is inappropriate. But to the extent that any of the international externality effects underlying the compensation/retaliation debate are already internalized, it is possible that measures adopted in the name of defending the environment could instead worsen the situation. Although, realistically, the likelihood of such Coasian accommodations already having been adopted in the international context seems small, given the large transactions costs involved.

But these insights from Coase further emphasize the point that the assignment of property rights is key in this as in other environmental debates. In a typical externality situation, it is often not clear who has the right to do what, and hence who should be taxed, or compensated. Does the producer have the right to emit smoke, or does the consumer have the right to breathe clean air? In the international environmental policy debate this translates into disagreement over whether Brazil has the right to chop down forests to further its economic development, or whether tropical forests which are important for global climate

and air quality are, in effect, a globally owned communal resource. Under the former view, Brazil should be compensated for slowing deforestation; under the latter view, they should be taxed if they deforest too quickly.

What Is the Most Efficient Instrument?

Whether compensation or retaliation is likely to provide the most efficient instrument for improving global environmental quality is a further key element in the debate. Global environmental problems represent a special case of the theory of externalities, and from a theoretical perspective an issue with the compensation or retaliation choice is whether, from a resource allocation point of view, one of them represents a more preferred way of proceeding in dealing with the externalities involved. Which is most likely to lead to an efficient allocation of resources as its outcome?

Externalities occur when the economic activities of some agents (such as consumption and production activities) affect the utility or production costs of other agents through an avenue other than the price mechanism. Thus, agents inflicting externalities make economic decisions without regard to the effects on others, and there is no market mechanism to penalize or reward the elements missing from their behaviour. A firm producing a product which generates, say, smoke, imposes additional costs on other producers or consumers, which are not internalized in their own cost structure. The solution is to impose a tax on the activities causing the externality, and at a rate reflecting the difference between the marginal social and private costs of production.

While some externalities are localized, with one producer affecting other producers and consumers close by, others are more diffuse in their impacts. In principle, the appropriate response to all externality problems is the same, even if externality causing activities (pollutants) have effects which cross borders. From a conceptual point of view, the only difference is the number of agents affected by the externality. For instance, auto exhaust emissions in Mexico City affect millions of residents, while global externalities such as carbon emissions affect billions through their impact on global warming. An efficient policy is one which forces producers' cost calculations to reflect marginal social costs, and this includes the social costs imposed on other countries. Thus, a tax reflecting the Polluter-Pays-Principle would be collected from producers, with the public at large assumed to have rights to assured quality of environmental resources (such as clean air and water) while those who degrade resources by mismanagement, paying a tax reflecting additional social costs (Baumol and Oates (1988), p.180).¹¹

Externalities may also be internalized through non-tax mechanisms, such as marketable permit schemes, with the permits issued allowing producers to pollute up to a socially optimal level. If these are freely traded, market forces then determine the price of pollution permits.¹² Alternatively, subsidies to polluters to induce them to adopt pollution abatement methods may be used; and use various standards and regulations, or command-

¹¹But to the extent that a PPP tax induces higher risk behaviour by prospective victims, it is clearly an inefficient tax.

¹²In May 1992, the first U.S. transactions of emissions permits trading took place between the Tennessee Valley Authority and Wisconsin Power and Light. *Financial Times*, May 13, 1992, p.7. Heggelund (1991) discusses some of the issues involved in trading emissions permits. See also Bertram (1992) and OECD (1992b).

and-control measures, may also be adopted to force polluters to use certain abatement techniques.¹³

It is, however, the implementation of appropriate environment policies that becomes more difficult when environmental effects cross borders, since countries have no direct incentive to internalize the additional costs imposed on others across their borders. In some special cases, there are simple remedies. Thus, if a country's imports from a neighbour are associated with production-generated cross-border pollution (as, for example, in the U.S.-Mexico border region), and the importing country can affect the terms of trade of the exporting country, a tariff can reduce the output of the environmentally unfriendly import by the neighbour, and hence cross-border pollution. However, even this is not the most efficient policy since it does not attack the problem as directly as a production tax on output (levied by Mexico). The tariff introduces both production and consumption inefficiencies, unlike a production tax, and the importing country may or may not be better off with the pollution-reducing tariff, since the net effect also depends on the effects on trade.

