Expert Paper Series

Expert Paper Two

Global Commons

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Acronyms and Initials

CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CFC	chlorofluorocarbon
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
CRS	Creditor Reporting System
CSD	Commission on Sustainable Development
EIA	Energy Information Administration
EMG	Environmental Management Group
EPA	Environmental Protection Agency
EU	European Union
FAO	Food and Agriculture Organization
FCCC	Framework Convention on Climate Change
GDP	gross domestic product
GEF	Global Environment Facility
GEM	global environmental mechanism
GEO	Global Environment Organization
GEO	*Global Environmental Outlook*
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
NCSA	national capacity needs self-assessment
NGO	non-governmental organization
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
PAC	pollution and abatement control

PCF	Prototype Carbon Fund
R&D	Research and development
UN	United Nations
UNDP	United Nations Development Programme
UNEO	United Nations Environment Organisation
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WHO	World Health Organization
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WWF	World Wildlife Fund

Preface

The creation of property rights and the delineation of territories and national boundaries have made it possible for private actors or nations to lay claim to significant parts of the Earth. Global commons are the resource domains that do not fall within the (exclusive) jurisdiction of any one government.

They include such diverse resources as the global climate, the stratospheric ozone layer, outer space, Antarctica, high-seas fisheries, international waters and migratory wildlife. Some of these resources, such as the global climate, have the characteristics of global public goods: no state can be prevented from consuming them, and the consumption of such goods by one state does not diminish the amount available to others. Other resources are managed under common property and open access regimes. For these resources, such as fisheries, consumption by one state depletes the resources, leaving less for others. But they are fundamentally alike once opportunities for nationalization, private ownership or other restrictions on access have been exhausted.

The management of global commons has generated growing international public interest since the late 1950s. The transboundary character of environmental degradation was highlighted during the landmark United Nations Conference on Human Environment held in Stockholm in 1972. Since then the complexities of preventing the degradation of the global commons have multiplied with the growth of world population and the associated pressure on resources, with the evolution of technologies to extract and consume natural resources and with the development of knowledge and techniques to identify and understand transnational pollution. In this context global commons issues have typically been addressed one by one in the form of separate international agreements. Among the many treaties and conventions that have been promulgated, some aim at preventing pollution of collective resources, and others are intended to conserve (or make sustainable use of) the global commons.

At the time of the 1972 Stockholm conference most global commons agreements focused on avoiding pollution. More recent agreements designed around the 1992 Earth Summit in Rio de Janeiro focus on the conservation or the sustainable use of the global commons. Examples for the air, the earth and the sea, respectively, include the 1992 UN Framework Convention on Climate Change and its 1997 Kyoto Protocol, the 1992 Convention on Biological Diversity and the 1993 FAO Compliance Agreement for the conservation of high-seas fisheries.

In addition to the hundreds of individual and ad hoc international agreements, many international organizations have been created or mandated to handle specific issues. The United Nations Environment Programme (UNEP) was created in 1972 with a broad mandate but limited authority. It was established as a part of the United Nations Secretariat but not as a specialized agency, which meant its influence in its area of responsibility was much less than that of the World Health Organization. Over the years other UN agencies have been used or created to handle specific or cross-cutting issues (for example, the Commission for Sustainable Development). In addition, new institutions, such as specific secretariats, have typically been created for each environmental treaty adopted since 1972. Non-state actors, such as the World Conservation Union, other non-governmental organizations and private firms, also play a major role in environmental governance, either independently or in partnership with governments. Finally, a specific financing scheme for global commons, the Global Environment Facility (GEF), was established in 1991 to help developing countries fund projects and programmes that protect the global environment. This institutional fragmentation is accompanied by a geo-

graphical dispersion of strategic institutions around the world in Bonn, Geneva, Montreal, Nairobi and Washington, D.C., among other locations.

Notwithstanding the institutional fragmentation, the current international system to manage the global commons has been successful in some instances. Good examples include the Montreal Protocol banning the use of ozone-destroying substances and the International Convention for the Prevention of Pollution from Ships reducing the deliberate release of oil in the sea. For most of the other instruments developed to address global commons issues, however, debate continues about their adequacy and effectiveness.

Six papers were prepared for the Task Force to explore further some of those highly debated issues. In these contributions international experts identify institutional and financial shortcomings, offer recommendations to better address the selected global common issues and estimate what would be the costs and benefits of implementing these proposals. Other invited papers look at institutional fragmentation and propose ways to move towards increased coordination and coherence at the global level. Finally, one paper focuses on ways and means to build global commons capacities of developing countries.

Papers commissioned by the Secretariat of the International Task Force on Global Public Goods

In "Managing the Global Commons" Scott Barrett analyses institutional arrangements in three areas: climate change, high-seas fisheries and biodiversity. For each he provides an overview of what has been achieved in previous attempts and demonstrates where and why they have succeeded or failed. Based on this analysis Barrett makes proposals for moving forward. On climate change he argues that the current strategy embodied in the Kyoto Protocol does not provide a platform on which deep and broad cuts in greenhouse gases can be sustained. He therefore proposes a complementary long-term approach focusing on the development and diffusion of climate friendly technologies. On high-seas fisheries Barrett identifies that the main problem lies with illegal, unreported and unregulated fishing and recommends a tightening of international agreements coupled with an evolution in customary law. On biodiversity Barrett focuses on protecting "hot spots" and proposes increasing financial resources to that end.

In his papers "The Costs and Benefits of Protecting Global Environmental Public Goods" and "Resource Needs and Availability for Protecting Global Environmental Public Goods" Raymond Clémençon focuses on the economic aspects of global commons protection and of climate change mitigation and biodiversity preservation in particular. In the former paper he reviews existing cost-benefit analyses and discusses their usefulness in guiding policy-making. His assessment shows that the growing literature on cost-benefit analysis has provided valuable data on the economic impacts of large-scale changes in global commons but much more flawed information when it comes to future development. His rather critical findings are illustrated in the case of climate change and biodiversity. There he shows that while cost-benefit analysis can be useful when limited to local assessment, such as clear-cutting a forest parcel for timber, or to a specific industry, such as the impact of greenhouse abatement on the coal industry, they become very contentious when applied at the aggregate level. He concludes by proposing that quantitative research focus rather on how to provide predictable increasing funding for the protection and sustainable use of global commons.

In the latter paper, "Resource Needs and Availability for Protecting Global Environmental Public Goods", Clémençon builds on his previous findings and narrows the analysis on the significant funding gap he identifies for the protection of global commons. Based on existing data, the accuracy of which is sometimes debatable, he explores how much the international community is currently spending in several global commons areas and estimates the additional financial needs to mitigate climate change and preserve biodiversity. He furthermore identifies different explanatory factors for the funding gap, including the absence of international agreement on how costs should be shared and what efforts should be prioritized. Moving forward Clémençon offers several recommendations to fill the gap, including strengthening the GEF by adopting a transnational mechanism that could raise funds directly from individuals.

While Barrett and Clémençon address specific global commons issues, Daniel Esty and Maria Ivanova, in separate papers, look at the institutional picture. In "Sustainable Management of the Global Natural Commons" Esty first identifies the weaknesses of the international environmental regime leading to its poor performance. His assessment of the current system is that it lacks institutional support and regulatory coherence and that there are many inconsistencies and gaps in responsibility and authority. He then briefly reviews the different alter-

natives proposed as remedies, including the conversion of UNEP into a full-fledged UN-specialized agency or its replacement by a new, more powerful Global Environment Organization. Avoiding extremes and focusing on practical steps to create the needed oversight capacity, Esty calls for the creation of a global environmental mechanism that would initially focus on core tasks to support global policy-making, including collecting data for monitoring and assessing the state of the world environment, identifying gaps and challenges and disseminating scientific findings and best practices.

In "Assessing the United Nations Environment Programme" Ivanova looks at the role of UNEP in greater detail and assesses its performance against three core functions essential to serving as the lead institution for global commons: monitoring, agenda setting and capacity development. Like Esty, Ivanova describes an increasingly complex and fragmented international system lacking coherence and coordination. But she also highlights that UNEP has been effective in certain areas such as monitoring and assessment and information sharing. Moving forward she recommends that UNEP builds on this comparative advantage and specializes in being an information clearing house and a policy forum rather than an operational agency. She also offers a list of practical steps to reform UNEP, including initiating a strategic review of the institution, consolidating financial reporting and accounting and restructuring organizational governance. In parallel she proposes launching a comprehensive assessment of the global environmental system and encouraging clustering of specialty organizations to cover individual global public goods and regional public goods (such as water, climate, forests and biodiversity).

All authors acknowledge the importance of building developing countries' capacities to provide environmental global public goods and to adapt to the adverse effects generated by their degradation. In "Capacity Building for Global Environmental Protection" Raymond Clémençon investigates this further and reviews the environmental capacity building undertaken by the main multilateral institutions and by the GEF in particular. His analysis brings to the fore that capacity-building programmes are underfinanced and that they have taken place mostly at the individual and institutional levels and rarely at the systemic level. Building on these findings Clémençon proposes increasing funding for long-term capacity-building programmes and better balancing resources going to specific areas with developing countries' needs. He also recommends supporting the recent recognition that capacity-building

activities should cut across global commons areas and encouraging investment in cross-cutting programmes. He finally proposes to develop an operational framework to facilitate developing countries' participation in international negotiations on global commons issues.

Managing the Global Commons

Chapter 1

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This paper examines the challenge of managing the global commons. It distinguishes between public goods and resources subject to open access or common property management, showing that they are fundamentally alike once opportunities for nationalization and entry limitation have been exhausted. There are many commons problems, but this paper focuses on three: global climate change, overfishing (especially in the high seas) and biodiversity conservation. In all three cases improved management requires that state behaviour be constrained. It also requires that cooperation be enforced. The Kyoto Protocol is a first effort to reduce greenhouse gas emissions globally, but it has serious weaknesses. An alternative approach that promotes the development and diffusion of new technologies may improve on Kyoto and could be implemented alongside Kyoto. Many agreements seek to limit fishing, but only a few have made serious efforts to address enforcement challenges. The biggest problem is with illegal, unreported and unregulated fishing on the high seas. A sticks-and-carrots approach would help, but an evolution in customary law prohibiting illegal, unreported and unregulated fishing is likely to be needed. Biodiversity has many dimensions and will require action at the domestic and regional levels as well as at the global level. The global public good of biodiversity conservation is ensuring species existence, and this will require international financing of habitat protection, mainly in tropical countries.

Ozone layer protection is a global public good *par excellence*. No state can be prevented from enjoying the benefits of ozone layer protection, and one state's consumption of ozone protection does not affect the amount available to other states. Most important, a state benefits from ozone layer protection regardless of whether it contributes. The provision of global public goods thus faces a formidable incentive problem.

When chlorofluorocarbons leak from a refrigerator, they rise in the atmosphere, eventually reaching the stratosphere. There they are broken down by the sun's ultraviolet radiation, releasing chlorine. It is the chlorine, not the chlorofluorocarbons, that depletes ozone. The process of ozone depletion is slow—from start to finish about 50 years. And the depletion does not occur directly above the original source of emission.

Chlorofluorocarbon molecules mix in the atmosphere. But depletion is not uniform; it is greatest over Antarctica because in the winter strong winds isolate the Antarctic atmosphere. Special chemical processes then delay the time it takes chlorine atoms to join with other atoms and become stabilized. New substances can even be created, including new chlorine atoms that attach themselves to the existing chlorine atoms. When the sun shines again on Antarctica in the spring, the ultraviolet rays release all of this chlorine, the chlorine that had not yet stabilized and the newly created chlorine. The result: an extra burst of depletion (usually reaching a maximum in September of each year) not seen elsewhere.[1] The effect is an "ozone hole".

The only way the public good of ozone protection can be supplied is if states exercise mutual restraint by cutting back on releases of chlorofluorocarbons. This cannot normally be expected to occur spontaneously, because of the incentive problem previously noted. The role of a treaty is to restructure these incentives. For the ozone layer, this was achieved by the Montreal Protocol—one of the greatest successes of international cooperation ever. The reasons for Montreal's success have been detailed elsewhere (Barrett 2003). This paper focuses on a very similar problem that has so far proved more challenging: global climate change.

Like ozone protection, climate change mitigation is a global public good. But it is otherwise very different; so what worked for protecting the ozone layer may not work for mitigating climate change. The Kyoto Protocol was meant to do for climate change what Montreal did for ozone depletion, and Kyoto resembles Montreal in several respects. But there are reasons to think that Kyoto will not work as well as Montreal. Indeed a very different approach is needed to address this important and vexing problem, as explained in the next section.

Global commons problems encompass a broader class of resources than global public goods. They include resources that can be managed under alternative property rights regimes—common property and open access. High-seas fisheries are open access resources. Fisheries in closed areas like Lake Victoria are shared and treated as common property (by the three

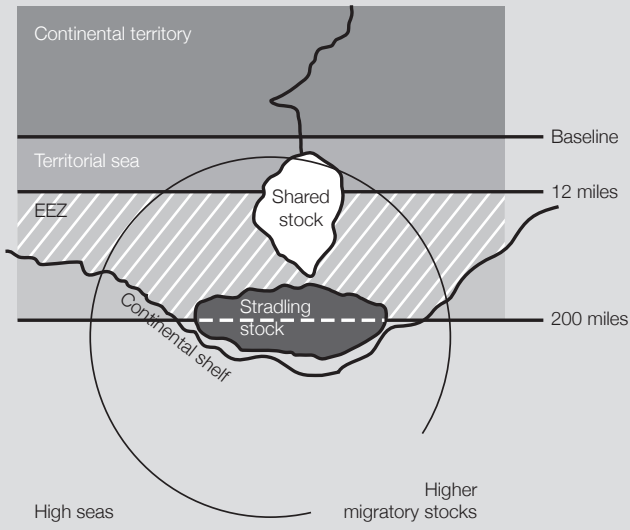
states that border the lake, Kenya, Tanzania and Uganda). The distinction is important because cooperation generally becomes more difficult as the number of countries having access to a resource increases (Barrett 2003). That some resources are open access is not inevitable. Fisheries beyond the three-mile territorial limit used to be high seas, open access resources. The extension of the territorial sea to 12 miles coupled with the creation of the exclusive economic zone (which can extend up to 200 miles from the coast) effectively closed or nationalized a large fraction of the commercial fisheries of the world.[2] An important management tool for ocean fisheries is thus the system of property rights, a tool not available to limit the incentive problem in supplying global public goods. Air space can be nationalized (and is, for the right of overflight), but the stratospheric ozone layer cannot be. Nor can the climate be parcelled out.

There are limits to the use of this management tool, and after these limits have been reached, the challenge of managing the ocean's fisheries is much the same as supplying transnational public goods. Both are collective action problems. One limitation is that, as the seas become nationalized, the burden on enforcement increases. Indeed fishing in some exclusive economic zones is essentially open access because of the inability of coastal states to enforce restrictions. Another limitation is that many commercial fish migrate, passing through different exclusive economic zones as well as the high seas (tuna). Yet another limitation is that some fisheries overlap between an exclusive economic zone and the high seas, a problem of "shared and straddling stocks" (see figure 1.1).

Property rights remedies may aid efficiency, but they can also create equity problems—a further limitation. When one country claims a larger piece of the ocean, less is available for other countries. Under international law, a property right does not exist only by virtue of a country's claiming it. Other countries must also recognize the property right as being legal. As an example, the United States claimed ownership of fur seals even in the high seas—a claim rejected by an international tribunal in 1892, causing the United States to abandon it. Today it appears that nationalization of the ocean's resources has run its course. Improved management of the world's fisheries will thus have to rely on international agreements—just as for global and regional public goods. Once again, however, the details matter. There are features of commercial fishing that make management especially difficult; these are analysed in the second section.

A final important global commons problem is conserving biodiversity. This problem is even more complex than the others in that the

Figure 1.1 **Shared and straddling stocks**



Source: UN Atlas of the Oceans; see www.oceansatlas.com/world_fisheries_and_aquaculture/html/govern/capture/execozones/default.htm.

concept is multidimensional. It involves the management of individual species (a classic commons problem), the maintenance of ecosystem functions (often a regional public good) and the preservation of species (a global public good, if the existence of species is valued). These are different kinds of incentive problems best addressed on different levels (domestic, regional and global). They are examined in the third section.

Mitigating climate change

Probably no global commons issue has attracted more diplomatic attention than global climate change. And yet, for all this attention, little has actually been done to mitigate this environmental problem. This section explains why this problem deserves our attention, why a multilateral remedy has thus far proved elusive and how the world might do better.

Science

Discussion of climate change must begin with the science.[3] The basic physics of climate change are straightforward. If the concentration of greenhouse gases in the atmosphere increases, then, all else being

equal, global mean temperature will rise. These gases trap the sun's heat. If there are more of these gases in the atmosphere, more of the sun's heat will be trapped. Since the industrial revolution, concentrations of greenhouse gases have increased by about 30%. Concentrations will increase even more in the future, though by how much depends on several different things: emissions, which depend in turn on economic growth, technologies and policy; take-up by the oceans and other carbon sinks; and the effect of carbon-dioxide fertilization on terrestrial absorption. By 2100 concentrations are expected to be 90%–350% greater than pre-industrial levels. Beyond 2100 concentrations are expected to keep on rising. Global mean temperature has already increased about 0.6°C. By 2100 it is expected to rise 1.4–5.8°C. Sea level is expected to rise 0.09–0.88 meters over this same period as a result of thermal expansion and the melting of glaciers and ice caps. Of course, if concentrations are not stabilized, the climate will change even more. Even if concentrations were stabilized today, changes would continue because of lags in the system. In a sense we are already committed to some amount of climate change.

The uncertainties in the science of climate change are substantial. Most important the direct changes caused by climate change may trigger yet more changes because of a number of feedbacks (positive and negative). One such change is a weakening or even collapse of the Gulf Stream. Abrupt climate change has occurred in the past and could be triggered by human-induced climate change. As noted in a recent report by the National Academy of Sciences (Committee on Abrupt Climate Change 2002, p. 1), "future abrupt changes cannot be predicted with confidence, and climate surprises are to be expected."

The essential point is that climate science is uncertain and will remain so. We are conducting a huge experiment and will not know its full consequences for sure until they are manifest. Waiting for uncertainties to be resolved means doing nothing. Doing nothing would make sense only if the effects of climate change were sure to be both very, very modest and as likely to be positive as negative. The changes expected will not be modest. And while some regions may possibly gain over some intervals of time, the expectation is that the overall effects will be negative. In the longer term (beyond 2100) they would be even more so.[4]

Economics

What level of emission reductions is justified? Article 2 of the Framework Convention on Climate Change establishes as its objective the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The problem with this objective is that science has not clearly identified the concentration level that would be "dangerous". There is real concern, as just noted, that a threshold may exist, beyond which climate change may proceed rather suddenly—and perhaps be irreversible. However no such threshold has yet been identified. An arbitrary level could be set, but the problem here is that mitigation will be costly. We cannot look only at the climate damages when deciding what to do. We also need to consider the mitigation costs.

An economically efficient climate change policy would take both damages and costs into account when indicating what it is best to do. In particular it would equate the marginal benefits of mitigation with the marginal costs.

The marginal benefits of mitigation may not be as large as is sometimes claimed. Often one hears about the damage climate change could do to vulnerable coastal regions, and it is true that these areas could be harmed severely. However, and as noted previously, much of this damage cannot be avoided by current policy; even if global emissions were cut to zero, concentrations would remain well above historical levels, and some climate change would ensue. For mitigation, policy must ignore the part of damage we are already committed to.

Often one also hears about the threat that climate change poses to particularly vulnerable areas, such as small island states. And it is true that some areas are more vulnerable than others. But some regions may benefit from climate change, at least in the short to medium run, making the total (or average) avoided damage much smaller.

Moreover, the benefits of mitigation would be realized only after a delay of decades, and even small discount rates would reduce the present value of these future benefits. It is sometimes remarked that, if this is so, the benefits should not be discounted. But failing to discount would only "cook the books", so to speak. And discounting may actually favour mitigation policy. The discount rate is endogenous for this problem. If climate change can be expected to reduce future consumption levels, the appropriate discount rate may be negative. It is better to

have the analysis reflect the real implications of climate change for the future than to adjust discount rates arbitrarily.

Finally, countries will have incentives to adapt to climate change. Precisely because coastline is valuable, efforts may be taken to protect it—by building sea walls, for example. Adaptation will lower damage costs. (The marginal benefits of mitigation are the sum of the marginal avoided damages and adaptation costs.)

The cost side to mitigation is also important and sometimes misunderstood. The marginal costs of reducing emissions are likely to increase rapidly with the level of reduction, especially if little time is given for the economy to adjust. Some people argue that significant mitigation can be achieved at zero or even negative cost, but if this were true, there would be less of a need for a global regime. Countries would have strong unilateral incentives to reduce their emissions substantially, even if they were unconcerned about climate change.