Perhaps more importantly, many global environmental issues are not linked in this way to trade, and hence cannot be dealt with directly through trade measures, only indirectly through their use as a sanction. If no co-operation takes place between the parties through compensation and adoption of environmentally improving policies, trade-restricting

¹³It is more common for countries to use command-and-control measures than price-based interventions to control pollution, even though the latter are thought to be a more efficient way of achieving pollution targets and encouraging pollution-reducing innovations. Difficulties in measuring the marginal social costs of environmental damage, or the "damage function", required in determining an optimal tax (or pollution quota in the case of marketable permits) are usually cited as the reason. (Pearce and Turner (1990)).

instruments would be used as a unilateral measure. Such usage threatens to occur in a number of areas: existence issues for species and biodiversity, and global climate issues including deforestation and coal burning.

Sanctions may, however, take a number of forms. An agreement among a subset of polluting countries which includes a credible threat of sanctions against non-signatories is one possibility. If well designed, such sanctions may induce polluting non-signatories to change their behaviour, and hence their use may not be necessary. Even if used, they may nonetheless provide for a more efficient outcome than no action at all. But compensation and consent would be a more efficient way to proceed, since they would not have the associated distorting costs accompanying the instruments used to implement the sanctions.

Efficient policy would be a co-operative agreement whereby the importing country makes a side payment to its neighbour, which, in turn, agrees to improve environmental management through, say, a pollution tax (Low and Safadi (1992)). As noted above, such an arrangement¹⁴ would embody a Victim-Pays-Principle at the international level since the country suffering from the pollution is paying the custodian to improve environmental management, embodying a Polluter-Pays-Principle internally within the exporting country. It is, of course, in line with this approach that less-developed countries have maintained that developed countries should provide financing to them if they are to be expected to comply with costly environmental protection objectives set by developed countries.

¹⁴The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer is a frequently cited example of such a co-operative environmental agreement. A \$200 million fund was set up to help developing countries meet the terms of the agreement. See Enders and Porges (1992) for more detail. Schelling (1991) discusses different co-operative approaches to global warming.

Compensation and Retaliation and the UNCED Debate

The growing profile of this debate on compensation and retaliation can be seen in both the decisions of the UNCED global environment conference in Rio de Janeiro in June 1992, and the accompanying process both leading up to and surrounding the conference. Two major problems emerged. One involved an inability, primarily among industrialized countries, to agree on binding targets for carbon dioxide emissions. The second involved an inability on the part of industrial countries to agree to the resource transfer agenda proposed by the UNCED Secretariat as necessary to carry out the agreed programs.¹⁵ In each case, United States reticence to commit was a difficulty.¹⁶

¹⁵Compensation for developing countries for forgoing development for environmental reasons was recognized in declarations adopted at the 1972 UN Environmental Conference in Stockholm and the 1982 U.N. Conference in Nairobi. Compensation for developing countries and the need for transfer of technology was also addressed by the Intergovernmental Panel on Climate Change in 1990. At the Earth Summit in Rio, developing countries were unsuccessful in achieving commitments for large financial transfers from the industrialized countries to help with their environmental problems. A chapter on Trade and Environment in the recent GATT (1992a) annual report goes even further, however, and suggests that countries with rainforests should be paid for their "carbon absorption services". According to the World Bank, such compensation should be considered "as payments for imports, not as aid." World Bank (1992), pp.23,24. See *Yearbook of International Environmental Law* (1990), p.581, and Handl (1991), p.29, for further discussion of these issues.

¹⁶For example, the U.S. resisted proposals, primarily from other industrial countries, for a specific target to stabilize emissions of carbon dioxide at 1990 levels by the year 2000. Earlier drafts of the climate convention contained specific commitments by the industrial countries to maintain carbon emissions at 1990 levels by the year 2000 and to reduce emissions after that date. The U.S. would, however, not commit to these. *New Scientist*, May 16, 1992, p.5.

The decisions from the summit in Rio contained a number of elements.¹⁷ Agreement was reached on two legally binding treaties: the U.N. Framework Convention on Climate Change, and the Convention on Biological Diversity. Under the terms of the climate change convention, developed-country signatories committed themselves to lead the way in reducing long-term greenhouse gas emissions; but no targets or deadlines were set. The Convention on Biodiversity aimed to protect biodiversity through establishment of protected areas, conservation of eco-systems and promotion of sustainable development. The rights of countries to exploit their biodiversity were recognized in the convention. Each convention was required to be ratified by 30 countries before becoming effective.¹⁸

A statement of Principles for the Conservation of Forests was agreed at Rio; a non-legally binding statement considered a first step towards defining sustainable forestry practices. Agreement was also reached to establish a Commission on Sustainable Development, to be set up within the U.N. Participants at the Earth Summit also endorsed the Rio Declaration on Environment and Development which sets out twenty-seven principles on development and the environment. It is this which provides the political framework for Agenda 21, widely considered the blueprint for achieving the principles set out in the Rio Declaration. Agenda 21 contains 40 chapters and covers a wide range of topics, including:

¹⁷For a summary of the results of the Rio conference, see *The World Economy*, 15:6, November 1992, News and Events Section. See also UN (1993a, 1993b).

¹⁸U.S. President Bush refused to sign the Biodiversity Convention in Rio during the Earth Summit. However, in April 1993, President Clinton announced the U.S. would sign the convention and that it had prepared an interpretative statement clarifying its position. See "News and Events", *The World Economy*, Vol.16:3, p.398.

reduction of poverty; human settlements; efficient resource use; pollution; safe disposal of chemicals and wastes.

The cost of implementing these agreements was a major topic of debate, and it is here that issues of compensation arise. Initially the UNCED Secretariat estimated that Third World countries would need as much as \$625 billion a year to implement the programs agreed at the Rio Summit. \$500 billion would be provided by the Third World countries themselves. Of the \$125 billion remaining, \$55 billion would come from existing aid flows from developed countries, and \$70 billion would be required in new funds. The UNCED Secretariat subsequently settled on the estimate that the programs from Rio would cost \$125 billion a year through the year 2000.¹⁹

There was also disagreement over the institutions to be given responsibility for allocating any additional funding to support improved environmental management (Haas, Levy and Parson (1992)). Industrial nations wanted to channel a substantial amount of funds through the Global Environmental Facility (GEF) which provides concessional financing for projects aimed at alleviating global environmental problems, and is run jointly by the World Bank and the U.N.²⁰ In its pilot phase, decision-making in the facility was limited to

¹⁹But even this is more than twice the amount industrial countries currently spend on overseas development assistance. See U.N. (1993a,b); *Financial Times*, June 10, 1992, p.5.

²⁰The GEF focuses on four areas: global warming; pollution of international waters; ozone layer depletion; and protection of biodiversity. The GEF was restructured and reorganized after the Earth Summit to provide for more say to developing countries on its allocation. The restructuring should be completed by December 1993. When it was first established in 1990 the fund was set at \$1.2 billion, but after Rio it was agreed to roughly double the fund to approximately \$2-3 billion. Two areas will be governed by conventions agreed at the Earth Summit; namely, the Climate Change Convention and the Convention on Biodiversity. Projects to be funded through the GEF must be for the global benefit, which

contributors of \$5.5 million or more, with weighted voting according to the amount of the contribution. But developing countries were concerned that this emphasis in the GEF would leave them out of the decision-making process, as well as potentially preclude GEF funding for projects that deal with local environmental problems. Developing countries thus sought an alternative mechanism which would be more universal and transparent.

The G77, as well as Scandinavian countries and China, also advanced proposals which would involve increased liability for environmental problems for transnational corporations. This was rejected by the U.S. as well as the United Kingdom and Japan. Many developing countries and NGOs thus also found fault with the results of the Rio conference because they relied on corporate self-regulation.