Little evidence supports this view. The Kyoto Protocol demands only very modest reductions in emissions, and if the costs of achieving these reductions were very low or negative, why would some countries decline to participate? To be sure, the costs of meeting Kyoto are low and even negative for some countries. But this is not because emission reductions are costless; it is because Kyoto awarded generous emission allowances to some countries. More broadly, the essential point is that, even if there were "no regrets" options, marginal costs will rise beyond some point, and a consideration of marginal benefits would then be needed to decide the amount by which emissions should be reduced.

So much for conceptual matters. What do the numbers say? Studies that have tried to estimate the marginal benefits of mitigation had to rely on poor data, and their results are subject to significant error. But they are also all that we have to work with, and they should be taken seriously if only for that reason. Most estimates are in the range of $5–$50 per ton of carbon, though some estimates are as low as zero and some over $100 per ton (see Barrett 2003 for estimates and sources). These estimates are rough, but they do tell us something qualitative: doing something is justified. Almost nothing is being done today, and starting from where we are, more certainly needs to be done.

What level of mitigation is justified today? The Kyoto Protocol provides a useful reference point. If implemented cost-effectively, Kyoto has been estimated to cost the world less than $25 per ton of carbon (Clinton Administration 1998).[5] Given the estimates for marginal benefits provided above, the limits prescribed by Kyoto would thus seem to be

economically justified, or at least not wildly out of line—assuming cost-effective implementation. The main problem with the Kyoto Protocol is not the level of mitigation set by the treaty (roughly, a 5% reduction in the emissions of industrial countries from 1990 through 2012). The main problems lie elsewhere, primarily with the time given to achieve this level, with the emission reduction targets set for individual countries, with the short term of these emission reductions, with the mechanisms for implementing them and, most important, with the inability of the treaty to enforce both participation and compliance.

To put this more crudely but perhaps more clearly, the main problem with Kyoto is not that it requires that too much be done; the problem is that it will do nothing, or next to nothing, to mitigate climate change.

Enforcement

Consider first the compliance problem: how to get parties to the agreement to comply. The agreement negotiated in Kyoto in 1997 did not incorporate a compliance mechanism, though it did require that parties approve "appropriate and effective procedures and mechanisms" for compliance at the first meeting of the parties. But according to article 18, "any procedures and mechanism … entailing binding consequences shall be adopted by means of an amendment to this protocol." Under the rules of international law, an amendment is binding only on the countries that ratify it (and on the countries that accede to the original agreement after the amendment enters into law). Since any party to Kyoto could decline to ratify a subsequent compliance amendment, each can avoid being punished for failing to comply. In other words, there is nothing in the agreement that actually makes countries do what they said they would do. As matters now stand the Kyoto emission limits are more "political" than "legal".

Does this matter? Chayes and Chayes (1995) argue that binding compliance mechanisms are not needed—indeed, that such mechanisms can be counterproductive. But the evidence—even limiting our attention to the climate regime—fails to support this view. The industrial parties to the Framework Convention on Climate Change pledged to stabilize their emissions at their 1990 levels, yet very few did so. Moreover, those that did limit their emissions did so for reasons having little to do with climate policy.

Plainly many countries believed that compliance would be a problem because they negotiated a compliance mechanism in subsequent

meetings in Bonn in 2001. Under this agreement, a party that failed to meet its emission ceiling in the first control period (2008–12) must make up for the shortfall and reduce its emissions by an additional 30% of this amount in the next control period (2013–17). The 30% value was meant to reflect "interest" earned on the shortfall (removing the incentive for countries to "borrow" emission reductions from the future) plus a penalty (for failing to comply).

This is a defective mechanism, and not just because it cannot be binding (except by means of an amendment, as noted previously) for the first control period. First, the mechanism relies on self-punishment. That is there is no procedure for enforcing the compliance agreement. Second, the emission limits for the second control period have yet to be negotiated. A country that worries that it may not be able to comply in the first control period may thus hold out for easy targets in the second control period—so that the punishment, if triggered, does not actually bite. Third, and perhaps most important, a country can always avoid the punishment by not ratifying a follow-on protocol for 2013–17 or even by withdrawing from the protocol at a later date. This is why participation is important.

Why do countries participate in a treaty? The answer is not obvious, given that an effective treaty must make countries do things that they would not otherwise do—reduce their greenhouse gas emissions, for example. Countries may be willing to make such a sacrifice because others are making a similar sacrifice or because doing so is simply the right thing to do. They may also be willing to make such a sacrifice because, were they not to do so, others would not do so. It turns out that this last reason is especially important. Cooperation is often sustained by a strategy of reciprocity.

In a climate agreement reciprocity would require that if one country were not to reduce its emissions, others would not reduce theirs. In a bilateral setting reciprocity is often very effective. Indeed this is how the multilateral trading rules are enforced under the World Trade Organization. Climate change mitigation, however, is a global public good, and when some countries punish another for failing to mitigate emissions, they harm themselves in the process. In other words, for global public goods, severe punishments are often not credible.

Intuitively a punishment must "fit the crime". A small deviation can be deterred by means of a small punishment. A larger deviation can be deterred only by a larger punishment. The largest credible deviation from cooperation for any country would be for it to emit as much as it would if it were not to participate in an agreement. Hence large punishments

are needed to deter non-participation. Smaller punishments will suffice to deter non-compliance. Since small punishments are more credible, this means that if parties to a treaty can deter non-participation, they should also be able to deter non-compliance. In other words, participation is the binding constraint on international cooperation (Barrett 2003).

Kyoto

The Kyoto Protocol has entered into force, but this achievement came at a price.

In negotiations held in Bonn and Marrakech, country-specific concessions were given to Canada, Japan and the Russian Federation to promote their participation. But these concessions (more generous allowances for sinks) effectively relaxed the emissions constraints negotiated previously in Kyoto. Other modifications, such as the decision not to impose a quantitative limit on trading, also helped encourage participation by lowering the cost of compliance to countries facing net emission reduction obligations. At the same time, however, this relaxation in the trading rules limits the environmental effectiveness of the treaty by releasing more "hot air".[6] In other words, Kyoto entered into force only after being diluted. This is not much of a victory for the environment.

Most important, Kyoto failed to secure participation by the United States—the world's largest emitter and only superpower. Why is this? One reason is that the emission reduction obligations for the United States are especially stringent. Most countries that have ratified Kyoto do not need to reduce their emissions at all under the agreement. Some must reduce their emissions by modest amounts. The United States was required to reduce its emissions 7% below the 1990 level. It is widely believed, however, that US emissions under a business-as-usual scenario will be around 30% higher in 2008–12 than in 1990. That means that the United States would need to reduce its emissions very substantially to comply with the agreement.

The failure by the United States to participate is striking, but it should be clear that this is part of a general pattern. The United States failed to participate (at least in part) because the costs of participation were high. Other countries agreed to participate (at least in part) because the costs to them of participating were low or even negative. Still other countries agreed to participate on the condition that their initial reduction obligations were diluted. Ironically, Kyoto entered into force because of Russia's decision to ratify, but because Russia was given a

generous allowance of "hot air" and trading will now be unrestricted, Kyoto may fail to reduce emissions at all (Buchner, Carraro and Cersosimo 2001).

Moreover, Russia agreed to ratify only after being offered yet more concessions by the European Union, especially the pledge to support Russia's entry into the World Trade Organization. This is a warning that Russia may hold out for more concessions later, during the implementation phase.

To sum up, the Kyoto Protocol now has two possible fates. It may not be complied with, or it may be complied with, but only because it is so diluted that it fails to change behaviour substantially. The problem with Kyoto is not just that it will make little difference. After all, by design the agreement requires only very modest emission reductions by very few countries over a very short period—not enough of a difference to change the course of climate change. The problem with Kyoto is also that it does not provide a platform for sustaining deeper and broader cuts in emissions.

Could a redesign of the agreement better sustain compliance and participation? The obvious suggestion is to use trade restrictions (as, for example, in the Montreal Protocol; see Barrett 2003). But there are problems with imposing trade restrictions in a climate treaty. To be effective such restrictions would need to be both credible and severe. The history of environmental diplomacy shows how hard it is to meet both these requirements (Barrett 2003). And for a climate treaty all trade would need to be affected—creating the risk that trade restrictions would strain the multilateral trading system to the breaking point.

Alternative approach

To make a difference to the climate a treaty has to create incentives for long-term technical innovation. Kyoto creates a short-term "pull" incentive. In limiting emissions it raises the cost of emitting carbon dioxide, creating a market for carbon-saving technologies and thus an incentive for inventing and diffusing such technologies. This is a good way to design a domestic environmental policy, but not an international agreement. A substantial pull incentive requires robust enforcement; and, as already explained, this will be hard to sustain in a climate change treaty.

In any event, a "push" programme for research and development (R&D) is also needed. Yet Kyoto makes no provision for this. Basic research is in part a public good and is best done cooperatively. Examples

of "big science" collaboration include nuclear fusion research, the International Space Station and the Consultative Group on International Agricultural Research. An even more ambitious collaborative effort, incorporated within a new protocol, is needed to fund research into new energy technologies, particularly technologies that produce energy without emitting carbon or that capture and store carbon safely. The emphasis should be on electric power and transportation. To provide incentives for participation, each country's contribution to the collaborative effort should be contingent on the level of participation. Base-level contributions could be determined on the basis of both ability and willingness to pay and be set according to the UN scale of assessments. Partners in the R&D programme should be given free access to the fruits of all basic research.

Just as important as the size and financing of the R&D budget is the direction of the expenditure, which should be strategic. Technologies that capture and store carbon dioxide, for example, may be especially important, as they may allow fossil fuels to be burned without adding to atmospheric concentrations. Such an innovation would reduce industrial opposition to emission reductions, while at the same time enhancing the incentives for both participation and compliance.

Note that, in contrast to Kyoto, this approach addresses the long-term challenge and creates incentives for participation. It also does not entail any leakage problems. As one group of countries limits emissions, comparative advantage in the emitting industries may shift towards other countries, causing emissions by these countries to rise. With collaborative R&D, the opposite is more likely to occur. If non-participants acquire the fruits of the R&D, they will be able to reduce their emissions more cheaply (leakage may be negative).

It is also important to note here that all the while that Kyoto has been negotiated, most industrial countries have actually scaled back their R&D funding, just the opposite of what is needed (Battelle Memorial Institute 2001).

Finally, the R&D protocol has the advantage of capping total expenditure. Parties to this agreement will know how much money they will be spending. This is not true of the Kyoto approach, which caps emissions but not expenditures.

A push incentive by itself is not enough, however; a pull incentive is also needed. Just as we rely on the private sector to develop and produce vaccines, so we must rely on business to develop and produce new energy technologies. Supplemental protocols should establish a system

for agreeing on common standards for technologies that can be developed using the R&D.

Economists normally reject the setting of technology standards, which nevertheless have a strategic advantage. The standard of requiring catalytic converters on automobiles, coupled with the use of unleaded gasoline, has effectively spread this technology around the world for five reasons.

- A combination of economies of scale and learning has lowered the costs of producing both technologies.
- Countries manufacturing either automobiles or gasoline want to be able to sell their products in leading markets. So they produce to these standards for commercial reasons.
- Network externalities mean that every country wants to do what its neighbours are doing. If your neighbour requires catalytic converters, your gas stations will supply unleaded gasoline to meet the demand of cars and trucks crossing your border. Having done so, it then becomes cheaper to require catalytic converters domestically.
- There will be domestic demand for the new technologies. It is hard for a country to argue for an environmental standard that is weaker than what is available abroad. (Why should our country's public health be valued less than that of other countries?)
- Standards create automatic trade restrictions—restrictions that are easy to monitor and enforce and that are permitted by the rules of the World Trade Organization.

Again, notice the strategic effect. As more countries adopt a standard, it becomes more attractive for others to adopt the same standard. This kind of incentive is lacking in the Kyoto approach. In contrast to Kyoto, compliance with the protocol would also be easy to monitor and verify.

There are, to be sure, problems with the standards approach. One is that standards will work better for some sectors than for others. For automobiles network externalities are relatively important, leading to a positive feedback in the adoption of new technologies like the fuel cell. For electric power generation economies of scale may be important, but network externalities will be less so.

Another disadvantage is that standards are not always the most cost-effective way of reducing emissions. Certain parts of the economy will not be affected by the standards protocols. And standards may "lock in" a technology rather than promote continual innovation and improvement. The standards approach is very much a second-best proposal. But

the nature of this problem means that first-best solutions cannot be implemented. One of the problems with Kyoto is that the negotiators took it on faith that participation and compliance would be rather easily taken care of. They were wrong.

The standards protocols, like the cooperative R&D protocol, should also be open to every country to sign. It is almost certain that the technologies needed to meet the standards will be more costly than those currently available. So even if the incentive to adopt the new technologies is strong, developing countries should be compensated, at least in part, for agreeing to the new standards. A relevant model here is the Montreal Protocol Fund, which compensated developing countries for the "agreed incremental costs" of complying with the agreement to phase out ozone-depleting substances.

Note the difference between this approach and the flexible mechanisms under Kyoto (the Clean Development Mechanism and trading among annex I countries). With the Clean Development Mechanism, it is impossible to know the baseline for calculating emission reductions, making transactions costly. Trading can avoid transaction costs, but will likely result in the transfer of huge surpluses from one country to another. Funding technology transfer is different. Baselines are less tricky, and transfers of surpluses can be virtually eliminated. This is an advantage. By reducing surpluses, the cost to the industrial countries of financing emission reductions in developing countries is reduced, and so the incentive to offer the finance is increased.

The need to change the technology of development is manifest. Poor countries like China and India are growing very rapidly, and it is important that the investment underlying this new growth be climate-friendly. The capital invested now will have a long life. In rich countries, by contrast, growth is more modest and the rate of capital turnover relatively low. Rather than have the poor countries grow like the rich countries and then transition to a new technology base—as promoted by the Kyoto Protocol—it would be better for these countries to grow using new technologies.

The R&D and standards protocols address climate change in the longer run. They can and should be complemented by protocols that focus on reducing emissions in the short run. Indeed, rather than be seen as an alternative to Kyoto, these protocols should be seen as complementary. The difficulty with Kyoto, as mentioned before, is that its success depends entirely on effective enforcement. An agreement like Kyoto would be more helpful if the pretence of

international enforcement were dropped. The focus should be on the actions that countries can and should undertake domestically and in the short run. Countries could, as in Kyoto, establish targets and timetables. Alternatively, they could pledge to adopt policies and measures (ironically, perhaps, an approach suggested much earlier in the negotiation process). In contrast to Kyoto, the pledges would be domestically enforced, though cast within a multilateral framework. The process of pledging may create a kind of "tote board" for action and have some minimal effect over and above pure unilateralism (see Levy 1993).

It must be acknowledged that climate change is almost sure to happen no matter what we do now to try to mitigate it. Since developing countries are more vulnerable, and since industrial countries are largely responsible for the cumulative build-up in atmospheric concentrations, the adaptation fund established under Kyoto should be retained and perhaps expanded. It is a necessary ingredient for establishing fairness in the international response. Incorporating "cooperative adaptation" also creates an incentive for parties to balance adaptation and global mitigation.

Although the approach proposed here is radically different from Kyoto, it would not in any way undermine Kyoto. Nor is it inconsistent with the current policy of the United States. For both reasons, it is a feasible proposal—an arrangement towards which the international system may evolve.

The first step: R&D spending

As already suggested, R&D into new energy technologies is needed with or without Kyoto. But how much should be spent on R&D?

Consider this question first from a conceptual point of view. In a first best there would likely be two components: the basic research provided by governments, either directly or indirectly (and perhaps through a cooperative process), and the development, likely to be undertaken by industry, influenced by the previous expenditure on research, by the pull incentive of a first best carbon tax (or equivalent permit system) and by the associated incentive of intellectual patent protection. Formal analysis of this problem by Goulder and Mathai (2000) shows that, compared with the alternative in which the push incentive of research spending is left out, abatement is reduced in the short term but increased overall. The reason is simple: it is better to put money in R&D in the short

term to lower the cost of abatement over time. The essential point is that the amount of money to be spent on R&D must be linked to the mitigation policy; the optimal "push" must be determined jointly with the optimal "pull" policy.

Unfortunately policy in this area will not be undertaken in a first-best world. A patent system may be essential to create incentives for development of new technologies, but patents introduce distortions even as they correct others. In addition, mitigation is a global public good, and the financing of any activities that will facilitate mitigation is likely to be vulnerable to free riding. Finally, the associated pull incentive is also likely to be imperfect because of the challenge of enforcing international cooperation. For a variety of reasons, policy in this area will need to be second best.

If determining the optimal R&D expenditure is a difficult conceptual problem, it is even more difficult to determine empirically. Indeed few analyses have examined this question very seriously. Sandén and Azar (2005) propose a $1 per ton carbon tax, levied not so much to change behaviour as to raise revenue for R&D. But this value is chosen arbitrarily. A recent article by Popp (2004) comes closest to trying to estimate the value, but for several reasons his analysis is incomplete. For example, R&D in his model is meant to improve energy efficiency. The kinds of R&D needed to transform the technology of energy use are not considered by his analysis.

Although no estimate of the optimal R&D fund exists, there is a widespread belief that the current amounts being spent are much too low. Estimates produced by the International Energy Agency suggest that spending on R&D has fallen (country data are available from www.iea.org/Textbase/stats/rd.asp). Margolis and Kammen (1999) note how energy R&D fell about 40% between 1980 and 1995. They also note that R&D is concentrated: 98% of all energy R&D in International Energy Agency member countries is in just 10 countries.

To sum up, qualitatively, we can be sure that more money needs to be spent on R&D; quantitatively, we can say little. This is an astonishing conclusion. It is remarkable that so much effort should have been devoted to the study of the "optimal carbon tax" and so little—almost none—to estimating the optimal R&D budget. Indeed the observation is all the more stunning when one considers that estimating the optimal carton tax cannot be done independent of estimating the optimal R&D budget.

Great care will have to be taken in designing institutions for financing and carrying out the R&D. To take an obvious example, once it is known that government will finance R&D, rent-seeking will eat up resources that could otherwise be spent on real activities. More research is thus also needed to examine these institutional questions.

Managing fisheries

As noted in the introduction, fisheries management is not a global public good, but it does address a collective action problem and in this sense is very much like a global public good. In contrast to climate change, fisheries management can be aided by creating property rights to a fishery. But this remedy is easily exhausted. Some resources are shared and cannot really be otherwise (unless the contiguous countries merge). High-seas fisheries are, by law, subject to open access. They are thus more akin to the global climate change problem.

Shared fisheries

Shared fisheries are relatively easy to manage effectively. Consider a situation in which two countries share a fishery and each agrees to limit its catch. A treaty seeking to implement such an agreement would not enter into force until ratified by both parties. Moreover, once the agreement entered into force, it would be credible for each party not to limit its catch unless the other country did so, too. Cooperation between two countries is relatively easy. Cooperation among many is much harder; with a high-seas fishery, it may benefit some countries to limit their catch even if other countries do not.

Consider two management problems. Both concern Pacific salmon, but they are otherwise very different. In the first case, salmon are a shared resource; in the second, they are an open access resource.

Pacific salmon originate in the rivers of both the Canada and the United States. But the salmon originating in each country migrate and mature in the territorial oceans of the other country. Eventually they return to their river of birth, where they spawn, and die, to begin a new cycle. The incentive problem is this: because each country's fish spends part of its life in the other country's territory, each has an incentive to harvest the fish excessively. As noted by representatives of

Canada and the United States in a preliminary negotiation (Strangway and Ruckelshaus 1998):

> The problem of the Pacific salmon and its multiple claimants is a classic "tragedy of the commons" as popularized by University of California at Santa Barbara Professor Garrett Hardin. The immediate users (the fishermen) of the commons (the fish) in pursuit of their unregulated self-interest risk harvesting the commons at an unsustainable rate. There are other threats to the Pacific salmon ranging from habitat destruction to inadequate science to inconsistent fish management, but rules for their harvest must be set and enforced if the fish are to have a chance of survival.

Establishing such rules, of course, is the purpose of a treaty. Negotiation of a bilateral Canada-US treaty was hardly straightforward, but it did succeed (McRae 2001). Crucially, the agreement makes catch rates conditional on abundance. The treaty thus not only allocates the catch between the two countries, it also conserves stocks of the fish.