Thus, at the end of the day the profile of the compensation-retaliation issue at Rio remained, but with relatively little by way of concrete results. Property rights issues, and who has rights to do what, and who should be compensated for not doing what, were not resolved. Which instruments to use to achieve which objectives was not agreed. And the orders of magnitude as to potential compensation or the effects of trade sanctions linked to environmental management remained vague.

means funds cannot be spent alleviating poverty or improving local environmental degradation.

III. HOW MUCH COMPENSATION, AND TO WHOM?

Despite the heat of the debate on compensation or retaliation in Rio, and in other fora, any concrete sense of what would be involved is noticeably lacking. There is a feeling that eventual claims for compensation by developing countries for adoption of approved environmental management could be large, while developed countries claim, in turn, that their ability to pay is heavily constrained. Talk abounds of the use of sanctions to encourage improved management, but exactly how they might work, and with what effect, remains vague.

As noted above, the UNCED Secretariat initially estimated that²¹ the average annual costs of implementing the Agenda 21 proposal in developing countries over the period 1993-2000, would be in the order of \$625 billion. They suggested that Third World countries would have to provide \$500 billion themselves, with \$125 billion made up of grants or concessional aid from the international community. Since industrial countries already provide \$55 billion of aid, \$70 billion would be required in new funds. The Secretariat stressed, in releasing their estimates, that these were "indicative and orders-of-magnitude estimates only and have not been reviewed by governments."²²

But a report prepared for a preparatory meeting on financial resources and global environmental management in March 1992, put the annual financing needed for programs which address global environmental issues only at about US \$15 billion per year. Admittedly, this US \$15 billion estimate was for the actions included in Agenda 21 and did

²¹See U.N. (1993a, b); *Financial Times*, June 10, 1992, p.5.

²²See U.N. (1993b), p.251.

not cover the additional cost of meeting obligations that would arise under global conventions, once ratified; i.e., in global climate and biodiversity.²³ This estimate also emphasized the difficulties in drawing the line between global issues and environmental issues of primary concern only at the national level. Nonetheless, the enormous difference between these two estimates reflects both the paucity of underlying data for such estimates, and the imprecise bases which have been employed thus far.

The UNCED Secretariat subsequently settled on an estimate that the programs that were called for in the Rio Summit and in the Agenda 21 Declaration through to the year 2000 would cost \$125 billion a year to implement in developing countries.²⁴ But even this estimate is more than twice the amount that industrial countries currently spend on overseas development assistance. And while a figure of \$125 billion per year would be possible if all countries were to meet the U.N. commitment of 0.7 percent of GDP in aid flows, many industrial countries currently fall well short of this target. Japan and the U.S. currently contribute 0.3 and 0.2 percent respectively of their GDP. Among European countries, the U.K. contributes 0.3 percent, and Germany 0.4 percent. The Scandinavian countries generally exceed the guideline commitment; Sweden and Denmark contribute 0.9 percent of GDP to ODA, while Norway contributes 1.1 percent. Japan has been progressively

²³See U.N. (1992), *Financial Resources and Mechanisms*, Preparatory Committee for UNCED, 4th Session, March 2-April 3. New York. A/Conf.151/PC/101.

²⁴In April 1992, the Brundtland Commission issued a statement that developed countries should, at a minimum, commit themselves at the Rio Summit to raising an additional \$10 billion in new funds. At the end of the Summit, Maurice Strong, Secretary-General of the Earth Summit, estimated \$6-7 billion in new funds had been pledged. This figure included an anticipated \$5 billion increase in aid from Japan. *New Scientist*, June 20, 1992, p.4.

increasing its aid commitment, and in the next few years may come close to meeting the 0.7 percent target.

While the developed countries generally agreed at Rio with the G77 countries that some degree of new funding would be required to achieve the \$125 billion target, the U.S. and others argued that a large part of the funding could come from reallocating funds from other projects, such as fossil fuel investment programs. India, Brazil and China, in particular, resisted any agreement that might reduce their access to funding from such projects.