Illegal, unreported and unregulated fishing on the high seas

The salmon covered by this agreement also enter the high seas. So do the salmon originating in other countries in the region—Japan and Russia. And the stocks of these different fish intermingle so that it is not possible to distinguish one country of origin's fish from another's (except by genetic testing). This is a harder problem, and not only because there are four countries of origin. It is harder because fish in the high seas can be captured by *any* country.

Economic theory predicts that, with open access to such a fishery, the "rents" (that is, the economic surplus accruing to harvesting) would fall to zero. The logic is simple. If there are positive rents, an entrant can make money by entering. Since entry is unrestricted under open access, entry will occur until no more money can be made by entry. The obvious problem with this is that under open access the resource will yield every country (and thus the world) only a fraction of its potential economic return. Depending on the biology of the fish and the technology of fishing, the fishery may even collapse; the species may even become extinct.

This is why the countries in this region negotiated the Convention for the Conservation of Anadromous Stocks in the North Pacific

Ocean in 1992. The agreement is very simple. It bans fishing for anadromous fish (that is, fish that spawn in fresh water but that otherwise spend their lives in the ocean; the fish included in the treaty include six species of salmon and steelhead trout). The difficulty is that the treaty can only restrict the behaviour of the parties themselves. The agreement would enter into force only if ratified by Canada, Japan, Russia and the United States, and all these countries did ratify the agreement (the convention entered into force in 1993). But any country can fish in the high seas, and a treaty cannot prescribe behaviour for non-parties.

There are two ways for the treaty to be undermined. First, the contracting parties may allow their own fishing vessels to sail under the flag of a non-party state. This way they may continue to operate as before, only incurring the nominal cost of reflagging. Second, third-party states may enter the fishery.

Both possibilities are covered under article 4 of the convention. The relevant parts (paragraphs 3 and 4) are reproduced below:

> Each party shall take appropriate measures aimed at preventing vessels registered under its laws and regulations from transferring their registration for the purposes of avoiding compliance with the provisions of this convention.
>
> The parties shall cooperate in taking action, consistent with the international law and their respective domestic laws, for the prevention by any state or entity not party to this convention of any directed fishing for, and the minimization by such state or entity of any incidental taking of, anadromous fish by nationals, residents or vessels of such state or entity in the convention area.

At sea, anadromous fish are most efficiently caught in large-scale driftnets. But these nets ensnare other sea life, including dolphins, sea turtles and whales and have been called "curtains of death". Use of this technology (greater than 2.5 kilometres in length) was banned by United Nations General Assembly Resolution 46/215 in 1991. Enforcement is also aided by a bilateral agreement between China and the United States, allowing law enforcement officials of either country to board China- or US-flagged vessels suspected of illegal driftnet fishing on the high seas. The reach of enforcement can be substantial, as suggested by this description of a seizure by the head of fisheries enforcement for the U.S. Coast Guard (Davis 2003, p. 13):

On May 12, 2000, the Coast Guard, with authorization from the government of Honduras, seized the Honduran-flagged fishing vessel *Arctic Wind* for illegal driftnet fishing within the convention area. At least three driftnets totalling 20 miles were left behind by the *Arctic Wind*, and one whale was entangled in the net. The *Arctic Wind* was sold at auction for $226,600. More than half of the vessel's catch proved to be salmon from Alaskan spawning areas as determined by National Marine Fisheries Service genetic testing.

Enforcement is also aided by more general agreements, especially the 1995 Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (the Fish Stocks Agreement) and the 1993 Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (the Compliance Agreement). The former says that flag states of vessels that fish stocks regulated by a regional fishery organization should either join the organization or apply restrictions on its own vessels consistent with the restrictions imposed by the regional organization. The latter agreement enjoins flag states not to undermine the effectiveness of international conservation measures. The problem here is that only the former agreement has entered into force and that such treaties can be binding only on the countries that ratify them, if they also enter into force.

Enforcement can also be supported by trade restrictions. The anadromous stocks treaty requires that parties "take appropriate measures ... to prevent trafficking in anadromous fish taken in violation of ... this convention," and other agreements have taken a similar approach. The International Commission for the Conservation of Atlantic Tunas, for example, has recommended that parties "take non-discriminatory trade restrictive measures" against non-parties (and parties not in compliance). The problem with this approach is that there may exist large markets for the fish not covered by parties. The commission today has only 38 parties. That leaves a large market for any fishing interests to undermine its best conservation efforts. Transhipment is another problem. There is little to stop a fishing vessel from selling its catch to a third party that has not violated the commission's agreement, and for this state then to sell the fish in the markets of the commission's members.

In a phrase, the overfishing problem is one of illegal, unreported and unregulated fishing.[7]

The essential problem is that international law allows any state access to the global commons of high-seas fish stocks and does not require states to comply with agreements to limit catch levels unless the states voluntarily choose to become parties. The treaty approach is thus inherently limited. But so is the approach to reassigning property rights. Both measures have had some success. But each such success has also created the conditions for yet more illegal, unreported and unregulated fishing. Nationalization of some fisheries only encourages exploitation of the high seas. Success by regional agreements to limit harvests only increases the incentives for non-parties to fish in these same waters.

This process can lead in only one direction: a further tightening of international agreements coupled with an evolution in customary law. The reason for the latter is that custom applies universally. But custom evolves and is not created in the same way that treaties are. The Task Force should thus direct its attention to improving fisheries treaties, while noting that a change in customary law is likely to be needed ultimately.

Tightening fisheries agreements will require a combination of sticks and carrots. The problem is to get existing fishing states to join these agreements and comply with their conservation measures—where necessary, to comply with stronger conservation measures—while at the same time deterring new entry. The required sticks include trade restrictions with, where possible, extensions to transhipments—a possibility requiring a catch documentation scheme (such as the one now used by the Commission for the Conservation of Antarctic Marine Living Resources). The required carrots are necessary to ensure that non-parties gain by acceding to fisheries agreements. Essentially existing parties must be prepared to lower their catch limits to make it attractive for other countries to join, and so accept constraints on their catch levels.

Transparency in the behaviour of states will also help—not least by facilitating the naming and shaming of offenders. According to an official from the UN Food and Agriculture Organization (Doulman 2003, p. 24):

> The polite, soft diplomatic measures of the past, where members and other countries were not named, are no longer in vogue. Information made available on the Internet provides lists of vessels that have engaged in IUU [illegal, unreported and unregulated] fishing, their flags and other related information. There is evidence that making such information available publicly has a positive impact

on vessel and fleet behaviour and encourages some countries that offer 'flags of convenience' to rein in offending vessels that damage the countries' reputation.

The role of non-governmental networks and technology could thus be as important to addressing overfishing as it is in disease surveillance (see Barrett 2006).

These actions will promote a general rejection of the right of states to undermine international conservation measures (especially by serving as a flag of convenience) and so help promote an evolution in custom. The rules incorporated in the Compliance Agreement must be seen to apply universally and not only to the parties to this agreement.

Conserving biodiversity

Biodiversity is an important and complex part of the commons. Even defining the concept is difficult, because it has many dimensions, starting with species diversity, ecosystem function and resilience. If the goal were to maximize species diversity only (subject, say, to a budget constraint), conservation should focus on protecting tropical ecosystems rich in species, especially endemics. If the goal were to conserve ecosystem function, however, the focus should be on keystone species in important ecosystems. The arctic is especially vulnerable to the loss of an individual species precisely because it is low in species diversity. Such a loss can set into motion a complex of changes that cause the ecosystem to be fundamentally transformed. The value of an extra species conserved in the tropics, where species are more often redundant in terms of function, would thus be less than the value of an extra species conserved in the arctic—particularly if the latter could be identified as a keystone. And yet redundancy may also be worth conserving. Functionally similar species help make an ecosystem more resilient to shocks.

The threats to biodiversity are equally diverse. They include overexploitation, pollution, biological invasion and habitat destruction. There are also many different values to biodiversity. Some species have direct use value. Some are valued indirectly, perhaps because they support a species valued directly or because of their role in maintaining ecosystem function. And some are of potential value in future research, and so have

an option value. Even the existence of some or all species may be valued. Only the last value makes biodiversity conservation a global public good.

A variety of institutions aims to remedy the incentive problems.

- Treaties seeking to protect individual species (such as the Agreement on Conservation of Polar Bears) and groups of species (such as the Convention for the Conservation of Anadromous Stocks)
- Regional agreements (such as the Agreement on the Conservation of African-Eurasian Migratory Waterbirds) and global agreements (such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora)
- Treaties focusing on harvesting (such as the Convention for the Conservation of Southern Bluefin Tuna) and habitat protection (such as the Convention on the Protection of the Alps)
- Agreements seeking to reduce pollution that can be harmful to wildlife as well as people (such as the Convention on Persistent Organic Pollutants) and limiting the risk of species invasions (such as the International Plant Protection Convention)

The Convention on Biological Diversity offers a more comprehensive approach. Among other things it requires that parties establish a system of protected areas, conserve their biological resources, protect their ecosystems, promote environmentally sound management in areas adjacent to protected areas, rehabilitate and restore degraded ecosystems, limit the risks posed by genetically modified organisms and prevent harmful species invasions. For reasons outlined earlier, these are all appropriate actions. But the agreement leaves it to parties to determine what specifically they should do. It may therefore fail to alter behaviour.

Domestic policy

In some cases this apparent failure will not be a huge problem. Countries may have incentives to conserve biodiversity unilaterally. Suppose that the cost of protecting some discrete amount of biodiversity (a species, say, or a well defined habitat) in country i were C_i and that the corresponding benefit were B_i. Further, let the aggregate benefit of conserving this biodiversity to the rest of the world be B_{-i}. Then conservation is really only an international problem if $B_{-i} + B_i > C_i > B_i$. The gain to all countries from conservation exceeds the cost, but the cost of conservation exceeds the benefit to the country having to pay for it. In rich countries the incentives to conserve biodiversity are likely to be fairly high. And this is reflected in domestic legislation, such as

the United States Endangered Species Act of 1973. Even in developing countries the incentive to conserve biodiversity will be strong in many cases. Ecosystem function, for example, will yield substantial local benefits—a matter returned to later.

And yet even where a country gains from conservation, imperfect domestic institutions may prevent it from implementing effective policies. Smith and others (2003) found that countries containing priority conservation areas (as identified by three international conservation non-governmental organizations) had lower governance scores (based on Transparency International's corruption index) than countries that did not. Poor governance was also associated with declines in elephant and black rhinoceros populations. Smith and others (2003, p. 69) conclude that the usual approach to promoting conservation (especially trade bans, as implemented under CITES) is counter-productive, serving only to "encourage bribery and increase the power of corrupt officials." The suggestion is that domestic institutions matter as much as international institutions and that the effectiveness of the latter may depend on the quality of the former.

Preventing extinction

When biodiversity conservation supplies a global public good, however, unilateralism will often not suffice, no matter what the quality of the domestic institutions. Under these circumstances, the countries that gain the most from conservation will need to finance its provision (Barrett 1994). The need for financial transfers is incorporated in the Convention for Biological Diversity. Article 20 requires that developed country parties "provide new and additional financial resources to enable developing country parties to meet the agreed full incremental costs to them of implementing measures which fulfil the obligations of this convention." It also says that the "extent to which developing country parties will effectively implement their commitments under this convention will depend on the effective implementation by developed country parties of *their* commitments under this convention related to financial resources [emphasis added]." The Global Environment Facility was made the financial mechanism for the convention.

Habitats especially deserving of protection because of being rich in endemic species are sometimes called "hot spots". A recent analysis by Myers and others (2000) identifies 25 habitats that the authors

guess harbour 44% of all plant species and 35% of vertebrates on just 1.4% of the Earth's land surface. Their work suggests that these habitats need to be protected as a priority. But the Global Environment Facility is not on course to protecting biodiversity on this scale. Through 2000 the facility had spent about $1 billion on biodiversity conservation. And yet, according to Wilson (2002, p. 183), about $30 billion would need to be invested to save "the hottest of the hot spots on the land and in shallow marine habitats, which together contain perhaps 70% of Earth's plant and animal species." If the benefits exceeded the costs, it would seem that there is a manifest need for scaling up funding in this area. The reason for underfunding is likely to be a failure to correct free-riding incentives, and any proposal for increasing funding will need to devise an appropriate and effective incentive mechanism.

Protecting ecosystem services

Although international attention often focuses on the conservation of species, this is only part of the challenge and perhaps not even the most important part. As Daily and others (1997, p. 5) put it, "the benefits that biodiversity supplies to humanity are delivered through populations of species residing in living communities within specific physical settings—in other words, through complex ecological systems, or ecosystems." This perspective draws our attention to the importance of location. Ecosystem services provide local as well as global benefits.

Local communities have an incentive to protect their ecosystems, even if local conservation provides global benefits. And biodiversity conservation undertaken for the global good has local consequences. These consequences are both positive and negative: positive insofar as ecosystem services are provided by conservation, and negative if substantial opportunity costs are borne locally. As noted by Adams and others (2004, p. 1146), for example, "creation of protected areas can have substantial negative impacts on local people. The eviction of former occupiers or right holders in land or resources can cause the exacerbation of poverty, as well as contravention of legal or human rights."

As noted previously, poor local governance is a cause of biodiversity decline. The other side of this coin is that global conservation efforts may leave local communities worse off where local governance is poor. International agreements are between governments, but if local governance is weak, such international transactions may not be efficient in the

sense of making all parties—not just states as aggregates, but individual communities—better off. Global biodiversity conservation efforts must thus channel resources to the local communities affected adversely by conservation. The question is not just one of compensation. It is also one of process. And it is one of incentives. Creating protected areas, for example, is not enough. The communities living in and around protected areas must have incentives to protect the global biodiversity value.

Conclusions

This paper has focused on three of the most important commons problems. The main recommendations following from the analysis are as follows:

- A different approach is required to address global climate change. Even if the Kyoto Protocol is fully complied with, it will make little difference to the climate. But as explained here, enforcement is likely to be a problem with this agreement. It is also likely to be a problem for any follow-on agreements that involve setting targets and timetables. Efforts to reduce greenhouse gases in the short term are needed, and voluntary approaches may make some difference. However this approach should not be relied on exclusively. It is essential that the current approach be broadened. More than anything, it must be supplemented by taking a longer term perspective and addressing the enforcement problem.

  Any serious effort to address climate change will require new technologies that produce energy without emitting greenhouse gases. Discovering new technological possibilities will require basic research, and Kyoto creates no incentives for basic research. Indeed energy R&D has been cut back in many countries since Kyoto was negotiated. The R&D needs to be strategically focused to take account of the enforcement problems. A focus on carbon sequestration technologies, for example, would have a distinct political economy advantage in that this technology would allow fossil fuels to be burned without emitting greenhouse gases.

  A new approach will also be required to promote the diffusion of new technologies, and this must also be strategic. Technologies entailing economies of scale and network exter-

nalities are likely to be easier to diffuse. Financial transfers are also likely to be needed to compensate developing countries for adopting the new technologies. Such transfers have an advantage, however, because investment in developing countries will not require scrapping capital prematurely.

- The central problem with the management of international fisheries is illegal, unreported and unregulated fishing. This problem arises because of limits being reached in property rights approaches to fisheries management and because of weaknesses in treaty design and enforcement. A sticks-and-carrots approach needs to be used to enforce fisheries agreements. Improved monitoring, coupled with public disclosure of violations, is also needed. The latter can make use of informal channels, coupled with better surveillance technology. Eventually customary law will need to evolve to make actions that undermine international fisheries management illegal.
- Biodiversity—a multidimensional concept involving the conservation of species diversity, ecosystem function and resilience—cannot be conserved by a single instrument. Domestic institutional reforms and regional and global agreements are needed. Protecting "hot spots"—a cause championed by some ecologists and non-governmental organizations—will require financial transfers from the countries that benefit from in situ conservation to the countries that supply it. The amounts currently available through the Global Environment Facility fall far short of the need. The continuous nature of the pure global public good of existence will require a strategic approach to financing.

Notes

1. The process of ozone depletion and the history of its discovery are beautifully told by Irwin (2002).
2. According to the World Bank (2000, p. 92), "90 to 95% of fish are found within EEZs [exclusive economic zones]."
3. The discussion here draws from Intergovernmental Panel on Climate Change (2001).
4. One reason to expect the effects of climate change to be negative is very simple. Many of our investments are climate-specific, the location of economic activity being a clear example. From this perspective, any

change in climate (including cooling) would impose costs. And because it takes time—in many cases, a very long time—for species and ecosystems to adjust to changes in climate, this reasoning applies as much to non-marketed effects as effects that would be counted in GDP.

5. If the "flexible mechanisms" perform poorly, marginal costs could be as much as 10 times their cost-effective levels (Clinton Administration 1998).

6. "Hot air" refers to the surplus of emission reductions for the former communist countries of Europe. Russia, for example, is required to stabilize its emissions under the Kyoto agreement, and yet its actual emissions in 2000 were about 70% of the 1990 level. Trading with Russia can thus allow countries to comply with the agreement, not by reducing emissions, but by paying Russia to obtain a portion of its surplus.

7. See Upton and Vitalis (2003) for an excellent discussion of illegal, unregulated and unreported fishing.

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The Costs and Benefits of Protecting Global Environmental Public Goods

Chapter 2

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This chapter analyses information on the possible costs and benefits of conserving global biological diversity and of mitigating climate change and provides ranges of such costs and benefit estimates. It considers two questions: To what extent is there a broadly shared understanding of costs and benefits? And to what extent is cost-benefit analysis a helpful tool in finding adequate policy responses to global environmental problems?

The chapter first considers modelling of costs and benefits of climate change and of policy measures to control the build-up of greenhouse gases in the atmosphere. It then examines the literature on values of biodiversity and of ecosystem services and on the cost of protecting global biodiversity. It concludes by discussing international efforts to allocate resources for addressing these problems and makes some suggestions on how to increase international funding for protecting global environmental public goods.

This review leads to a rather critical assessment of the value of cost-benefit analysis, particularly for assessing the costs to societies of greenhouse gas mitigation measures. Modelling results claiming high costs of implementing the Kyoto Protocol have often been used to politically frame the issue in a way that has helped special interests to oppose proposals for environmentally motivated energy policies. However modellers have to make far-reaching assumptions about a range of variables such as about the long-term impact of environmental and economic policies, about technological progress and about trends affecting the energy economy. As a result, wildly differing claims about the costs and benefits of environmental policy measures have been made by the political actors most vested in the debate and by economists sympathizing with one side or the other.

Cost-benefit studies have helped a great deal in finding specific cost-effective abatement strategies, but they are poor or misleading tools

for assessing aggregate long-term costs and benefits to societies. Estimates of the annual costs of implementing greenhouse gas mitigation measures range from net benefits of 1% of a country's or the world's gross domestic product (GDP) to net losses of 2% of GDP. More recent studies tend to show lower costs or higher benefits than earlier studies. High-cost scenarios generally estimate only direct costs to the hardest hit economic sectors without taking into account transitional regulatory exemptions and governmental support measures, and without estimating public commons benefits. Low-cost studies, on the other hand, have been criticized as overly optimistic about energy conservation potentials, positive employment effects or the speed of renewable energy technology diffusion.

Economic studies attempting to measure the use and non-use value of biodiversity and natural ecosystems have provided more useful input into the political decision-making process than climate policy cost modelling. They work best when focusing on well defined local ecosystems, for which they can show the economic trade-off costs and benefits to local communities—for example, of clear-cutting a forest parcel or of sustainably managing it over decades. Most recent assessments are rather pessimistic about the so-called win-win opportunities—the real potential of protecting biodiversity while realizing economic development gains at the same time. This suggests that non-use values will often be protected only if a global interest in this exists, and if local stakeholders can be compensated for not using the resource.

Empirical findings point to great difficulties in assessing a global economic value of biodiversity based only on economic use values. Contingent valuation studies provide one instrument to estimate the willingness-to-pay of the public for the aesthetic or intrinsic non-use value of biodiversity and wilderness. They find that such a willingness to provide more funding for conservation seems to be considerable. However no systematic efforts have been undertaken by governments to capitalize on this willingness to contribute more towards global conservation goals.

Attempts to aggregate empirical findings on the non-use value of biodiversity and ecosystem services to a national or even global level are hampered by the limited data on biodiversity as well as by the very uneven distribution of biodiversity among countries. But while cost-benefit studies on biodiversity conservation are fraught with problems, they do indicate that a global network of protected areas in developing countries could be built and maintained at relatively low cost compared with what

the world spends on other public policy objectives. Annual international investments of less than $10 billion would go very far towards permanently protecting most remaining critical biodiversity around the world. Although this is a very small nominal amount when compared with many other public policy expenditures, it is nevertheless more then 10 times what the international community currently spends on this objective, non-governmental organization (NGO) and philanthropic foundation giving included (Clémençon, this volume, Chapter 3).[1]

Cost-benefit analysis related to environmental public goods has been a growing business over the past decade, and valuable insights have been gained into how to assess economic impacts of large-scale changes to ecosystems and the ecosphere. But the experience also shows that modelling of future developments ultimately remains informed guesswork, no matter how sophisticated the models. The belief that cost-benefit analysis can provide answers for policy-makers may have postponed the introduction of sensible policy measures, which could have been justified with reference to a precautionary approach. Had such policy initiatives—particularly in the energy sector—been initiated more firmly a decade ago, by now this would have led to far different framework conditions for cost-effectively reducing carbon emissions and would have saved consumers hundreds of billions of dollars in energy costs in addition to producing significant health benefits from a reduction in air pollution. Cost-benefit analysis—willingly or not—has long served as the fig-leave for far-reaching policy failure in the energy sector.

International investments into both climate change and biodiversity conservation continue to fall painfully short at a time when progress on strengthening multilateral environmental agreements remains elusive. However, as the following detailed discussion will show, an exact price tag cannot be put on policies to "adequately" protect global environmental goods. More important than attempting to identify exact costs of future policy interventions is designing measures that will gradually but steadily move towards providing predictably increasing financial resources for programmes and projects in developing countries that benefit global environmental objectives. This would help sustain momentum for investing in research, development and marketing of renewable energy technologies and towards provision of incentives for energy conservation. It would help scale up efforts to protect and expand national nature conservation systems, improve park maintenance and allow implementing initiatives for broadly conserving biodiversity in economic productive zones.

A predictable increase in funding is extremely important because it provides the markets with signals that investment opportunities exist and will grow, and it maintains existing capacity on the individual and institutional levels and can build on it. Currently, however, funding specifically for global environmental protection is actually declining in real terms. This trend jeopardizes what has been accomplished so far, particularly in biodiversity conservation, where human resource and institutional capacity can evaporate quickly if financial resource flows cannot be sustained.

Two paths of action must be explored:

- Countries must increase budgetary resources for global environmental protection gradually but predictably over the coming decade.
- New ways of raising funds for global environmental protection efforts must be explored that are independent of national budgetary allocation processes. In the long term some form of global commons tax should be introduced on the international level. It could evolve from voluntary, government-backed fund-raising initiatives that are designed to tap into the public's willingness to pay for provision of global environmental public goods.

Climate change

A stable climate is a global public good. Rapid climate change stresses the ability of ecosystems and of societies to adapt, and there now is little doubt that global warming is taking place as a result of the increased concentration of greenhouse gases and that this increase is caused by human activities (IPCC 2001; Hansen 2004; Dowdeswell 2006; *Science* 2006). Providing for a stable climate implies addressing the anthropogenic factors that cause climate change, an objective that led to the negotiation of the Framework Convention on Climate Change (FCCC) in 1992. Parties to the FCCC agree to stabilize greenhouse gas concentrations in the atmosphere at a level that will "prevent dangerous anthropogenic interference with the climate system".

The only legally binding target for greenhouse gas reductions is contained in the Kyoto Protocol. It commits developed countries to reduce their overall emissions to at least 5% below 1990 levels from 2008 to 2012. The entry into force of the Kyoto Protocol in February

2005 opened the door for formal negotiations on a second commitment period beyond 2012. On 22 March 2005 European Union (EU) heads of state supported a goal of 15–30% cuts in greenhouse gases by developed countries by 2020. EU environment ministers earlier called for emission cuts of 60–80% by 2050 and stated that global temperature increases should be held to less than 2 degrees Celsius over pre-industrial levels (*Europa Newsletter* 2005). However these are not internationally accepted targets, and the United States—the largest emitter of greenhouse gases—is not a party to the Kyoto treaty.

Costs of climate change

Assessing the economic cost of climate change for society is almost impossible. It requires modelling different scenarios of energy economy pathways, emission trajectories and atmospheric concentrations and how they translate into changing global climate patterns. And it requires predicting how climate change might affect ecosystems and the economy. The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2001) identifies a range of impacts—on agricultural productivity, precipitation patterns and water availability, frequency of extreme weather events such as floods and droughts, inundation of coastal zones and rapid changes to natural ecosystems.

Poor and low-lying developing countries will suffer the most direct consequences from changes in precipitation patterns, extreme weather events and rising sea levels. But in the longer term developed countries will be affected as well. Many recent national and regional assessments have attempted to estimate potential effects of climate change on national economies. Most refrain from estimating actual costs of the potential damage. They do, however, predict significant effects on agricultural productivity, in both developing and developed countries (EEA 2004a; EPA 2004). They also show that the costs of extreme weather events have increased measurably over the past decades, from an average of $5 billion to $11 billion a year in Europe. In 2004 the United States suffered one of the worst hurricane seasons since 1930, costing Florida $30 billion in insured and $20 billion in uninsured damage (*New York Times*, 28 September 2004). The 2005 hurricane season proved even more catastrophic. Hurricane Katrina, which hit New Orleans on 28 August, cost the lives of more than 1,300 people and economic damages estimated to far exceed $100 billion (NOAA/NCDC 2005).

In June 2004 India presented its first comprehensive national communication to the UNFCCC, discussing the country's overall vulnerabilities in great detail. Regional climate models project significant warming for India. The Indian summer monsoon rain is, however, not expected to be greatly affected by warming trends, nor are the simultaneous occurrences of floods in some areas and droughts in others. The Indian national report points to significant ranges in climate modelling results and does not contain any quantitative assessment of potential costs in monetary terms. The report does foresee adverse implications for the agricultural sector, which is seen as undergoing significant transformation over the coming decades due to changing demand and technologies.

Considerable effort is being devoted to developing economic scenarios for projecting emissions and warming trends. But what type of scenarios to use in the next IPCC assessment is a politically contentious issue. Countries disagree on underlying assumptions, such as the extent to which models should include scenarios "with measures" and with "additional measures" and how to deal with uncertainty and how to assign probabilities to "what-if" scenarios (IPCC 2005). Discussions reflect the difficulties in agreeing on how to forecast even just emissions trajectories, let alone environmental and socio-economic consequences. But the ability to model GHG emission trajectories with some degree of confidence is a necessary first step towards modelling costs and benefits of policy measures to reduce emissions.

Cost of abatement measures

Shifting to a less carbon-intensive future will require huge up-front capital investments in carbon-free or less carbon-intensive fuels and technology. Cost-benefit studies try to assess whether such investments are warranted. On the cost side, regulatory costs (such as pollution taxes and emission standards) and opportunity costs of using capital for mitigation measures rather than some other public or private good objective need to be considered. On the benefit side, one first needs to estimate the value of avoided environmental externalities. Such externalities include possible climate change, with all its consequences. Of more immediate concern are environmental and health costs from air pollution caused by burning fossil fuels. Air pollution remains a significant issue not just in developing countries, but also in the United States and Europe, causing 50,000 to 100,000 premature deaths a year in the United

States alone (Schaefer 2002; Pope and others 1995). An integrated approach to air pollution and climate change improves cost-effectiveness of policies that may not be considered cost-effective from a climate change or air pollution perspective alone (see EEA 2004b on this subject). A shift away from a fossil fuel economy to a less carbon-intensive energy economy is also expected to increase employment and reduce energy costs.

The big question is whether the benefits outweigh the costs. Economists come to very different conclusions. There are two basic approaches that modellers use to assess carbon reduction potential and costs: bottom-up and top-down.[2] Bottom-up models try to identify the energy saving or carbon reduction potential available to specific consumers, producers or sectors. Attaching costs to each option makes it possible to determine the least costly ways to reduce greenhouse gases. Top-down models are macroeconomic models of various types (general and partial equilibrium models) based largely on how such macroeconomic indicators as economic growth, energy economy and demographic trends affect each other. Top-down estimates are not concerned with exactly what a consumer or producer does when the price of energy changes, but with what the overall result is in terms of energy consumption.

Top-down cost estimates are typically higher than bottom-up estimates. One explanation is that top-down models are inherently pessimistic about behavioural changes, while bottom-up models are more optimistic about consumer responses to market incentives and government measures (Kolstad and Toman 2001). While bottom-up approaches tend to overestimate carbon abatement potential at the individual and firm levels, the extent to which this potential can be captured depends critically on the policy mix adopted in the model. Top-down assumptions may not sufficiently consider, for example, the effects of gradual policy changes and the advances in technology development they may trigger. Such assumptions tend to emphasize immediate costs to the economic sectors most affected, while assessing long-term benefits much more cautiously—if at all. Many experts argue that this leads to a systematic bias emphasizing short-term costs and neglecting long-term benefits (Repetto and Austin 1997; Krause, Baer, DeCanio and Hoerner 2001; Barker and Ekins 2004). One should add that top-down highly aggregated models also fail to consider the domestic and international distribution of winners and losers.

Newer integrated assessment models combine elements of top-down and bottom-up approaches but do not escape the inherent limi-

tations posed by having to make far-reaching assumptions about key economic, demographic, environmental and social indicators.

The following section discusses a few widely quoted results from such modelling studies. The first costing studies related to climate change emerged in preparation for the Kyoto Protocol negotiations. One of the earliest economic assessment models—GREEN, for General Equilibrium Environmental model—was developed by the Organisation for Economic Co-operation and Development (OECD) Secretariat and has been used extensively for a wide variety of analyses (Cline 1992; OECD 1993, 1995).[3]

The IPCC's Third Assessment Report (2001) goes to great length to sort through the literature on cost estimates of implementing various greenhouse gas abatement scenarios. The IPCC concludes that the range of estimates from top-down models is large—from 0.5% to 2% of GDP—by projecting actual net benefits to overall economic costs (IPCC 2001, p. 503). Bottom-up models discussed by the IPCC showed that energy efficiency gains of 10–30% above baseline trends could be realized at negative to zero costs over the next two or three decades.

In July 1998 the Clinton administration published a study concluding that the costs to the United States of reaching the Kyoto targets would be modest (Council of Economic Advisers 1998). The estimate was that permit prices of $14 to $23 per ton of carbon would increase fuel oil prices by $0.05 to $0.08 per gallon above their projected prices in 2010. Several economists questioned this assessment and asserted that costs for the United States would be much higher (Nordhaus and Boyer 1999).[4] These higher estimates were widely publicized and became politically very influential. The *Wall Street Journal* in 2001 quoted an economist of the 2000–04 Bush administration, Richard Schmalensee, predicting that the United States would have to close all its coal-fired power plants by 2012 just to get halfway to Kyoto's targets. In the same article, Alan Manne, a Stanford University professor and renowned climate modeller, is quoted as saying that implementing Kyoto would amount to a $400 annual tax on every US citizen.

Other economists disagree with the assumptions underlying such estimates. Krause, Baer, DeCanio and Hoener (2001) altered five widely cited federal and university economic simulations so that the models incorporate the full range of approaches the IPCC recommended to soften the Kyoto Protocol's potential economic impact. They find that while such sectors as the coal industry would be seriously affected, the US economy would gain from ratifying the protocol. The five altered models

show gains of 0.5–1.0% in GDP instead of drops of 2–4%. Many simulations rule out alternative market outcomes and possibilities for profitable energy efficiency improvements in industry (DeCanio 2003).

Others agree with the premise that modest carbon control can be achieved at marginal costs of less than $100 per ton of carbon—and in some cases considerably less than $100 per ton—if well designed policies are implemented gradually and purposefully (Toman 2003; Rivers and Jaccard 2005). A $100 per ton carbon tax translates to about $12 per barrel of crude oil, or $0.25 per gallon ($0.06 per litre) of gasoline. Implementation costs also strongly depend on assumptions about the extent of emission trading and the price of emission permits (McKibbin and Wilcoxen 1997).

Actual empirical evidence contradicts simulation results that show high costs of carbon mitigation. The recent experience of the Global Environment Facility (GEF) with greenhouse gas mitigation projects shows that few of its active projects in developing countries cost more than $10 per ton of carbon reduced—and many cost considerably less (Eberhard and Tokle 2004, p. 31). Long-term energy efficiency projects turn out to be the most cost-effective ones. Small investments in energy efficiency could produce huge economic savings in many countries (Froggatt and Canzi 2004). However, what is lacking is not only seed capital to develop these projects, but basic knowledge and individual and institutional capacity to identify low-cost or win-win investment opportunities necessary to break out of the traditional local energy economy.

A key methodological criticism of economic assessment models: few consider opportunities for market reforms, technology programme and tax shift reform, and the incremental shifts they can cause. In a comprehensive review of the literature on costs of the Kyoto Protocol, Barker and Ekins (2004) conclude that assumptions and methodologies in top-down models do not hold up well and that if policies "are expected, gradually introduced and well designed", net costs to the United States of mitigation are likely to be insignificant—that is, within a range of +/–1% of GDP. They intentionally leave out bottom-up models, which consistently arrive at more optimistic assessments of the potential of no-cost carbon abatement. Others criticize more fundamentally the dominance of quantitative cost-benefit analysis in the economic analysis of climate policy and the lack of approaches based on precaution and the possibility of extreme events and structural change (Van den Bergh 2004). The experience of European countries with environmental taxation for promoting energy conservation and

renewable energy technologies furthermore provides strong evidence that such measures have resulted in environmental and economic benefits (EEA 2006).

One central assumption every model makes is the discount rate to use for assessing the worth of an investment today against its worth tomorrow. A discount rate of 7% means that $100 today is expected to be worth only $93 next year. A high discount rate applied to climate change suggests there is little need for immediate and costly measures; the assumption is that abatement measures will be cheaper in the future. Because of the high degree of uncertainty, many experts suggest discount rates for climate change should be close to zero.[5] Economic assessment models often use higher discount rates, which bias towards showing higher costs for policy measures.

Another assumption is the baseline that future economic costs of policy actions are measured against. Models generally depart from a status quo that locks in significant special interest privileges, such as subsidies and regulatory exemptions, which are not efficient. Negative changes in these sector entitlements then show up as economic costs on the aggregate level.

Another issue often neglected in integrated cost models is valuating non-use benefits of a healthy or stable environment. Direct costs to regulated entities can be assessed rather easily (such as how logging restrictions may affect jobs in a community, or how much it costs to install state-of-the-art air pollution abatement equipment). Direct and indirect benefits are much more difficult to assess because they are mostly non-monetary and their quantification poses significant methodological and ethical problems. What is a human life and good health worth, and is it worth the same in a poor and rich country or in the poor and rich part of town (Markandya 2001; Schaefer 2002)?

Recent energy price developments demonstrate how dependent models are on making the right assumptions about key indicators. Oil prices stood at over $60 a barrel in February 2006, far above what international experts estimated only two years before, when many economists saw prices decline again from the $35 a barrel they had reached after the Iraq war began (TFC Commodity Charts 2006). Oil producers also did misjudge pricing trends, and oil giant BP, for example, almost doubled its price estimates between May 2003 and August 2004 (Verleger 2004).

Most climate change economic assessment models use energy price scenarios much lower than current prices. The Energy Information Administration (EIA) worked with three scenarios. The reference scenario

projects stable oil prices at about $20–25 a barrel, and the high price scenario reaches $30 by 2020. In 2003 uncertainties brought about by the Iraq war and strong oil demand increases led the EIA to revise price projections, with the reference scenario now using price estimates of $25–30 by 2020 and the high price scenario reaching $40 in 2020 (EIA 2004). Steep energy price increases in 2005 have created very different overall framework conditions for investments in energy-efficient and renewable energy technologies, with many energy analysts predicting oil prices to continue to raise over the coming years, due both to stagnant production and increasing demand from new economic powerhouses, China and India.

It is now evident that many investments into conservation or renewable energy technology considered too costly in the 1990s would have resulted in economic benefits even without considering environmental benefits. Significantly higher energy taxes in European countries have also contributed to very different trends in car fleet fuel efficiency and per capita CO_2 emissions in European countries compared with the United States (EEA 2006).

The social (and political) construction of costs and benefits. Cost-benefit modelling needs to be considered in a broader political context. It provokes one of the great holy wars in environmental politics between those who advocate more reliance on a precautionary approach and those primarily concerned with cost implications of regulatory intervention to key economic sectors. Since the early 1990s cost-benefit assessments have exerted a growing influence on the policy debate on climate change—for example, in connection with the early debate on joint implementation and emissions trading. Modelling results are often used to argue for or against certain types of policy interventions and—particularly in the United States—against policy intervention in energy markets.

Social scientists have long been interested in the processes that lead to societal recognition of social and environmental problems that are not easily observed and political response to them. They have stressed the role that different actors such as scientists, non-governmental social movement organizations, the business community and government agencies play in calling attention to environmental problems or in challenging claims that have been made by what sociologists call "issue entrepreneurs" (Schneider and Kitsuse 1984; Hannigan 1995; Mertig, Dunlap and Morrison 2002).

The question of how an issue can be successfully framed for political consumption has gained considerable attention in recent years. Some have made the point that the environmental movement has failed to capture the attention of the public despite deteriorating global environmental quality, while interests opposing environmental policies have used environmental-sounding slogans to push through policies that have weakened environmental laws and standards (Shellenberger and Nordhouse 2004; Lakoff 2004). The cost-benefit debate must therefore be understood as part of a political struggle over the distribution of costs and benefits from climate control measures among different segments of society related to the distribution of economic and political power.

Early cost-benefit analysis has focused almost exclusively on the implementation costs of policy measures to particular economic sectors. The cognitive "frame" that greenhouse gas control measures are costly to society at large has since become a dominant perception among the general public, particularly in the United States. Absolute cost figures have also become a staple for most news media hooked on catchy sound bites to drive home political arguments. The cost-benefit debate also reflects the emphases of different disciplines. While economists tend to explain individual behaviour as a rational utility function, psychologists and sociologists focus on cognitive factors and how learning, social change and cultural norms shape beliefs and policy preferences. Political scientists focus on how parliamentary systems, special interest group politics and institutional constraints affect policy decision-making (Almond and Powell 1978; Dunlap and Catton 1979; Schnaiberg and Gould 2000; Rosenbaum 2004). Cost-benefit assessments rarely take account of interdisciplinary insights.

While cost-effectiveness is an important element in building coalitions for change, the rent-seeking behaviour of vested interest groups has little to do with overall economic efficiency and social welfare considerations, but it is often framed as being in the economy's—and therefore the public's—best interest.

The history of the US Clean Air Act is a case in point. This piece of legislation has rightly been heralded as a pioneering piece of lawmaking among developed countries. But it was also critically watered down by politically well connected vested interests in the coal and car industries, and its full implementation has stalled for decades. The costs of abatement measures were systematically advertised as excessive in industry-sponsored studies, while medical studies on the human health impacts of air pollution were systematically being chal-

lenged as "junk science" (Dewey 2000; Davis 2002; Bradsher 2002; Barcott 2004; UCS 2004).

Despite progress on environmental issues, persistent policy failures have resulted in gross economic inefficiencies, amounting to hundreds of billions of dollars in direct and indirect subsidies for the coal industry over the past decades, at an arguably significant cost to society. They have prevented industrial countries from more effectively addressing energy conservation and renewable energy technology development, and they have increased dependency on foreign energy sources. They have contributed to a situation where more than 100 million Americans and equal numbers of Europeans live in urban areas that routinely violate minimum clean air standards (OECD 2001; American Lung Association 2004).

The cost-benefit debate has profoundly affected the discussion about what environmental policy instruments are acceptable, and in several countries it has encouraged opposition to environmentally motivated energy taxes. It is also important to note that cost-benefit analysis is generally more widely used in the United States than in European countries, which can be linked to philosophical differences. The United States bases environmental policy on the principle of risk management, building on scientific evidence and cost-effectiveness, while most European countries have adopted the precautionary principle as the basis for environmental legislation (Andrews 2000; Vogel 2001; Rosenbaum 2004).

The purpose of this discussion is not to question the value of cost-benefit assessments in general but to demonstrate that politics and personal preferences cannot be kept out of modelling. A sensible energy policy implemented throughout the 1990s could have encouraged broad-based energy conservation, renewable technology development and market penetration. This would not only have saved consumers hundreds of billions of dollars and helped reduce the growth of greenhouse gases, it would equally have contributed to a significant reduction of dependency on foreign oil of developed countries, an objective that has now moved to the top of the political agenda even of the Bush administration, which for years has only supported measures to increase energy supply.

In hindsight it is clear that most cost-benefit assessments got it seriously wrong but contributed to stalling the phase-in of decisive energy policy measures designed to address both air pollution and greenhouse gas emissions.

International investments in climate change abatement

How much would it cost the international community to adequately mitigate greenhouse gas emissions? This question can only be answered politically, taking into account a qualitative assessment of the severe risks involved in not controlling climate change and the potential benefits of decisive steps towards reducing greenhouse gas emissions. Such an assessment leads to the conclusion that the risk of not controlling emissions is significant and open-ended, while the costs are likely small and declining—or even negative to start with.