None of these estimates, however, represent explicit compensation for forgone growth and development, but instead reflect the cost of implementation of various programs for environmental management. They are cost estimates of meeting specified standards, and neither estimates of willingness to pay for improved environmental management of global resources by the developed world, or estimates of losses from forgone growth in the developing world. Moreover, they relate to combined environmental programs, not just those involved with global environmental questions. They are all, therefore, some distance from an appropriate measure of compensation, and some other calculation is needed to shed perspective on the compensation-retaliation debate.

There are two different ways to make calculations of the level of compensation that might be involved for developing countries in adopting improved environmental management practices. One is to estimate the value developed countries place on improved management of global environmental resources in the developing world. This measure is what the developed countries would be willing to pay for improved quality, and hence the maximum

that the developing countries might hope to extract from developed countries in a global environmental negotiation.

The other is the loss to developing countries from the growth-retarding effects stemming from improved environmental practices. What compensation that would leave developing countries in an equivalent position along their new growth path in real income terms to that which they enjoyed before improved environmental quality management policies were implemented. This, of course, presumes that there would be adverse growth effects due to such management policies if adopted.

There is no comprehensive measure currently available of compensation based on the first approach²⁵; namely, obtaining a measure of the developed country valuation of improved management of globally related environmental resources in developing countries. Indeed, there is some degree of controversy even as to the appropriate way to proceed. The discussion focuses on how to combine so-called existence (or non-use) value with the more direct economic (or use) value of these resources to the developed world. Existence value is the price that residents of developed countries would be willing to pay in order to know that a resource is preserved in its present state. Direct economic value captures more tangible

²⁵Munasinghe (1992) reports on different methods for such valuations and notes "hardly any developing country examples are available" (p.231) which allow for estimation of the option value of such resources. He mentions a World Bank study attempting to estimate non-use values of a tropical rain forest in Madagascar. Munasinghe also reports that the GEF is supporting a study consisting of 18 countries which will look at, among other things: identifying methodologies for defining, assessing and calculating biodiversity values to the national economy; estimating the total cost of implementing required measures for effective conservation; how to calculate the net benefits foregone by embarking on the proposed measures (p.233).

spillover effects, such as the economic costs of elevated global warming due to coal burning or deforestation.

A recent piece by Pearce (1991a)²⁶ took this approach towards the valuation of Amazon rain forests, suggesting that Brazil could claim approximately \$9.7 billion per year from the world at large as compensation if deforestation were to cease entirely in Brazil. The approach that Pearce adopted was to focus on both use and non-use values for the unique natural assets represented by the forests. He first focused on the benefit to residents of other countries from reduced carbon absorption of tropical forests in Brazil. A slowed (60 percent lower) rate of deforestation would, he estimated, provide benefits of \$3.9 billion per year to residents abroad; a cessation of deforestation benefits of \$6.5 billion per year.

While there are no explicit studies valuing the existence of the Amazon rain forest for residents of the developed world, Pearce appealed to studies of the non-use values of unique natural assets for other amenities. For instance, a study by Sample (1986) ascribes a valuation of \$22 per U.S. adult per year in the mid-1980s to the existence of the Grand Canyon. Existence values for such species as the grizzly bear in this study emerge at comparable orders of magnitude to the Grand Canyon, at around \$15. The bald eagle is around \$11, while lesser well-known species, such as the whooping crane, are only \$1.00 per adult per year.

On the basis of this review of studies, Pearce conjectured that the existence of the Amazon rain forest in its present form might be valued on average at \$8 per adult per year in the developed world. This provides a non-use valuation of these forests to residents outside

²⁶See also Pearce (1991b).

of Brazil of \$3.2 billion per year. If direct and indirect use values are added, assuming complete cessation of deforestation, these would provide a valuation estimate of \$9.7 billion per year as the benefit to the developed world.