Governments around the world are already pouring billions of dollars into renewable energy and energy conservation measures—among them large greenhouse gas emitters such as India and China. But the same governments are investing many times more resources into building traditional coal and oil resources and nuclear power plants. Efforts have been made to accelerate the development of renewable energy markets, but international funding remains very small compared with both the needs and the opportunities. International financial support for developing countries from bilateral and multilateral sources (including the GEF and the Clean Development Mechanism) amounts to perhaps $1.5 billion, although financial resources for renewable energy sources amount to no more than 10% of that (Clémençon this volume, Chapter 3; Compare Clémençon, Chapter 3, Table 3.6, p. 91).[6]

The GEF is the largest grant-providing multilateral institution to support greenhouse gas abatement measures in developing and transition countries. Annual GEF commitments to the climate change focal area have averaged around $150 million annually over the last 8 years, however decreased to about $140 million in recent years. The GEF distributes its funds over four operational programmes, the largest two being the promotion of renewable energy and the removal of barriers to energy efficiency and conservation. The other two programmes target the reduction of the long-term costs of low greenhouse gas–emitting energy technologies and the promotion of environmentally sustainable transport. The GEF has also funded 269 enabling activities to facilitate implementation of effective climate change response measures and preparation of national communications. A new strategic focus is on cross-sectoral capacity building at the individual, institutional and systemic level.

Renewable energy as a target for international cooperation. The GEF is programming about $100 million a year for removal of market barriers

to renewable energy technologies. Other multilateral donors have also increased their efforts in this regard. The European Bank for Reconstruction and Development has set up a fund worth €30 million, and the World Bank has pledged to target 20% annual growth of its lending portfolio for renewables and energy efficiency.

But such initiatives have been late in coming and are small compared with needs and opportunities. Many countries have adopted tentative targets for generating 20% of their electricity with renewable technologies by 2020, but much more ambitious targets seem possible. In June 2004 the International Conference for Renewable Energies produced a useful compilation of country actions and commitments to promote renewable energy technology but no breakthrough for a coordinated international commitment (Renewables Conference 2004b).

The good news is that renewable energy has experienced surprisingly strong growth and increased its significance relative to conventional energy. The Renewables 2005 Status Report (2005, p. 4) finds that $30 billion was invested into renewable energy worldwide in 2004 (excluding large hydropower), a figure that compares to conventional power sector investments of $150 billion (also excluding large hydropower, which accounts for another $20–25 billion). While this is encouraging, the potential for a much faster shift towards renewable energy technologies exists, if emerging policy initiatives can be scaled up.

One study puts the gross investment cost for getting the European Union to produce 12% of its electricity with renewable technologies by 2010 at €10–15 billion a year (Zervos 2003). Increasing China's share of renewable energy from 5% to 17% by 2020 is estimated to cost about €49 billion (Renewables Conference 2004a). These estimates reflect pure investment costs and do not consider any cost-benefit assessment of reduced human health and environmental costs or economic returns on the investment from reduced fuel costs.

In 2001 the US EIA conducted a study to assess the costs to American consumers of a national renewable energy standard that would increase renewable energy resources from 2% to 20% by 2020. It concluded that such a standard would generate a range of environmental benefits while costing consumers almost nothing (the increase in electricity prices in 2020 was estimated at 4.3%). The general problem with such modelling has been discussed before. Even before oil prices rose to more than $60 a barrel at the end of 2005, many experts considered the EIA study as much too conservative, arguing that more realistic assumptions about the price of developing renewable technology would

result in projected savings to consumers of up to $65 billion a year by 2020 (Clemmer, Nogee and Brower 1999). At least one recent study also suggests that economies of scale could bring down prices for wind technology much faster than anticipated (Junginger, Faaij and Turkenburg 2005).

Policy recommendations relating to covering the costs of global greenhouse gas abatement should focus on massively scaling up activities spearheaded by the GEF and its implementing agencies, as well as bilateral activities, such as the European Union's renewables and conservation programmes. Targets should be set in terms of annual percentage increases in international funding over certain periods. The GEF and other funding sources still do not have the critical mass to tip the scale towards making many renewable energy technologies commercially attractive without subsidies. A concerted effort to provide more financing could create economies of scale and lower prices relatively quickly, particularly for solar photovoltaic sources. To create such markets it makes sense to focus on the highest future greenhouse gas emitters. The GEF is doing this implicitly but could do so more systematically, if allowed. But increasingly such projects should be funded through concessional loans and not through GEF grant money. The GEF for some time to come will have an important role to play to leverage commercial financing for renewable energy technology development. The debate on a GEF resource allocation framework based on global benefits and performance capability may lead the GEF to adopt a more targeted approach. Any scale-up of resource flows needs to address this issue as well.

Biodiversity

Assessing the global value of biodiversity

On 17 November 2004 the Third World Conservation Congress opened amid what the official press release called "an escalating global species extinction crisis" (IUCN 2004). More than a decade after the negotiation of the Convention on Biological Diversity, loss of biodiversity continues unabated (Gibbs 2001; UNEP 2002; Millennium Ecosystem Assessment 2005). Anecdotal evidence of the impoverishment of the world's biodiversity abounds. The decline in amphibians, first reported more than a decade ago, continues and has reached critical levels, with

a number of species believed to have become extinct over the past two decades (Mattoon 2001; Amphibiaweb 2006). The habitat of great apes in Africa—chimps, gorillas and bonobos—continues to shrink, with only a small percentage of the original habitat left (*Afrol News* 2004). The Great Apes Survival Project (GRASP), under the auspices of the United Nations Environment Programme (UNEP) and United Nations Educational, Scientific and Cultural Organisation (UNESCO), has been working on a survival plan, but progress is slow and money scarce. GRASP recently received $25 million in support of urgent measures.

This case exemplifies the issues at stake. In the grand scheme of things, the money allocated for GRASP is very little and hardly commensurate with the expressed desire to protect apes in the wild. However, the value—ethical and economic—of keeping apes in their habitat is difficult to estimate, particularly if eco-tourism is better served by concentrating them in a few small wildlife parks.

The case for large expenditures for biodiversity conservation is even more difficult to make if it does not directly involve charismatic poster species. However environmental economists have greatly improved their understanding of the economic non-use value of natural systems, providing critical support for political measures to encourage investments in conservation.

Empirical research also demonstrates that in many specific cases the direct economic benefits of conservation to local communities may not be significant. The degree to which biodiversity should be conserved is therefore ultimately an ethical and philosophical question that cannot be answered based solely on an assessment of its economic usefulness. Conservation in many cases may be justified only if it is considered a global public good. But finding the rationale for considering some rare plant species in a remote area of tropical forest or an indigenous pupfish in a desert salt lake to be of global importance is difficult to make case by case. As a result, decisions on how much financial resources should be allocated for conserving global biodiversity are intrinsically political.

Economic valuation of biodiversity. Natural resource economists have tried to quantify the benefits from protecting wilderness areas and species diversity. In the wake of the Rio Conference the idea was that environmental economics could prove the economic value of sustainably managing biodiversity resources, thereby increasing political support for conservation. This idea created considerable optimism in conservation circles. Bioprospecting, eco-tourism and sustainable use of forest products were seen as potentially significant sources of revenue that

could provide incentives for conservation. However the economic benefit argument seems in many instances to be more difficult to make than anticipated. There has not been a bonanza in bioprospecting, and the potential of eco-tourism as a significant source of revenue for local communities appears to be limited to accessible areas with high density of visible wildlife. Sustainable management of forest resources depends on long-term planning and careful project design—only an exception, not a rule. Still the literature on the cost-benefit ratio of conserving rather than using natural resources has advanced impressively, greatly improving our understanding of what is at stake. It also highlights the limits of this analytical tool for making decisions.

Economic valuation distinguishes between use and non-use value of natural resources (see Brown 1994; Bateman and others 2002). The use value results from measuring the economic return from extractive activities such as mining and logging, or converting open space into shopping malls, highways and residential homes. The non-use value is the value of services that the converted ecosystem could have provided long into the future had it been left intact.

Measuring and comparing use and non-use values is very tricky, reminiscent of the methodological and theoretical problems underlying cost assessment of climate change. Measuring use values from timbering and mining is relatively straightforward, essentially a function of production costs and market prices. Assessing environmental externalities and trade-off costs related to foregone non-use opportunities is a different story. It requires modelling future developments, setting a discount rate and making a judgement about the value—economic and intrinsic—of some obscure plant or animal species.

Contingent valuation tries to assess such societal values of non-use of the environment indirectly by measuring individuals' willingness to pay for having a public good provided. If the rationale for biodiversity relied solely on the economic benefits generated for humans, the case for conservation would in many cases be difficult to make. What is interesting and encouraging is that contingent valuation studies show that people are willing to pay for environmental services from which they never expect to directly benefit. A recent contingent valuation study for Brazil showed that households' willingness to pay exceeded resources spent on conserving three endangered species (Mendonça, Sachsida and Loureiro 2003). Studies for developed countries show a similar uncaptured willingness to pay for species protection. However the political

and institutional obstacles for actually capturing this willingness tend to be large (Clémençon 2000).

Other indirect valuation methods use proxy values to determine an economic value—for example, of wildlife and nature preserves. Revenues from eco-tourism can be used to assess the value that people assign to particular geographic locations, such as national parks.

Aggregated estimates. One of the first attempts—famous and contested—to aggregate the direct economic value of nature's free services to the world economy put the value at about $38 trillion, compared with the world's GDP of $18 trillion (Costanza and others 1997). Other studies focus more narrowly on the economic value of biogenetic resources for agricultural productivity and pharmaceutical products (Ten Kate and Laird 2000). Despite all the progress in biotechnology, wild relatives of commercial crops remain an invaluable resource for keeping a step ahead of crop diseases that can cost billions of dollars in damage. In 1997 42% of the world's top selling drugs were derived from natural sources, and more than 25% of Western prescriptions contained active ingredients from wild plants (Ten Kate and Laird 2000). The combined value for the agro- and pharmaceutical industries has been estimated at $500–800 billion annually.

One big issue there is little agreement on is the extent to which modern technology will be able to replace such natural components. One argument for bioprospecting is that the complexity of natural components cannot be designed in the laboratory. Others maintain that it is just a question of time until progress in combinatorial chemistry catches up (Macilwain 1998). What is clear is that the big gold rush for bioprospecting and a related increase in financial resource flows to developing countries never materialized after the signing of the Convention on Biological Diversity in 1992.

Recent international efforts have focused on understanding the role that ecosystem services play in national economies beyond direct economic use benefits (WRI 2000; UNEP 2002; Millennium Ecosystem Assessment 2005). Ecosystem services include water filtration and purification, soil regeneration, natural pollution abatement, climate regulation and absorption of greenhouse gases, in addition to supplying a wide range of resources for industrial production, construction and human consumption. In a recent review of the literature on environmental valuation of ecosystem services, Turner and others (2003) show that estimates of ecosystem value are incomplete because most studies focus on single-use, marginal values using economic cost-benefit analy-

sis to support conventional decision-making. Multiple, interdependent ecosystem services are rarely valued.

One exception is a recent valuation study that used multiple criteria analysis and a panel of experts to assign weights to various factors. It illustrates the complexity of the methodological problems associated with such estimates. Ecosystem goods and services were estimated for the 9,000–square kilometre Wet Tropics World Heritage Area in Australia (Curtis 2004). The total value was $145–163 million a year, or $16,000–18,000 per square kilometre.

Although the non-use value of ecosystems may be very large, immediate opportunity costs to local communities of not using natural resources can also be very large. Land conversion can bring significant immediate economic benefits to communities and whole countries. In the example above, the opportunity costs of not converting at least part of this protected area for some economic use may be significant. Huge incentives for present consumption exist in many instances where long-term protection would be in the broader public interest. The boom and bust cycle for Amazon logging operations can be as long as 15–20 years, well beyond the planning horizon of most political entities (Schneider and others 2002). The development of alternative use options is one way to try to address these opportunity costs in conservation projects (Pagiola and others 2002). However experience with integrated development and conservation projects is mixed at best (Robinson and Redford 2004; McShane and Wells 2004).

Several empirical studies have shown that conservation can be costly for local communities, depriving them of access to natural resources that have no value to them if not used for direct consumption. Conservation measures may also prevent locals from killing wildlife that damage crops (Muriithi and Kenyon 2002; Ferraro 2002). A study in rural China showed that local people's willingness to pay for restoring river ecosystem services fell far short of what restoration would cost (Zhongmin and others 2003). Such research shows that conservation and restoration efforts need to be considered in a national, if not global, context and may need to involve some form of compensation payment to local communities. In some instances such compensation could come from higher visitor entrance fees for protected areas. Entrance fees often represent less than 1% of total trip costs incurred by visitors (Gossling 1999). They generally do not reflect visitors' full willingness to pay, and they rarely cover the capital and operating costs of protected areas.

The value to local communities of conservation of protected areas has also been demonstrated in many instances, as for the Bwindi Impenetrable National Park in western Uganda (Makombo 2003). An evaluation of different use models for the Leuser Ecosystem in northern Sumatra over a 30-year period found the total economic value to be $7 billion under the deforestation scenario but $9.5 billion under the conservation scenario (Van Beukering and others 2003). In this case a 4% discount rate was applied. Proving the direct economic benefits of conservation activities may be the best argument for establishing and maintaining protected areas.

Other valuation studies look at the costs of destructive activities beyond protected areas, such as from using fire in the Amazon to clear forest and pasture for agricultural use (Mendonça and others 2004). From a private perspective, fire is a highly efficient way to clear brush and forest, but accidental fire results in significant costs. The Mendonça and others study attempts to quantify social costs associated with respiratory ailments provoked by smoke from fires and the release of carbon into the atmosphere. The damages were valued between $90 million and $5 billion, representing 0.2–9.0% of the region's GDP in 1998. The study points to the potentially large benefits of curbing fires used for clearing, as well as the equally large methodological complexities associated with attempts to measure non-use values or environmental externalities. A similar study for Indonesia finds that slash and burn in 1997–98 resulted in an estimated net loss of $20.1 billion (Varma 2003).

A better understanding of the non-use value of natural resources and environmental economics clearly helps build a case for greater political efforts for conservation and in some cases may provide critical support for political decisions favouring conservation. But valuation studies run into significant problems when analysts are forced to make far-reaching assumptions about the responses of complex ecosystems and the economic consequences of diminishing ecosystem services. The question of how much biodiversity should be preserved cannot be answered with cost-benefit assessments alone but remains fundamentally a political and ethical issue. In this respect the Millennium Ecosystem Assessment report concludes that "the total amount of biodiversity that would be conserved based strictly on utilitarian considerations is likely to be less than the amount present today" (2005, p. 6).

Costs of maintaining protected areas. Valuation studies indicate that conservation and sustainable management of natural resources can generate significant economic and social benefits, but that such benefits are

often difficult to quantify and do not always directly benefit the communities adjacent to the areas in question. The other side of the cost-benefit equation relates to the costs of maintaining protected areas and of adequately preserving biodiversity outside such protected areas, in productive zones.

Protected areas are the cornerstones of conservation, and several studies have attempted to broadly estimate the costs of maintaining a worldwide system of protected areas. Despite significant methodological flaws and differences, they all indicate that the costs of conserving a significant proportion of global biodiversity would be relatively small.

James, Green and Paine (1999) conclude that adequately maintaining protected areas would cost $2.3 billion a year more than is currently spent. This averages $277 per square kilometre in developing countries and $1,090 in developed countries. It contrasts with only about $93 per square kilometre spent in tropical countries when the study was done. The same survey stipulates that buying land to place 10% of the area of each region in strictly protected reserves would require approximately $164 billion, which translates into annual outlays of approximately $10.9 billion and annual management costs of another $3.3 billion. The authors suggest that purchasing and managing a broadly representative system of nature reserves covering nearly 15% of global land area would cost roughly $16.6 billion a year on top of the $6 billion governments were estimated to be spending in the late 1990s. A later study (Balmford and others 2002) estimates resource needs for an idealized global system of protected areas at $45 billion a year. The same study compares this figure with the total economic ecosystem services of this land area, which the authors estimate at between $4.4 and $5.3 trillion.

The methodological challenges related to coming up with such figures are huge, and the most that should be taken from such estimates is a sense of the order of magnitude of the costs involved to secure some reasonable degree of global biodiversity conservation. One conclusion to be drawn from such an aggregation is that the cost of conserving global biodiversity is very likely modest compared to what the world invests in other public policy expenditures. But this and other estimates also show that the costs are far above what national governments and the international community are currently covering. A best estimate is that in the years 2000 and 2001 on average between $350 and $450 million in bilateral and multilateral official development assistance and $300 to $500 million from non-governmental and grant-making foun-

dations went towards all biodiversity conservation projects in developing countries (Clémençon, this volume, Chapter 3). The problems with estimating these numbers are many and include double counting of resources by NGOs and grant-making foundations and generous labelling of official development assistance financing as "biodiversity relevant".[7]

Many conservationists, resigned to dealing with scarce funding, advocate a narrowly targeted approach to conserving the most critical biodiversity, rather than pursuing an ideal system. Central to this approach is the identification of biodiversity "hot spots" (Myers and others 2000; Sanderson 2002). Myers and others believe that safeguarding the hot spots—and thus a large proportion of all species at risk—could be accomplished for an average of $20 million per hot spot a year over the next five years. Given that they identified 25 such hot spots, this would amount to $500 million annually, only a tenth of the resource needs cited earlier for conserving an ideal protected area system. Some believe that a focus on hot spots may be particularly effective, because more than a billion people live in these 25 biodiversity hot spots, and in 16 of them population growth is higher than the world average (Jenkins, Scherr and Inbar 2004).

The hot spot approach raises many questions about how to decide what is worth protecting and what is not. Some approaches adopted by large conservation organizations in developed countries that involve large land purchases for conservation have come under criticism (Chapin 2004). The ecosystem approach, largely advocated by the international community, is a much more comprehensive approach that includes biodiversity outside protected areas.

Biodiversity conservation beyond protected areas. Maintaining an adequate system of protected areas around the world (perhaps 15% of land mass) can be only a first step towards sustainable management of biodiversity resources. Recently the international community has stepped up efforts to conserve biodiversity in productive economic zones. Assessing the costs of this effort is tricky. One study estimates that a truly global conservation plan that includes productive landscapes such as agricultural production zones would cost $300 billion a year (James, Gaston and Balmford 1999). This cost needs to be compared with the tens of trillions of dollars that ecosystem services are worth to the world economy. Again, such estimates must be treated with great caution.

After the Rio Conference and the signing of the Convention on Biological Diversity in 1992, there was great hope that productive landscapes would offer significant opportunities for conservation that pro-

duces economic benefits. Recent assessments have come to more sober conclusions. Experience over the past decade suggests that win-win opportunities in integrated conservation and development projects are few and difficult to realize (Dublin, Volonte and Brann 2004; Brown 2004).

The Convention on Biological Diversity

The Convention on Biological Diversity (CBD), signed in Rio de Janeiro in 1992, so far has not attempted to assess the specific resource needs related to implementing the convention and drawn up no priority list of sites where countries should spend scarce resources to maximize conservation of biodiversity. The CBD has a broad mandate related to three interlinked objectives: the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources. In 2000 the convention adopted the Cartagena Protocol on Biosafety, which addresses the safe transfer, handling and use of living modified organisms that may have an adverse effect on biodiversity, with a specific focus on transboundary movements.

Over the past decade the convention has developed many guidelines and work programmes on all aspects of biodiversity conservation and use, but it has been very slow to develop specific targets and objectives that could serve as quantitative benchmarks for assessing resource needs. The international community has not ventured into the contentious issue of trying to put a price tag on what it might consider "adequate" protection of global biodiversity. Such an assessment would require a definition of "adequate", which would raise sovereignty concerns. Most countries have long opposed the idea that an international forum would determine which parts of a nations' territory should be protected. This may be part of the reason why no estimates for funding needs can be found in the national reports submitted to the convention by large megadiversity countries.[8]

In the hope of giving implementation new momentum, the fifth session of the parties to the convention in 2002 adopted a strategic plan to significantly reduce the current rate of biodiversity loss at the global, regional and national levels by 2010. The plan enumerated some general goals and initiated work on setting specified targets and timetables.

In response to outcomes of the 2002 World Summit on Sustainable Development in Johannesburg, the seventh session of the CBD in early 2004 adopted several new work programmes, among them one on pro-

tected areas. The subtargets include conserving at least 10% of each type of ecosystem, protecting areas particularly important for biodiversity, stabilizing populations of certain species now in decline and ensuring that no species of wild flora or fauna are endangered by international trade. Subtargets are to be set in the context of the convention's work programmes (UNEP/CBD/COP/7/21 PART2). The Eighth Conference of the Parties to the CBD in March 2006 in Curitiba, Brazil, did not break new ground or substantially add to these objectives. It was notable for a record participation of the private sector, reflecting the desire to integrate biodiversity concerns more systematically beyond protected areas (IISD 2006).