Not all forests are under stress with threatened deforestation, and only a portion are in the developing world. Hence, extrapolating from Pearce's estimate, to a corresponding valuation on improved management of all developing country forests is even more speculative. But the Brazilian rain forests are approximately 60 percent of all South American rain forests, 50 percent of all South American and Central American rain forests, and a little over 25 percent of all forests in the Americas.²⁷ Globally, Brazil accounts for around 12 to 13 percent of all (tropical and non-tropical) forest acreage. If 3 to 4 times the Brazil estimate is defensible for an estimate of the value to the developed world of cessation of deforestation in the developing world, a figure in the region of \$30-40 billion per year would result. Adding something for species, biodiversity, and other related environmental management issues not directly captured in the Pearce conjectures, which relate only to the existence values present in the forests *per se* rather than the species they contain or resources outside forests would, in turn, further increase these estimates by a further layer of speculative adjustment; say 50 percent. Under these assumptions, the developed country valuation of improved management of global environmental resources in developing countries could thus perhaps be in the region of \$45-60 billion per year.

²⁷See Table 19.1 on Forest Resources in World Resources 1992-93, World Resources Institute, New York, Oxford University Press.

This range of valuation is, of course, smaller than the estimated cost of developing country environmental resource management requirements under Agenda 21 emerging from the UNCED Secretariat during the Rio Summit; but as noted above, the latter relate to all environmental costs, not just those involving global environmental resources.

Other studies, while less comprehensive in coverage, can also be used to provide some indication of the potential benefits involved for developed countries from improved environmental management, and hence how much compensation might be extracted by developing countries in negotiation. In their 1992 World Development Report²⁸, the World Bank makes reference to a study of the costs and benefits of resource conservation in the Korup National Park in Cameroon. The park contains Africa's oldest rain forest, and numerous endangered species of plants and animals. In the study, the measurable benefits to local residents of maintaining the park including the forest resources and the protection of soil, were weighed against the management costs and costs of forgone forestry revenues under conservation. Benefits to those outside the country were not explicitly included. But using a discount rate of 8 percent, the cost of conservation of the park was less than the local benefits by \$6 billion in discounted present-value terms, indicating the size that the benefits to non-local residents would have to be to justify conservation management. The implicit null hypothesis in the Bank's study was that these benefits exceeded this figure. Many of these benefits arise from the different species of plant and animals in the park and involve option and existence values.

²⁸World Bank (1992), p.152. See also the discussion in Barbier *et al.* (1991) on this study.

This park is a relatively small element of wider global environmental resources, since forest acreage in Cameroon is less than 10 percent of that in the whole of Africa.²⁹ Thus, if non-local benefits were of the size suggested and first converted from discounted present-value terms to a flow basis, then multiplied several times, this might again suggest an estimate of the developed country valuation termination of deforestation in developing countries. If a flow figure of \$0.5 billion per year is taken as a lower bound for out-of-country existence and economic benefits, and multiplied by 100 (a factor smaller than the ratio of Cameroon to total tropical forest acreage), a lower bound developed country valuation of \$50 billion per year for conservation of tropical forests is obtained, an estimate seemingly not inconsistent with the extrapolation above based on Pearce's Brazilian forest study.

Somewhat heroic speculations as to developed country valuations of global environmental resources in developing countries thus seemingly suggest large figures, although below the level suggested by the UNCED Secretariat calculation of costs of improved environmental management by developing countries. In part, this is because the latter relates to total environmental management, including those with both local and global externality effects.

Basing calculations of compensation for developing countries for adoption of improved environmental management on the negative growth effects that would follow is even more difficult. Perhaps most importantly, there is substantial disagreement in the literature as to what the sign of any growth effects on developing countries attempting to

²⁹See footnote 17 for source.

achieve tightened environmental standards would be. As pointed out by Birdsall and Wheeler in the recent volume edited by Low (1992), it is generally the case that countries with high growth rates move progressively to raise their environmental standards anyway, because the demand for environmental quality increases with income, and with growth higher environmental standards tend to be mandated.³⁰ Thus as Korea has moved through successive periods of rapid growth, environmental standards have improved, Birdsall and Wheeler (1992) also note improvements in environmental quality as having occurred in a similar way in Chile.