Estimating costs and benefits of biodiversity conservation is hampered by the fact that still little is known about the extent and relevance of biodiversity. The growing body of high-quality empirical research shines only an occasional spotlight on a small percentage of the world's species richness. Another recent effort of the convention therefore is the Global Taxonomy Initiative, intended to support national monitoring programmes and the development of indicators for assessing conservation efforts.

The GEF and biodiversity conservation. The GEF is the single largest multilateral funding mechanism for biodiversity conservation and the official financial mechanism for the CBD. Since its inception in 1991 the GEF has allocated $1,943 billion to biodiversity conservation, funding over 630 projects (GEF 2005b). The GEF's resource allocation for biodiversity conservation will average about $150 million a year for the period 2003 to 2006 (GEF3), about 5% less than for the previous four-year period (GEF2). As of this writing difficulties with replenishing the GEF at least at the level of GEF3 for a fourth funding period (2006–10) had not been resolved, with the possibility that existing GEF4 replenishment will come in significantly below the GEF3 resource level (Clémençon 2006).

The GEF has contributed substantially to supporting biodiversity conservation in areas of global significance—as the most recent biodiversity programme study points out—and support to protected areas has been central to GEF activities so far (Dublin, Volonte and Brann 2004). But the programme study also identifies several problems with the GEF's programmatic approach and long-term strategy. A key question is to what extent biodiversity projects can and should be expected to become financially sustainable after completion. Related to this issue are unrealistic time frames for project completion and overly ambitious

project designs that result from a need to respond to guidance from both the GEF Council and the CBD.

Other problems are the transaction costs of bringing a GEF project to fruition, which involves years of institutional front-loading of technical and administrative resources and provides strong disincentives for project development. Increasing project development costs are the internal policies and procedures of the implementing agencies. These are all problems that need to be addressed in conjunction with the funding shortfall.

Megadiversity countries have become the centre of attention of conservationists and NGOs. Biodiversity is highly concentrated in just a few countries (Mittermeier, Gil and Mittermeier 1997). Just four countries—Brazil, the Democratic Republic of Congo, Indonesia and Madagascar—harbour two-thirds of all primate species and also have the highest level of endemism, with 100% of Madagascar's 55 kinds of lemurs being endemic. In 2002 megadiversity countries formed a group of like-minded countries to better coordinate their interests in international negotiations.[9]

While the GEF does not explicitly target megadiversity countries, these countries have received a large percentage of the GEF's resources for biodiversity conservation. However this translates to very small amounts of international funding even for countries with the highest biodiversity richness. Mexico has received the largest GEF grants for biodiversity ($7 million expressed as an annual average), followed by Brazil ($5.6 million), Indonesia ($4.4 million), China ($3.9 million), Peru ($3.3 million), Ecuador ($2.9 million), Colombia ($2.9 million) and the Philippines and India ($2.3 million). If co-financing is added, the figures look somewhat better. Mexico on average has received $13 million in additional resources per year in the form of co-financing supposedly leveraged by the GEF grant, Brazil ($8 million), Indonesia ($7 million) and China ($6 million). (All calculations here are based on data from UNEP-WCMC 2005 and from the GEF Project Status Report of June 2004, GEF 2004.) Co-financing data includes funding from national governments, bilateral donors, NGOs and occasionally the private sector. It is important to recognize that these amounts usually are also reported in financial reports of these donors, which leads to overcounting total resource flows for conservation if contributions as reported by different sources are simply added up (see also Clémençon this volume, Chapter 3).

Expressed in resource flows per square kilometre of protected area, Costa Rica receives the most GEF grant money, namely $300 a year per square kilometre of protected territory. It should be noted, however,

that GEF funding does not go only to protected areas. Large countries receive much less funding: Brazil ($17), India ($16) and China ($7). Smaller countries, therefore, seem to have an advantage when it comes to accessing scarce international resources. The new and controversial resource allocation framework adopted by the GEF Council in September 2005 will likely improve access for large countries, while making it more difficult for small countries to get GEF funding.

James, Green and Paine (1999) have estimated that it would take about $277 per square kilometre on average to secure adequate protection of protected areas in developing countries. While such an estimate must be considered with great caution, it does suggest that GEF resources make for a very small percentage of what is considered necessary.

Conclusion on biodiversity

The CBD has embarked on a far-reaching and ambitious programme to improve information on biodiversity and to set targets and timetables for reaching clearly defined and measurable objectives in coming years. One of the challenges is to set priorities for allocating global funds that reflect the complex and highly uneven distribution of species and threats to species across ecosystems, both within and across countries. Attempts to prioritize come mainly from conservation organizations and recently the GEF, since the convention for political reasons has not been able to prioritize clearly among countries.

Quantitative targets for practically all the CBD's objectives are only now being developed. As a result no agreed official benchmarks are available for assessing resource needs in biodiversity. The Global Taxonomy Initiative has highlighted how little is known about the extent, distribution and value of biodiversity around the world, even in areas that appear fairly well researched. Clearer ideas are needed on how much biodiversity should be considered a global public good, how much of what is left should be supported with international financing and how much should be considered the responsibility of national governments. Such a consensus can only emerge as a result of broad-based discussions involving not just experts and politicians, but an educated public.

General conclusion on costing studies

How much will it cost to solve the most critical global environmental problems? What are the societal and economic costs of preventing a concentration of greenhouse gases that causes "dangerous interference with the climate system" and of conserving global biodiversity at an "adequate" level? Environmental economics has focused on finding quantitative answers to questions about the costs and benefits of environmental policies. This discussion has reviewed some of the literature on cost-benefit modelling and on economic valuation that may hold some answers to the initial question. The conclusion is that cost-benefit assessments are generally poor guides to policy-makers for setting policy targets related to global environmental goods or for deciding on funding needs to address global environmental problems. In fact studies that have attempted to aggregate cost-benefit modelling results to the national or global level to determine optimal and efficient policy intervention may do more harm than good.

Particularly with respect to the costs of controlling greenhouse gas emissions, models pretend to capture the true trade-off costs between action and inaction—even though huge uncertainties about complex future socio-economic developments and societal preferences demand highly subjective assumptions from researchers. Even the most sophisticated models have no scientifically reliable way of dealing with the possibility of non-linear, rapid developments. But by highlighting the short-term costs of the most far-reaching policy proposals on one hand and the uncertainty of long-term environmental and economic benefits on the other, most models are inherently biased towards business as usual. Particularly in the climate change area they have undermined political support for policy measures that could be implemented gradually and would lay the groundwork for stabilizing greenhouse gas emissions at little or no cost to national economies.

The ability to quantify costs and benefits of policy measures would—among other factors—also depend on the availability of clearly defined policy objectives relating to both climate change mitigation and biodiversity conservation. Such officially defined and agreed objectives, however, only exist in the form of tentative first steps. The Kyoto Protocol commits only one group of countries (developed) to a relative small 5% total percentage reduction in emissions by 2012 compared to the baseline of 1990, and talks about possible post-Kyoto commitments

have barely begun. Some climate experts believe that an increase of the Earth's global average temperature by more than 2 degrees Celsius must be avoided, because this could be a threshold to major climatic disruptions. But this is not an official international consensus, and even if it were, determining what emission trajectories would be required to keep an increase of average global temperature under this threshold remains a highly complex challenge. The only thing clear is that the need to reduce greenhouse gas emissions is evident and that the potential for scaling up measures for doing so is huge.

The Convention of Biodiversity has only recently launched the type of comprehensive action programme that might eventually lead to a comprehensive understanding of the extent, distribution and value of global biodiversity. A set of quantitative conservation targets is being developed within the convention's many work programmes. Today protected areas cover a little more than 10% of the Earth's land mass. Many conservationists advocate increasing this coverage to 15% while focusing on biodiversity hot spots and megadiversity countries. In the end, though, all targets will ultimately have to be based on national priorities and societal preferences. Science can only provide guidance on the question of how much biodiversity should be protected. Costing studies, however, do suggest that managing protected areas and acquiring additional land to be put under protection would cost relatively little, if put in a larger context. An additional $5–10 billion a year for global biodiversity conservation would go very far towards meeting the objectives set out in the convention.

This chapter has discussed estimated costs of policy measures tied to providing global environmental goods. Although absolute cost frameworks can be suggested only with many caveats, there is wide agreement that countries have reasons to significantly scale up their responses to climate change and the loss of biodiversity. While national activities must provide the bulk of funding for such measures, resource availability from international sources is far from sufficient to compensate developing countries for measures they take that are largely in the global interest, an understanding codified in international environmental agreements. Defining the extent to which responding to climate change and the loss of biodiversity is a national or international responsibility is extremely difficult. Studies have shown that local communities living next to wilderness areas with high biodiversity often have nothing to gain from protecting them and use of such resources provides communities with short-term economic benefits. Equally, many countries

have little to gain from being early adopters of low-carbon energy technologies unless they receive financial support. Negotiations within the FCCC and the CBD, however, are not likely to provide any answers to such intrinsically political questions as to who should pay how much for providing global environmental public goods.

Recommendations

Refocus the debate on resource flows. Governments and NGOs are predominantly concerned with how to use existing resources most effectively. No one argues that spending available resources as effectively as possible is not a critical concern. But it cannot be the only concern.

A focus on efficient resource use and allocation is understandable and results partly from pessimistic assumptions about the likelihood that governments will increase budgetary resources for global environmental issues. In this environment costing studies intend to inform policymakers about where best to invest scarce public resources and how to prioritize among public policy objectives. But global environmental protection objectives are usually considered as part of the development cooperation agenda. As a result it is often suggested that there is a trade-off to be made between spending resources on climate change abatement and biodiversity conservation or spending resources on fighting AIDS, malnutrition and poverty, or simply on economic development.

Such a link, however, is at least conceptually tenuous if not wrong. Resources provided for global environmental protection should be compared to public resources that go into subsidizing economic sectors that exert most pressure on the global environment, or resources that are allocated to national security and defence objectives. Subsidies distort markets and are inefficient, particularly if they mask externalized environmental and social costs, and global environmental problems clearly have a potential of undermining national security. In the end all things are political, and entrenched economic interests tend to have a strong influence on national governments and the budgetary allocation process. However there is no compelling conceptual or theoretical reason to take existing funding levels for global environmental protection as a given.

How to institutionalize effective and predictable fund-raising for protecting global environmental goods has not been a priority issue in international forums since the Rio Conference in 1992. It is a discussion needed at both the international and national levels and one that

should be related to the larger issue of global public goods and long-term international development and security objectives. Funding levels for the GEF were determined rather arbitrarily in the early 1990s, and they have in fact declined in real terms since; although the GEF and governments have used creative accounting to claim slightly increasing funding levels in nominal terms (Clémençon 2006). Approximate levels of national contributions were essentially locked in more than a decade ago and are today managed by mid-level civil servants with insufficient political influence or interest to press for a change in national contributions. This inertia is supported by a rigid burden-sharing formula that keeps the GEF's funding level at the mercy of the largest donor least willing to contribute.

Replenish the GEF. The basis for GEF replenishment negotiations needs to be reconsidered. The current burden-sharing arrangement has afforded the most recalcitrant country an effective veto power over the overall size of GEF funding. What this means is that the willingness of the United States to contribute to the GEF determines the contribution of donor countries, who would have contributed at a higher level if it were not for the low US contribution. Donor countries need to consider a majority-based burden-sharing arrangement that lessens the impact of the most reluctant donor on the overall funding level (Clémençon 2006).

Countries could also consider pledging their GEF contribution not as a fixed amount covering four years, but as annual instalments that grow yearly by a certain percentage, such as 10% or 20%. Periodic GEF conferences could discuss the adequacy of the resource flows and adjust not the nominal amounts, but the annual percentage increase. No doubt a new approach to replenishing the GEF would require the rethinking of basic policy principles by national treasuries and parliaments used to allocate fixed amounts for fixed time periods.

Reassessing the replenishment procedures alone will not be sufficient. Given a lack of political leadership, today any increase in resources for global environmental objectives would most likely have to come from budget lines within the development cooperation budget, from which in the case of most countries the GEF is funded. This would quickly limit the extent to which even the more generous donor countries could increase funding for global environmental protection. Countries need to re-examine what budget line the GEF should be funded from. Redirecting some subsidies that now go to the energy or agricultural sectors or linking funding for global environmental protection efforts to the national defence budget might be a better strategy

to provide larger resource flows for global environmental objectives. Arguably it would also be a theoretically more compelling approach, although the institutional and political hurdles to implementing such a model are likely to be large, at least in the short term.

Explore new fund-raising mechanisms. There is a need to look at new models for raising funds for global public goods. The UN-type burden-sharing arrangements on which the GEF and other multilateral financing mechanisms are built will probably not provide adequate resources, even if revamped in some form along the lines suggested above. Separate fund-raising efforts outside traditional government channels should therefore be pursued along several avenues.

The more the world moves towards having to provide for global public goods, the greater the need for some form of international fund-raising mechanism that is independent of the vagaries of national budgetary allocation processes.

Global environmental problems would seem to lend themselves best to an argument that resources to fight them should be levied at the international level—for example, through an international tax. For moral and ethical reasons a strong argument can also be made that critical international relief efforts and some development cooperation initiatives for least developed countries should be funded through some type of international charge.

Proposals should be developed that depart from the assumption that the public's willingness to pay for global environmental goods is significantly greater than what governments currently allocate but that this willingness is not captured because of institutional barriers and political constraints. Average per capita contributions to the GEF amount to $0.60 a year for OECD countries, although there are differences from country to country. Polling data generally shows a higher willingness of the general public to pay for environmental protection than what governments allocate (Eurobarometer 2005; Guber 2003).

There are many obstacles to implementing innovative revenue-generating schemes, but political momentum towards considering international charges for funding specific global common objectives has accelerated. In May 2005 EU ministers—based on a French initiative—adopted a voluntary air travel tax to fund the European Union's pledge to more than double development aid to Africa in line with the Millennium Development Goals (BBC News 2005; EU Press Release 2005). A tax on aeroplane tickets is expected to become mandatory in Belgium, France and Germany in 2006, and other countries, including

Brazil and Chile, have expressed support for this innovative form of raising funds for development projects in the poorest developing countries (Der Spiegel 2006). It would be ethically questionable to request that funds raised in this manner for critical development objectives in the poorest countries should be partially diverted to global environmental protection activities. But the successful implementation of an international tax on air travel could help provide political momentum and institutional support to develop similar ideas benefiting global environmental public goods.

The willingness to pay for providing global public goods probably needs to be captured through first voluntary but preferably government-endorsed and government-supported schemes. Very small per capita contributions could raise significant amounts of money, and there are a number of interesting options besides a carbon tax (and the ominous Tolbin exchange rate tax idea) that should be explored systematically. What is important is that such schemes take into account both political acceptability and administrative ease. As elaborated elsewhere, a small surcharge on car registrations clearly earmarked for global environmental protection would be easy to administer and is likely to be politically less contentious than further increases in gasoline or energy taxes (Clémençon 2000).

Distribute existing funds. Also needed is a debate about the usefulness of linking fund-raising efforts for climate change and biodiversity. At a meeting in Geneva in December 1991, lacking a compelling distribution key, a group of government representatives concluded that available funds should be equally distributed among the two key GEF issue areas, climate change and biodiversity.[10] But various evaluation studies led to the conclusion that the GEF is much more likely to contribute critically to biodiversity protection than to climate change abatement, largely because it can bring more critical mass to this issue, while affecting markets and prices for renewable energy technologies is a tall order with such limited funds (see Clémençon 2006 for a more in-depth discussion of this argument). A short-term strategy should therefore be to focus GEF funds increasingly in the biodiversity area, while scaling back climate change activities to capacity-building and educational efforts. The increase in oil prices in 2004 and 2005 from $35 to more than $60 a barrel has created better market conditions for renewable energy technologies and energy conservation. Given a scarce resource environment, relative more attention needs to be paid to biodiversity conservation than climate change.

Transfer philanthropic wealth. Many conservationists hope for a great wave of philanthropic wealth transfer to conservation organizations in the form of inheritances. A systematic effort to solicit such endowments for something like a global biodiversity conservation trust fund has never been undertaken (except by individual NGOs). One could pursue various models for building a trust fund in parallel to increasing government funding levels. Such efforts would need to involve NGOs and grant-making foundations, who obviously compete for such funds. Conceptual work is needed to consider why it would be better to capitalize trust funds rather then spending resources for global environmental benefits as they become available. But the establishment and gradual capitalization of a global biodiversity trust fund, which could fund conservation efforts indefinitely, deserves consideration. There might be considerable interest from governments, grant-giving foundations and the growing class of super-rich individuals.

Notes

1. A best estimate puts international financial flows from all international government and non-governmental sources for biodiversity at $800 million. This is less than other recent sources have asserted. Previous studies have overestimated funds because of double counting and problems with how countries label their expenditures when they report them to the OECD.
2. For a comprehensive overview, see IPCC/TAR, 2001, Working Group III, Mitigation, pp: 504 ff. See also Toman (2003) and Rivers and Jaccard (2005) for good overviews of economic modelling approaches.
3. For an overview, see WRI (1997).
4. Nordhaus and Boyer (1999) conclude that the costs of the Kyoto Protocol would exceed the benefits by a factor of seven, implying a global economic loss of $716 billion in present value terms, with the United States bearing two-thirds of that cost (using the RICE-99 model, an improved version of the DICE and RICE models that have been widely applied in climate change studies).
5. For a discussion of discounting the future, see Cline (1992, p. 238); IPCC (2001, p. 466); and Newell and Pizer (2003).
6. The figure was compiled using OECD data (Rio marker) and includes large loans for construction of natural gas utilities or hydropower generation.

7. For example, many NGOs draw significant resources from grant-making foundations, but not all grants for biodiversity go to NGOs. Annual reports of these organizations often do not adequately break down numbers. If biodiversity-related allocations shown in these reports are simply summed, this will result in significant double counting. No consolidated surveys are available.
8. Based on a perusal of national reports made available by megadiversity countries to the Convention on Biological Diversity.
9. The group includes Brazil, China, Colombia, the Democratic Republic of Congo, Ecuador, India, Indonesia, Malaysia, Madagascar, Mexico, Papua New Guinea, Peru, the Philippines, South Africa and Venezuela.
10. Personal recollection.

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Resource Needs and Availability for Protecting Global Environmental Public Goods

Chapter 3

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What will it cost to protect global environmental goods? How much money is currently being made available for that purpose? The main objective of this contribution is to identify to what extent a funding gap between what is considered needed and what is being made available exists and how it can be explained. As is shown, grant resource flows from developed to developing countries for both greenhouse gas mitigation projects and biodiversity conservation from all governmental and non-governmental sources amount to perhaps a bit more than $2 billion but less than $3 billion annually, using generous accounting methods. This is far from what studies identify as adequate or necessary to address the threat of global warming and the loss of biodiversity. The following contribution identifies the main sources of available funding and discusses what policy measures could possibly help address the significant funding shortfall in the coming years.

Resource needs

How much resources are needed to protect or provide global environmental public goods? This question cannot be answered in any definite way (Compare Clémençon, Chapter 2). Apart from the methodological problems associated with assessing absolute costs in view of great uncertainties, the question is also difficult to answer because there is no agreement on how investment costs should be shared or what efforts should have priority. The most concrete cost figures can be found for conserving biodiversity. For policy measures related to mitigating climate change, in contrast, future costs and benefits are highly speculative. For phasing out ozone-depleting substances and persistent organic compounds, however, costs are relatively small. A more in-depth analysis of

the costs and benefits of measures to protect global environmental commons is undertaken by the author elsewhere in this edited volume.

The cost of mitigating climate changes

The Framework Convention on Climate Change (FCCC) specifies that the objective of the convention "is to achieve … stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." What this exactly means has remained a key scientific and political question mired by great uncertainties.[1]

Cost estimates have been modelled so far mainly for reducing greenhouse gases in amounts and on timetables agreed upon in the Kyoto Protocol. Results, however, show great variation because the various models used require many assumptions about future trends.[2] While top-down, general-equilibrium models often find that reduction measures would entail significant costs to economies, bottom-up models that focus on domestic policy interventions targeting energy conservation and renewable energy sources often find that national economies would actually benefit.