In turn, countries that have lagged in growth performance (such as India, and until the last five to seven years, China), have been noticeable for their, on average, considerably lower environmental standards. Hence, one side of the argument is that growth itself will tend to generate higher environmental standards and hence higher environmental standards need not be a barrier to growth, but instead accompany growth. If this argument is accepted, no compensation need be paid. However, countries such as Malaysia strongly argue the case that any externally imposed restraints on their ability to implement their own forest conservation policies will significantly constrain their growth and development. In recent years Malaysia, of course, has been one of the most rapidly growing Asian economies with growth in the last few years in the 8 to 12 percent range.

What is important for the compensation debate is that even small changes in the growth rate across developing countries attributable to the restraining effects of

³⁰In a widely cited working paper, Grossman and Krueger (1991) use cross-country data to show that after a level of *per capita* income of \$5,000, emissions of sulphur dioxide, smoke and other pollutants begin to fall. GATT (1992a) also supports this view.

environmental policies have enormous effects on dollar measures of possible compensation. The highly publicized recent edition of *World Economic Prospects* (International Monetary Fund (1993)) which contains a revision of their weighting scheme used to calculate Worldwide Gross Product, uses a purchasing power parity calculation which places a higher weight on China. These calculations suggest that one half point of extra growth by developing countries in 1993 is worth in the region of \$60 billion a year to them as a group. As a conjecture, I suppose that the growth rate of developing countries as a group was either permanently lowered, or lowered for several decades as a result of adopting environmentally friendlier management practices. Forgone growth is then used as the basis for a compensation calculation, aiming to produce a figure roughly consistent with the UNCED estimate of \$125 billion of extra environmentally related costs each year for developing countries to improve environmental management. To achieve this outcome, one would have to argue that global resource-related environment restraint would cost the developing countries in the region of 1 percent of GDP per year in forgone growth and development; a seemingly high estimate of growth impact.

The 1992 *World Development Report (WDR)*, however, also provides an estimate of the costs over the rest of the decade of raising environmental standards in developing countries towards those now prevailing in developed countries. The Report suggests resource costs for this in the region of 2 to 3 percent of GDP over the period (to the year 2000).³¹ As the 1992 WDR points out, these cost estimates represent financial costs and

³¹World Bank (1992), p.173. These approximate estimates cover necessary investments to improve water and sanitation, electric power, road transportation, industrial emissions and wastes, agriculture, population control, and education for women.

hence do not translate into estimates of costs in terms of forgone GDP growth. Also, the resources used in environmental management and cleanup would, themselves, show up in measured GDP and, to some extent, might even accelerate growth in developing countries through improvement in infrastructure. Also, the costs described in the WDR represent incremental costs of raising all environmental standards, including those dealing with localized problems such as air and water quality. The global component alone of such costs will likely be considerably smaller.

Thus, potential claims of developing countries for compensation based on this second approach may be even more unreliable than those based on the first approach, but may again lie below the estimates produced by the UNCED Secretariat for combined environmentally related costs for developing countries over the next decade. At the end of the day, it would seem that if developing countries are taken to have property rights to environmental resources located on their territory, the compensation which they might claim for improved environmental management on their part, could be large, perhaps \$50 to \$75 billion per year, but probably not of the order of magnitude produced by the UNCED Secretariat for the cost of implementation of far-reaching new environmental programs covering domestic and global environmental management.

IV. HOW MUCH RETALIATION AND BY WHOM?

If claims actually made by developing countries for compensation for forgone growth and development on account of improved environmental management practices are as large as I suggest above, the question which follows naturally is to what extent might developed countries be able to achieve improved environmental quality on the part of developing countries through the use of sanctions. This is based on the presumption that developed countries reject the developing country property right assertion of unrestricted rights to use such resources for development purposes.