Recent studies have not brought more clarity. In its criticism of the Kyoto Protocol, President Bush's Council of Economic Advisers projected as much as a 4% drop in gross domestic product if the United States implemented the protocol. James Connaughton, chairman of the White House Council on Environmental Quality, testified before a Senate Committee in July 2002 that "the Kyoto Protocol would cost our economy up to $400 billion and cause the loss of up to 4.9 million jobs" (*New York Times* 2002). Critics of the Bush administration have calculated that implementation of the Kyoto Protocol would result in a 0.5–1% gain in gross domestic product, depending on the policy measures implemented (Krause and others 2001). A study by the Dutch consulting group ECOFYS Energy and Environment in Utrecht, Netherlands, projects that the European Union could meet its targets at a cost no greater than 0.15% of GDP by 2010 (Hendriks 2001).

There is no consensus on the cost and benefits of greenhouse gas emission reduction policies. Underlying the debate are wide disagreements about the potential effects various policy measures might have and to what extent such measures stand a realistic chance of being implemented in face of opposition by special economic interest groups.

Realistically public financing needs therefore need to be determined not with reference to some absolute cost figure, but with reference to

pursuing concrete but limited policy objectives that can be expected to lead economies towards lower carbon intensity in the long run. Such objectives are to increase the share of renewable energy technologies by a certain percentage and to conserve more energy. Some countries have set exactly such policy objectives.[3] Financing needs in the energy sector depend strongly on the extent to which regulatory instruments are used to mandate the private sector to take steps towards energy conservation and investing in renewable energy sources.

A definite assessment of resource needs for mitigating climate change is not possible. Almost unlimited public funds could probably be invested into subsidizing low-carbon energy technologies and energy conservation measures. The degree to which governments want to do this remains fundamentally a political decision. In support of the Kyoto Protocol objectives, it would appear important that public funding for climate-relevant projects in developing countries would at least be increased steadily and in a predictable manner in order to promote momentum for change towards lower carbon-intensity of economies. It may therefore be more useful to consider resource needs in terms of annual percentage increases, rather than in terms of an absolute figure.

The cost of conserving biodiversity

The degree to which biodiversity should be conserved is ultimately a social and political question of values (Robert May quoted in Gibbs 2001). This remains true despite many efforts by natural resource economists to quantify the benefits that can be derived from protecting wilderness areas, forests and species (Pagiola and others 2002; Ten Kate and Laird 2000). Land conversion can bring significant immediate economic benefits to communities and whole countries, which societies have to weigh against future opportunity costs (Schneider and others 2002). The question of how much conservation in response to some global objectives is "adequate", therefore remains highly political, particularly when considering that some so-called megadiversity countries harbour disproportionately more species than most other countries. Controversy also surrounds the question of whether conservation should focus mostly on "hot spots", areas that harbour the highest numbers of species, or whether other criteria should be used to set priorities (Myers and others 2000).

It is generally recognized that protected areas, which today cover some 11% of the total land area, are the cornerstones of conserva-

tion.[4] Several recent studies that focus just on protected areas come to the conclusion that resources available for maintaining and establishing such protected areas fall far short of needs. One study finds that funding needs in developing countries average $436 per km^2 compared with actual allocations from all sources of $161 (Castro 2003). A more recent study estimates the resource need for an idealized global system of protected areas to be $45 billion a year, compared with worldwide expenditures of about $6 billion per year, most of which is being spent in developed countries (Balmford and others 2002).

But while protected areas are the cornerstones of conservation, it is generally recognized that maintaining these areas may only be the beginning. Responding to guidance from the Convention on Biological Diversity, the Global Environment Facility (GEF) has several operational programmes that expand biodiversity conservation objectives beyond protected areas into "productive zones", particularly but not only targeting areas surrounding protected areas. No estimates were found on resource needs for "sustainable management" of economically productive zones with significant biodiversity.

The cost of protecting other global environmental public goods

Compared with the requirements for biodiversity conservation and climate change, resource needs to cover other areas of global relevance appear to be small. Since 1990 the Ozone Fund has allocated $1.48 billion for over 4,000 projects to phase out consumption and production of ozone-depleting substances in accordance with the Montreal Protocol (Multilateral Ozone Fund 2004). Annual funding needs for the 2003–05 period have been identified to be about $200 million, and resource needs are declining as developing countries come closer to completely phasing out CFCs and reducing reliance on related chemicals as a next step.

Activities to phase out or limit the use of the 12 persistent organic compounds (POPs) covered by the Stockholm Convention on POPs are also not likely to be very costly. The GEF budget allocates $213 million for this over fiscal years 2003–06, and allocations are projected to reach $75 million annually by 2007 (GEF 2003a).

Protecting international waters relates at least partially to pollution abatement and control and to biodiversity conservation. The GEF has funded a number of regional Strategic Action Programmes, which are identifying priority areas for project implementation. Many of these

project components are of significant local and regional benefit and are therefore not expected to require significant international resources. The GEF's projected level of funding for international waters is $398 million for fiscal years 2003–06, with the goal of reaching $189 million in 2007.

Desertification is another focal area of the GEF that relates to the biodiversity and climate focal areas. The GEF allocated $250 million for "sustainable land management" for 2003–06.

Overall the GEF's projected spending for 2004–06 is $3 billion, in line with the third replenishment concluded in 2003. Beyond that time frame the GEF Secretariat in its business plan in 2003 assumed increasing resource availability and for fiscal year 2007 projected a total annual financing level of $1,041 million to cover all programme priorities, compared to actual allocations of $522 million in 2005 (GEF 2003a, p. 8; GEF 2005). This would require a fourth replenishment of $5 billion for 2007–10.

Resource availability

Financial resources for environmental purposes, domestic and international, come from government sources, from non-governmental organizations and foundations, as well as from the private sector. The following discussion is restricted to grant resources and does not include financial instruments that may be of significant importance to environmental policy, such as highly concessional loans and debt relief. Nor was it possible to look at private sector flows in the limited context of this analysis.

Assessing the volume of resource flows for international environmental activities is fraught with methodological problems. The Organisation for Economic Co-operation and Development (OECD) provides the most reliable compilation of donor-country data on aid expenditure. The database includes trackers for identifying expenditures for specific purposes, such as for biodiversity, energy and sustainable development. OECD member countries are asked to report their project-level assistance to the OECD's Creditor Reporting System (CRS) by broad sectors, and within these sectors by specific "purpose codes". However, there are significant problems with assigning projects to one or the other category, as will be shown (Porter and others 1998; see also Lapham and others 2003). Evaluating existing data is even more

difficult when it comes to foundations, non-governmental organizations and the private sector, since for these sectors no systematic data compilations exist, and individual data sources are difficult to compare and aggregate.

Methodological problems abound when trying to aggregate available data into some meaningful summary figures of resource flows. To name a few:

- Inconsistency in reporting period and categorization of project types.
- Inconsistency in recording grant allocation and actual disbursement.
- Overreporting because non-governmental organizations often receive grants from philanthropic foundations as well as from governments. Given current data, disaggregation is difficult.
- Underreporting because many development programme activities will have environmental side benefits, which are not recorded.

Types of resources available

Official government spending. The resource availability for global environmental purposes needs to be put into the context of general official development assistance (ODA) flows. The good news is that, after years of decline in ODA flows, aid flows rose significantly from $52 billion in 2001 to $58 billion in 2002 and $69 billion in 2003 (OECD 2004). According to pledges made at the UN Financing for Development Conference in Monterrey, Mexico, in 2002, aid flows should reach $75 billion by 2006. But attaining this funding level will depend crucially on decisions still to be made in the largest OECD countries. In particular, the United States has been criticized for falling far short of fulfilling its pledge, and Congress has repeatedly cut the aid budget from its originally proposed levels (*New York Times* 2005). The devastation of Hurricane Katrina in September 2005 and relief efforts following the tsunami catastrophe in Southeast Asia at the end of 2004 are likely to further undermine implementation of the Monterrey consensus on the national level.

Philanthropic giving. Philanthropic foundations have come to play a significant role in foreign assistance, particularly in the United States (OECD 2003a). Although grant-giving, non-governmental foundations originated in Europe, relative high levels of personal taxation as well as Europe's comprehensive social safety net are seen as having restrained

Table 3.1 **Domestic and international grants given by US foundations, 1998–2002**

(millions of dollars)

Focus of giving	1998	1999	2000	2001	2002	Average annual increase (%) 98–01
Domestic	8,674	10,259	12,564	14,301	13,800	21.6
International	1,037	1,315	2,451	2,463	2,100	45.8
Total	9,711	11,574	15,015	16,763	15,900	24.2

Source: Based on data by the Foundation Center, which includes grants of $10,000 or more awarded by a national sample of 1,007 larger US foundations (2005).

the establishment and size of foundations there (OECD 2003a, p. 32). Europeans tend to feel that welfare should be provided by the state on the basis of objective needs criteria rather than through private means.

Philanthropic giving therefore has much more of a tradition in the United States. Based on data from the US Foundation Center, total grant giving by the 1,000 largest foundations in the United States amounted to $15.9 billion in 2002, up from $9.7 billion in 1998 but a slight decrease from $16.7 billion in 2001 (Foundation Center 2005). Since 1998 grants for international purposes have more than doubled from $1 billion to $2.4 billion in 2001 but dropped to $2.1 in 2002 (see table 3.1).

Another source shows total giving by foundations to have increased from $8.8 billion in 1990 to $27.6 billion in 2000, and the international share to have increased from $1 billion (8.8%) in 1990 to $3.1 billion (11.2%) in 2000 (OECD 2003a). According to the same source, $193 million in 2001 went towards environmental project activities, which amounts to about 10% of total foundation grant giving to international programmes. Almost 90% of the $193 million went towards natural resources and wildlife conservation, the rest towards pollution control.

Yet another source shows that total charitable giving in the United States, including grants by foundations, reached $240.92 billion in 2002. According to data by *Giving USA*, 2.7% of charitable giving went to organizations dedicated to "environment and animal" and 1.9% to international affairs. Given these percentages, charitable donations in the United States amounted to some $4 billion for international affairs and about $7 billion for the environment. The data do not allow any breakdown of how much went to environmental objectives abroad.

For a variety or reasons estimates for European foundations are more difficult to make. One study estimates that private European foundations donate some $350 million annually to the developing world (OECD

2003a, quoting Michael Brophy, "The Report on Europe in the World Network Feasibility Project," Help for All Trust, East Sussex).

Overall, non-governmental grant giving for international purposes from foundations in OECD countries has increased significantly in the 1990s, based on an assessment of mainly US data. The total amount in 2002 is probably at least $4 billion dollars—although well below $5 billion. This is a significant amount but ultimately makes for 6–7% of total ODA resource flows. However charitable and philanthropic giving often covers important niche areas (for example, the Bill & Melinda Gates Foundation's focus on tropical diseases and Conservation International's funding of conservation concessions with grants from the Gordon and Betty Moore Foundation).

Multilateral grants. As far as multilateral funding for global environmental projects goes, the GEF is the only source of grant resources. While regional development banks and the World Bank have increased funding for projects with global environmental relevance, only GEF resources are provided on a grant basis, indeed are often used to leverage concessional loans from these institutions.

Table 3.2 shows the cumulative amounts for the GEF work programmes of the last six fiscal years. The biodiversity and climate change focal areas are recovering from a dip in 2002, but funding for the climate change focal area has again dipped in 2005. Multifocal projects have shown an upward trend in recent years, which continued in 2005. Overall, GEF funding levels do not show real growth over the last six

Table 3.2 **Multilateral funding by the Global Environment Facility, by focal area, 2000–2005**

(in millions of dollars)

Fiscal year (1 July–30 June)	Bio-diversity	Biodiversity (biosafety)	Climate change	Inter-national waters	Land degra-dation	Multiple focal areas	Ozone	Persistent organic pollutants	Total
2000	183	-	186	47	-	29	7.5	-	453
2001	159	26	178	75	-	26	-	6	470
2002	85	7	134	80	-	42	-	-	349
2003	121	2	172	80	-	76	2	40	493
2004	160	10	202	116	34	83	5	5	615
2005	192	11.5	132	56	48	65	5	44	553
Total	900	57	1,004	455	83	320	19	95	2,934
Total %	31%	2%	34%	16%	3%	11%	1%	3%	100%

Source: GEF (2005).

years. In fact the GEF has been asked to take on new tasks over the years without being given additional resources, such as to halt land degradation and phase out persistent organic pollutants.

Resources available for climate change

Government resources. In recent years the OECD has improved the tracking of bilateral DAC resource flows with the introduction of the CRS. The CRS database can be accessed online and allows for targeted queries according to broad objectives and specific purposes (www.oecd.org/dac/stats/idsonline). "Rio Markers" allow tracking of ODA flows into all climate and biodiversity relevant development activities.

Data on ODA flows into climate-relevant activities derived from CRS queries has become more reliable in the last few years, but methodological problems remain as discussed before (see table 3.3). Data from the CRS for France, for example, does not square with figures reported by France in the second national report to the FCCC, which are shown to be about $7.5 million annually (compared with only $1.3 million as reflected in the OECD data). Furthermore, the Rio Marker data also comprise agricultural and forestry projects, as well as more traditional non-renewable energy projects. An analysis of expenditures for renewable energy projects also shows that a few large hydro-electric projects strongly influence individual country totals. When such projects are excluded, total bilateral ODA going into renewable energy projects amounts to only $90 million annually for all donor countries during 1998–2000, compared with an annual flow of some $500 million for climate-relevant projects as identified by the Rio Marker category.

Reporting to the CRS after the year 2000 is highly inconsistent, as the table shows. A look at some bilateral data suggests that in the case of some countries resources for climate-related activities have somewhat increased in the 2001–2002 period (Canada, Denmark, France), but decreased for others (Germany, Sweden). No data is available after the year 2000 for Japan, the United Kingdom and the United States.

The World Bank's Prototype Carbon Fund (PCF) is worth mentioning in this context, even though it does not provide grant funding for climate-relevant projects. Established in 2000 it is one of the more innovative global mechanisms to mobilize public and private resources to develop a market for greenhouse gas emission reductions. As a public-private partnership, the PCF represents a platform of shared responsibility among governments[5] and companies from rich countries

Table 3.3 **Official development assistance for climate-relevant projects by selected donors and information source, grant and grant-like, 1998–2000**

	1998–2000				2001–02			
	CRS totals for renewable energy projects		Rio Marker totals for climate-change activities		CRS totals for renewable energy projects		Rio Marker totals for climate-change activities	
	# of grants	Millions of $	# of grants	Millions of $	# of grants	Millions of $	# of grants	Millions of $
Australia	2	4.1	42	21	-	-	13	4
Canada	2	1.2	17	43	2	1.1	35	56
Denmark	2	9.3	5	13	6	7.1	56	58
France	1	1.3	2	2.5	-	-	23	22
Germany[a]	6	9	91	379	8	28	53	96
Italy	0	0	0	0	-	-	-	-
Japan	70	11.7	1,136	193	-	-	-	-
The Netherlands	30	33.6	117	96	5	21	88	94
Sweden	1	1.0	52	25			13	5
Switzerland	0	0	25	14	0	0	25	11
United Kingdom	2	0.5	33	100	-	-	-	-
United States	40	5.7	686	554.7	-	-	-	-
Total for selected donors		77.4	2,206	1,441				
Average per year, selected donors								
All CRS donor countries	212	135.4	2,300	1,521	-	-	-	-
Average per year		90.5		500	-	-		-

Note: Creditor Reporting System data include hydro, geothermal, solar, wind, ocean and biomass projects with CRS purpose codes 23065-70.

a. One large hydro-electrical investment project in Nepal amounting to $136 million was excluded from the German renewable energy total.

Source: OECD. 21 September 2005. www.oecd.org/dac/stats/idsonline.

that are committed to sustainable development. As of June 2003 the PCF had capital contributions of $180 million and Emission Reductions Purchase Agreements worth $19.5 million (PCF 2004). The idea is to facilitate emission reduction projects in developing countries and economies in transition by investing in emission reduction credits that may be tradable in the future. As a pilot activity, the PCF is scheduled to terminate in 2012.

The Clean Development Mechanism (CDM) under the Kyoto Protocol has recently begun to operate under similar assumptions as the PCF. As of September 2005, 23 CDM projects had been registered by the CDM Executive Board since 2004. CDM projects are funded

by private sector entities from developed countries and result in emission reduction credits to be shared by the private investor and the host country according to CDM rules. In the coming years the market for CDM projects is expected to grow considerably (for details, see http://cdm.unfccc.int/Projects/registered.html). For now CDM activities are small in scale.

Non-governmental resources. Non-governmental organization (NGO) funding for climate-relevant activities were not considered in detail, given the limited scope of the present study. Anecdotal evidence, however, suggests that much less NGO money flows into promoting renewable energy and energy conservation than into nature conservation. OECD estimates that 90% of foundation grants for international environmental purposes flow into conservation (OECD 2003a).

Since the deregulation of energy markets in OECD countries, many energy companies have started to offer energy products that include energy from renewable sources at a premium price. Consumers can choose to voluntarily pay a higher price per kilowatt, which allows the companies to invest in renewable energy technology, which is costlier than traditional electricity generating technologies. The exact scope of such voluntary funding schemes for promoting renewable energy technologies could not be determined within the framework of this study; beyond that it is very small.

Private sector funding. The private sector is the largest source of funding in the energy sector, and investments in wind and solar photovoltaic (PV) technologies have increased quickly in recent years. For example, annual global manufacturing output of solar PV modules has more than tripled in the past four years, from just over 155 MW of manufacturing output in 1998 to more than 560 MW in 2002 (Solar Catalyst Group 2003). The role of the private sector cannot be explored further in the context of this analysis. However investments in low-carbon energy technologies remain at below 1% of investments into traditional energy technologies.[6]

Resources available for biodiversity conservation

Official government funding. Current estimated spending in all countries of $6 billion a year on biodiversity conservation in protected areas (some $5 billion of it in developed countries) meets only about one-eighth of what has been estimated as needed (Balmford and others 2002). Table 3.4 shows ODA flows to developing countries and some economies in transition for biodiversity and biodiversity-related projects, again based

Table 3.4 **Official development assistance for biodiversity-relevant projects by selected donors, 1998–2000**

	1998–2000				2001–02			
	CRS totals for biodiversity conservation		Rio Marker totals for biodiversity-related activities		CRS totals for biodiversity conservation		Rio Marker totals for biodiversity-related activities	
	# of grants	Millions of $	# of grants	Millions of $	# of grants	Millions of $	# of grants	Millions of $
Australia	4	6.0	66	39	2	0.5	20	16
Canada	1	4.0	19	25	-	-	6	1
Denmark	5	9.5	29	74	6	3.2	53	40
France	12	2.5	67	86	8	7.9	35	100
Germany[a]	38	86.8	87	228	33	56	34	43
Italy	-	-	-	-	-	-	-	-
Japan	187	28.6	539	149	-	-	-	-
The Netherlands	93	63.6	217	68	70	67.2	87	28
Sweden	-	-	63	55	-	-	21	43
Switzerland	26	26.8	51	40	37	31.4	38	28
United Kingdom	3	2.5	62	63	-	-	-	-
United States	345	239	396	245	-	-	-	-
Total for selected donors			1,596	1,072				
Average per year, selected donors				357				
All CRS donor countries	566	330	2,303	1,257				
Average per year		110		419				

Note: Creditor Reporting System totals are for projects in CRS purpose code 41030.
a. In the case of Germany, for 2001–02, a data query limited to biodiversity-specific projects (purpose code 41030) produces more such projects than a query for all biodiversity-relevant projects (Rio Marker), which in theory should include all biodiversity-specific projects. Other inconsistencies with the data set exist.
Source: OECD. 21 September 2005. www.oecd.org/dac/stats/idsonline.

on the OECD's CRS. Donors collectively provided an average of $110 million annually for projects that were categorized specifically for "biodiversity" during 1998–2000. If projects are included that do not specifically target biodiversity conservation but which are considered to have strong biodiversity relevance, the average increases to $419 million.[7]

Methodological problems make the accuracy of these numbers questionable. Many (but not all) forestry and agricultural projects are included, and there is no standard way by which countries assign projects to the OECD purpose codes. But there may also be considerable underreporting, as many countries require development projects to con-

form with sustainable development criteria—particularly in the forestry and agricultural sectors.

Foundations and non-governmental organizations. The three largest internationally active conservation NGOs discussed below may be spending somewhere around $500 million a year in developing countries on conservation. There are many other non-governmental organizations around the world devoted to promoting nature and wildlife conservation through education, awareness raising and project work. However no aggregated data set exists for NGO expenditures, and comparable data is hard to find for different organizations and beyond the scope of this contribution. Further complicating any estimate is that NGOs derive a significant portion of their operating budgets from government grants or from foundations. Such funding is already at least partially reflected in government aid expenditure and foundation grant-giving data. Based on the information perused for this analysis all NGOs together may provide somewhere between $400 million and probably not more than $700 million in resources which are additional to government and foundation grants that are channelled through conservation NGOs.