The impacts of trade sanctions and resulting retaliation have been a subject of considerable investigation in the research literature over the last 20 or so years. Trade retaliation in the 1930s is widely believed to be a major contributory factor to the severity of the Great Depression (see Kindleberger (1973)), and the resulting trade wars were formalized in the 1950s in the celebrated pieces of Johnson (1954) and Gorman (1957). Subsequent work in the Johnson-Gorman frame (Whalley (1985)) have suggested that global retaliating trade wars could result in trade barriers in major regions around the world of up to 300 percent. The presumption, therefore, is that sanctions pose a major threat to those on whom they are imposed, and trade sanctions are a serious matter.

Generally speaking, however, over the years trade sanctions has been a relatively ineffective device for achieving changes in domestic policies.³² They have been used by larger developed countries (principally the U.S. and the E.C.) in areas such as intellectual

³²Trade bans have been implemented to further objectives in areas such as foreign policy; human rights and workers rights. For further discussion of the effectiveness of such bans, see Hufbauer *et al.* (1990), Charnovitz (1986, 1992).

property protection, but in broader areas of trade policy they have not been used, in part, because of the restraints imposed by the GATT under bindings of tariff rates and Article I (MFN). Because of these restraints the discussion of trade sanctions for environmental purposes has largely been in targeted terms: bans on imports of tropical lumber unless more effective management policies are put in place by exporting countries in the management of their forests; labelling requirements on tropical lumber; import bans on endangered species under the CITES Convention.³³

The amounts of trade involved in most of the products at issue in environmentally related disputes are limited,³⁴ and hence the penalties which can be inflicted on the exporting countries are correspondingly small. Wider trade restrictions by, say, the United States against Malaysia on grounds of mismanagement of tropical lumber would for now seem unlikely for the reasons given above. And even were such wider trade-based sanctions to be used, the amount of damage which could be inflicted on recalcitrant countries would likely be relatively small. China, for instance, which could well become an eventual target of environmental conditionality of this type because of its coal burning and links to global warming, only has 15 percent of its trade with the United States. Hence even a total ban on

³³A number of trade bans permitted under the 1975 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are currently in place for the purpose of species conservation. The extent to which these trade bans are effective has been a subject of some debate. See Uimonen and Whalley (1993); also Barbier *et al.* (1990). Labelling requirements on tropical timber have been raised recently in the GATT. See GATT (1992b), p.4.

³⁴Tropical countries generally consume more of their production for domestic use than they export. Policies to discourage exports, such as bans on exports of logs, have typically led to greater inefficiencies. See Barbier *et al.* (1991).

trade with China by the U.S. would likely not inflict penalties of the form which would cause immediate implementation of environmental restraint. Thus in the environmental area, the potentiality of effective use of trade sanctions for now seems surprisingly constrained.

This issue has already arisen in the tuna/dolphin dispute between the U.S. and Mexico, the first environmental case to be taken to the GATT after the U.S. used trade restrictions against Mexican tuna and tuna imported from five other countries because of the fishing methods which involved unacceptably large (to the U.S.) incidental dolphin kills. The GATT panel essentially found on the side of Mexico on the grounds that the extra-territorial nature of U.S. trade measures was inconsistent with the intent of Article XX of the GATT.³⁵ This case has become important because of the extent to which it potentially restrains the form and nature of any future trade-based retaliation on environmental grounds, presuming the ruling prevails. The GATT panel ruling in the case is yet to be adopted by the GATT Council, and may never be, given the current U.S.-Mexico bilateral relationship on wider trade issues.

There are also possible sanctions in other areas that could be used for environmental purposes. Aid flows linked to environmental objectives is one, but aid flows are falling in real terms in the North American and European countries, although increasing in Japan and other Asian economies. The use of sanctions of threatened aid withdrawal for these purposes would seem further unlikely since environmental conditionality is already increasingly entering aid discussions in an alternative form; namely, aid being offered directly for improvement of environmental management. The prospect of donor countries suddenly

³⁵See GATT (1992), Box 3, as well as GATT (1991a), p.2; GATT (1991b), p.6.