The international World Wildlife Fund (WWF) network is the largest conservation organization. WWF spent about $247 million directly on international conservation projects in 2004 compared to $190 million in the year 2000 (WWF 2005). Total revenues were some $469 million, and aside from financing international conservation efforts, WWF spends its resources on national conservation, educational and awareness-raising efforts and on fund-raising. Interesting to note is that WWF derives only 43% of its net income from individual contributions. Government and aid agencies provide close to 25% of its funding, while other sources of income are legacies, foundations and trusts, corporations and investment income.

The Nature Conservancy is the largest US conservation NGO, with annual conservation-related expenditures of some $472 million in 2004, of which $194 million went towards purchases of conservation land and easements. The annual report unfortunately does not disaggregate between domestic and international spending, but the Nature Conservancy is active in 28 countries and all US states (Nature Conservancy 2005).

Conservation International (CI) spent $92 million on conservation in developing countries in 2004, a 9% increase over fiscal year 2003 (CI 2005). More then half of CI's revenue comes from foundations. The NGO received the largest single contribution given to an environmental

organization when the Gordon and Betty Moore Foundation agreed to provide $261 million in a series of grants to be disbursed over 10 years.

Annual reports of these three NGOs show a decline in individual membership contributions since 2001. In the last two years investment income has become a significant source of income, particularly for the Nature Conservancy. Government and foundation grants in all cases constitute a significant source of net revenues. IUCN, the World Conservation Union, is not considered here, because it is an intergovernmental organization fully funded by government contributions.

To conclude this overview over international funding for biodiversity conservation, a best estimate is that annually some $600 million of bilateral and multilateral ODA goes towards conservation-related activities in developing countries. Non-governmental organizations and grant-making foundations are contributing an additional $500–800 million towards this goal, although this figure can only be based on anecdotal information. Total resource flows from developed to developing countries for biodiversity conservation therefore come to somewhere between $1.1 billion and $1.4 billion annually, depending critically on how "conservation relevant" is being defined. If the narrow definition used by the OECD CRS is applied, it is between $800 million and $1.1 billion.

Domestic expenditures for environmental protection

To put in context what countries spend on global environmental issues in developing countries it is interesting to look at how much developed countries spend on environmental protection at home. The OECD maintains rough figures for pollution and abatement control (PAC) expenditures by country (OECD 2003b).

PAC expenditure "comprises the flow of investment, internal current expenditure, subsidies and fees that is directly aimed at pollution abatement and control, and which is incurred by the public sector, the business sector, private households and specialized producers of PAC services" (OECD 2003b, p. 9). This entails all the expenditures, except for the protection of biodiversity and landscapes.

PAC expenditures for developed countries vary between 0.8% of GDP in the case of Italy and the United Kingdom to 2.6% for Austria (see table 3.5). A rough estimate for a selection of countries, including the six largest, shows that public expenditures for pollution abatement and control amounts to something like $170 billion annually.

Table 3.5 **Pollution and abatement control (PAC) expenditures in selected countries, 1997**

Country	Total PAC 1997 (% of GDP)	Public sector PAC 1997 (% of GDP)	Public sector expenditures (billions of dollars)	GDP 2000 (billions of dollars)
Austria	2.6	1.4	3.8	269
France	1.5	0.8	14.2	1,773
Germany	1.9	1.4	37.6	2,687
Italy	0.8	0.7	8.5	1,207
Japan	1.3	0.5	28.4	5,683
Netherlands	2.3	1.1	5.4	498
Sweden	–	0.2	0.5	291
Switzerland	–	0.8	2.8	348
United Kingdom	0.8	0.4	5.3	1,324
United States (1994)	1.6	0.7	62.7	8,955
Total for these countries			170	

Source: OECD (2003b).

No single data source could be found that shows and compares expenditures of OECD countries for national biodiversity and nature conservation activities. In the case of the United States federal and state expenditures for the protection of endangered and threatened species alone amounted to $610 million in 2000 (US Fish and Wildlife Service 2003). Comparable data for other countries could not be readily found.

The extent of the funding gap

As previously discussed, assessment of resource needs for meeting global environmental objectives is far from an exact science. It is as much hampered by scientific uncertainty relating to the cause and effect of environmental change as by divergent views concerning the ultimate value of "environment" and the costs and benefits of policy interventions to manage global environmental commons. The broadest consensus on environmental objectives available—and therefore the only real benchmark upon which a formal assessment can be based—is reflected in international environmental agreements.

The most concrete estimates available from scientific research relate to the cost of maintaining protected areas around the world. Cost estimates for meeting the Kyoto Protocol targets have also been calculated,

but results from modeling have varied widely. Hundreds of billions of dollars could be invested around the world in projects that could provide energy and transportation services at lesser carbon intensity than would be possible with traditional investments that follow short-term commercial returns.

Estimating a dollar amount of resource needs in the climate sector may in the end be a meaningless exercise. As pointed out, it may be more important to strive to maintain a steady and predictable increase in resource flows devoted to promoting renewable energy and energy conservation, thus creating momentum towards greenhouse gas emission control. But judging from the trend in bilateral and multilateral resources flows, such a steady increase does not appear likely. Nonetheless, several countries are phasing in progressive energy taxation schemes, which can provide more resources for supporting renewable energy technologies.[8] The steep oil price increases of 2004 and 2005 will likely create further incentives for cost-effective energy policies that so far could not be implemented.

The previous discussion has shown that the resources that are being made available for global environmental purposes through government, NGO and philanthropic channels are likely to total somewhere between $2.2 billion and $2.7 billion a year (see table 3.6).[9] This by any measure is a small sum given the global context, which raises the question of why it should be so difficult to gradually increase the level of such funds. It amounts to less than 0.5% of the US military budget in 2002; it is about 3% of total ODA flows from developed to developing countries, representing 0.01% of GDP, and amounts to an annual per capita expenditure of less than $4 for citizens in rich countries. It pales in comparison with domestic public sector expenditures for pollution abatement and control measures in OECD countries, which amount to $170 billion and 1% of GDP.

Explanations for the gap

While exact figures cannot be aggregated, the previous analysis leads to the not very surprising conclusion that a significant gap exists between the resources that are being made available for global environmental purposes and the resources that would seem to be required for meeting the vague objectives defined in major international environmental agreements. A theoretical discussion is useful for explaining the exist-

Table 3.6 **Estimated needs and annual resource transfers from OECD countries for global environmental purposes (based mostly on data for the 1998–2002 period)**

Purpose	Annual resource needs	Government and multilateral transfers	NGO and foundations	Total
Climate change	Uncertain/huge. Almost limitless investments could be made into low-carbon energy and transportation technologies and energy conservation.	$700 million	$100–300 million	$ 800 million–$1 billion
Biodiversity	At least $45 billion. Possible investments into sustainable management of productive zones are not quantifiable.	$600 million	$500–800 million	$1.1–1.4 billion
International waters	Substantial needs, but many pollution abatement projects benefiting international waters will be highly beneficial locally and regionally.	GEF only $80 million	?	?
Ozone	Limited; around $200 million for next three years and declining.	$200 million	–	$200 million
Persistent organic pollutants	Limited.	$50–70 million	–	$50–70 million
Total	$45 billion for biodiversity and international waters alone could be spent. Greenhouse gas mitigation measures could absorb very large investments.			$2.2–2.7 billion

ing gap and for identifying the possible policy venues for increasing resource flows for global environmental commons.

Game theoretical models and public choice theory can illustrate how difficult it is to create and maintain public goods for which private property rights cannot be established (Olson 1965; Hardin 1982). Individuals are much more likely to cooperate on creating private goods, because only those who invest in their creation can profit from their use. Global environmental quality is a good from which all human beings are said to benefit. However the nature of these benefits on the individual level remain nearly impossible to quantify, while the costs of providing them are much more tangible, particularly to special interests profiting from the status quo.

- *Resource allocation as a reflection of structure, interests and rational choice*. Many mainstream social scientists depart from a structural, rational choice analysis and conclude that democracies allocate tax resources according to the most urgent needs and the distributional effects policies have on key political constituencies and special interest groups. Recent trends in most rich countries are towards lowering, not raising, taxes and

towards reducing government spending on public commons projects. The allocation of resources for global environmental purposes has to be seen in the context of a highly competitive budgetary process, currently dominated by national security interests, profoundly affected by the Iraq war and the 11 September 2001 terrorist attack on the World Trade Center.

- *How societies decide on priorities*. Constructionist theories are concerned not with structure or interests, but with how societies "construct" reality—that is, how cultural factors and learning shape interests and perceptions.[10] Such a focus has produced insights on how ideas, culture, education, media and science influence voters and policy-makers and lead to changes in their preferences and choices (Hannigan 1995; Wapner and Ruiz 2000; Shellenberger and Nordhaus 2004). From this perspective "framing the issue" is what it is all about, and a funding gap is easily explained with interest group politics and the willingness and ability of advocacy groups or their lack thereof to "frame" certain issues as in the general publics interest in the context of many competing "good causes".
- *Political culture*. Institutionalists in comparative politics look at how political systems—such as proportional or majoritarian representative democratic systems—determine how latent societal interests are reflected in policy outcomes and through what mechanisms and procedures constituencies and special interests can influence politics. Such models can, for instance, shed light on differences between the United States and some European countries when it comes to providing aid to developing countries. As discussed previously, the much higher rate of philanthropic giving in the United States than in European countries reflects societal preferences regarding what role the government should play in the provision of general welfare. In countries where wealth redistribution is a much more accepted objective of taxation laws, the rationale and need for philanthropy is significantly less than in countries such as the United States, where an individualistic culture emphasizes self-help and voluntaryism. Such differences in attitudes can help explain different views regarding the value of voluntary action and the use of taxes to raise resources for funding public policy objectives.

- *Institutional factors*. Institutional factors also relate to the role various government agencies play in determining allocation of resources within given budget categories, such as contributions to global environmental protection or the GEF. The GEF was originally established as a fund separate from development cooperation, and a number of countries—directly through their finance ministries—did allocate GEF funds independently from development aid resources. This reflected the "new and additional" principle incorporated in the conventions and the Rio Conference.

  It appears that over the last decade this distinction has been all but lost in the budgetary appropriation process of most countries. Resources for global environmental activities are now part of the ODA budgets in all major countries, and environment or foreign affairs ministries usually in charge of negotiating environmental agreements have little or no influence on resource allocations in support of these conventions. There is no research on how this is playing out exactly, but anecdotal evidence suggests that such institutional competition for control over aid budget lines is a major factor determining the amount of resources going to the global environment. In such a context any effort to increase funding for the global environment would almost certainly put pressure on other aid budgets, something few politicians and bureaucrats or even environmental NGOs would advocate.
- *International burden sharing*. Another factor that is determining countries' resource allocation is the international burden-sharing arrangements used in international politics. The history of the GEF shows that GEF replenishment was determined by the largest donor countries' willingness to pay. Political constellations in the largest country, the United States, determined the overall size in a fairly arbitrary way. The initiators of the GEF, France and Germany, were originally favouring a GEF at the level of $3 billion, instead of $2 billion, a proposal which itself grew out of an arbitrary allocation of available funds in France at the time.[11] Once it was clear what the United States was going to contribute in 1994, this not only determined the overall size of the GEF, but essentially also the size of subsequent replenishments. Domestically the GEF has arguably also lessened the political need for governments to

provide bilateral resources for global environmental purposes, particularly in view of the recalcitrance of the largest donor country to contribute significantly. Path dependency related to institutional and political factors over the last decade has kept resource flows for global environmental purposes within a narrow range.

- *The public's willingness to pay*. Anecdotal evidence suggests that the general public considers environmental protection a particularly worthy public policy objective. Contingent valuation studies tend to show a much higher willingness to pay for global environmental public goods, such as saving tropical forests and protecting the climate, than what governments are making available (Clémençon 2000; Kramer and others 1997). However the public also tends to overestimate the resources that are actually being spent on foreign aid (Krull 1996).

As briefly discussed, many factors determine the current volume of resource flows for global environmental purposes. A systematic assessment of actual needs has never been one of these factors. Overall political and societal priorities determine the order of magnitude, but institutional factors relating to interagency competition and international burden sharing may significantly determine the volume within this broad range at the lower end of the scale. Any attempt to change this will likely have to be incremental. The fact that the public in developed countries has until recently expressed a high interest in global environmental issues suggests that there is room for a renewed effort to provide more resources in the future.

Addressing the funding gap

- *Government resources*. Attempts to secure larger allocations for global environmental issues in governments' spending bills are not likely to be successful, given the current situation in world politics. If ODA resources are indeed to reach $75 billion by 2006—which is doubtful given the political circumstances in key donor countries—a proportional increase for global environmental protection may result. However the proposed increase in ODA was motivated first of all by a desire to significantly reduce poverty around the world, to fight the AIDS epidemic and to respond to other Millennium Development

Goals. For ethical and moral reasons it is difficult to argue that there be an increase in the share of ODA resources for global environmental commons. Rather, a separate case would have to be made for raising funds outside and separate from development aid budgets. Only the highest level of political leadership, supported by legislative approval, could possibly achieve something like this. It is unclear what events could trigger such a response or how such an initiative could be "constructed". Hurricane Katrina may provide a renewed impetus for looking at global environmental change and how it can affect human life.

- *Non-governmental organizations and foundations*. To what extent will NGOs and philanthropic foundations increase their contributions towards global environmental protection? The potential for significant increases in philanthropic giving are great. One calculation suggests that in the United States alone between $40 and $136 trillion in assets will migrate from one generation to the next over the next 50 years, and a significant proportion of that legacy is expected to go to charitable organizations.[12] Changing tax laws in the United States to alter or abolish the inheritance tax, however, is said to discourage giving over the long haul, while the growing number of super-rich individuals may encourage it. Clearly philanthropic giving has provided a considerable boost to conservation financing over the past five years. Focusing fund-raising efforts on voluntary giving, however, raises a host of social and political questions fundamentally related to the future of democratic political systems. As far as NGOs are concerned, money raised through membership contributions is relatively small and has apparently remained stagnant. Voluntaryism by the average citizen is plagued by the traditional collective action/free-rider problem. Many people are discouraged from making large donations to a cause if they know that others do not have to contribute. Strategic political considerations designed to force the government's hand to do more may also limit membership contributions to NGOs.
- *Private sector*. Private sector flows to protect the public commons have not been examined in this analysis. They may be significant in many ways, particularly in the renewable energy sector. But ultimately market forces and competitive pressures

set limits on non-profitable investments and may have been particularly overestimated with respect to biodiversity conservation. Obviously, publicly funded efforts will to a large extent be designed to leverage the private sector.

- *Transnational cooperation*. Fund-raising efforts linked to traditional burden-sharing negotiations have led to lowest common–denominator outcomes (such as the GEF). This approach ignores any individual willingness to pay that may exist. Over time some transnational fund-raising mechanism could perhaps avoid this pitfall and be set up with the power to directly raise funds from individuals in rich countries.
- *Setting priorities*. As far as fund-raising goes, it may be easier to focus on one particular area than to devise a strategy that encompasses all areas considered to be globally relevant. The same dollar amount can make a much greater difference in conserving biodiversity than in reducing greenhouse gas emissions.[13] Given progress in technology development and market penetration, CO_2 reduction is likely to become cheaper over the coming years, while biodiversity conservation will likely require increased funding as population pressure increases. Commercial opportunities related to conservation may never be able to cover conservation costs fully.
- *Incremental change*. Most likely any grand design to significantly increase resource flows for global environmental purposes will run into the concrete wall of political realities. The best course of action in the short term may therefore be to push for incremental but predictable increases in resource allocations for global environmental commons. But new ideas—such as a small, internationalized tax mechanism for global public goods—should be explored and their merits explained to policy-makers and the public at large.

Directions for future work

As this analysis shows, confidence in available data is not great, and much could be done to improve the quality and availability of data. However the problems with categorizing projects according to their "global environmental benefits" are not just methodological in nature, but relate as much to difficulties in distinguishing between local, na-

tional and global environmental benefits and in determining short-term and long-term benefits. These are of course similar problems that the GEF is facing with respect to determining "incremental costs".

Despite the problems of availability and comparability data, it is unlikely that a more comprehensive study would uncover major unrecorded resource flows for global environmental projects and come to fundamentally different conclusions than this study does. Nonetheless, a microanalysis of how exactly existing resources are being used within the different focal areas, and of which sources fund which projects, would be useful. Such information could help guide existing resources to where they could be most effectively used. Such analysis is available for much of the GEF's programme, but not for other funding sources.

Little work has been done on how political leaders, institutional actors, special interest groups and public pressure in donor countries affect resource allocation. How does the resource allocation process vary for different "worthy" causes, and why?

Finally, more research is needed into alternative fund-raising mechanisms. How would an international fund-raising mechanism have to be designed to raise revenues directly from individuals? How could governments be encouraged to help establish an international fiscal instrument that bypasses domestic taxing authority? Such a mechanism might first be devised as a pilot project supported by a small group of countries. There is no doubt that considerable obstacles would have to be overcome for something like this to become reality. Still, it has never been seriously tried, and globalization trends should provide at least some rational for such an approach to fund-raising on the global level which bypasses national governments.

Notes

1. For a recent discussion of cost estimates, see McKibbin and Wilcoxen (2004) and Manne and Richels (2004). See also Intergovernmental Panel on Climate Change (2001).
2. "Estimates of cost and benefits of mitigation actions differ because of (a) how welfare is measured, (b) the scope and methodology of the analysis, and (c) the underlying assumptions built into the analysis" (IPCC 2001, p. 8).
3. Germany and the United Kingdom have introduced such targets: Germany, 20% by 2020 and the United Kingdom, 15% by 2015. The

European Union set a voluntary target of 22% for the electricity sector to be reached by 2010.

4. Based on the 2004 statistics, globally there are 104,791 protected areas covering more than 20 million km^2. However eco-regional and habitat representation remains uneven, and coastal and marine ecosystems are particularly underrepresented. Existing systems of protected areas are not representative of all categories of biodiversity important for conservation and sustainable use, as set in Annex 1 to the Convention on Biological Diversity. See http://sea.unep-wcmc.org/wdbpa/.

5. These governments include Canada, Finland, Japan, Netherlands, Norway and Sweden.

6. Environmental groups have criticized that such investments still amount to only about 0.5% of investments into traditional oil exploration (Greenpeace press releases, November 2000, www.greenpeace.org).

7. The query was run on 21 September 2005 for the CRS "biodiversity" purpose code 41030, and the Rio Marker "aid targeting CBD objectives". The results do not match the numbers used by Lapham and others (2003, p. 17), based on a query using the same indicators in 2003. The reason for the discrepancy could not be determined.

8. Of the large EU countries Germany, France and the United Kingdom all have recently adopted environmental energy taxation.

9. The significant methodological problems with interpreting the limited available data have been discussed above.

10. For a comprehensive discussion on neorealism and constructionism in social science, see Wendt (1992); for a recent treatise on "progress" in social science theory, see Blyth (2003).

11. Personal recollection. See also Sjöberg (1994).

12. *New York Times*, 27 April 2002. "The Newly Rich are Fueling a New Era of Philanthropy."

13. A conclusion I arrived at while on the team of the first GEF evaluation in 1997.

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Sustainable Management of the Global Natural Commons

Chapter 4

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International environmental protection is a classic global public good that tends to be underprovided. Organizing collective action worldwide to address pollution across boundaries and to manage the shared resources of the global natural commons will require a variety of strategies: clearer property rights, stronger markets and better regulation, particularly increased rise of market-based mechanisms and information disclosure. Success will also require a revitalized international environmental regime. The current structure, centred on the United Nations Environment Programme (UNEP), is chronically underfunded, lacks broad-based political support and continues to fall short of expectations. A variety of options exist for institutional reform, ranging from launching a new global environmental organization to strengthening UNEP.

One attractive possibility would be to shift to a more modern organization structured around a global public policy network. Such a global environmental mechanism (GEM) might focus initially on core functions that would support global policy-making, including data collection, science and knowledge exchange and a "best practices" clearinghouse that would disseminate cutting-edge thinking about environmental policies, technologies and systems. Over time a GEM could expand to include a funding mechanism, a structure for monitoring treaty compliance and measuring environmental performance, a negotiating forum and a dispute settlement mechanism—in support of systematic management of the ecological interdependence of the world community.

Many of the most pressing pollution control and natural resource management issues have an important international dimension. Ozone depletion due to chlorofluorocarbons (CFCs) and other chemicals could reduce agricultural productivity and leave people everywhere exposed to higher levels of ultraviolet radiation and at greater risk of skin cancer and cataracts.

Overfishing threatens a collapse of fisheries in almost all of the world's oceans. Deforestation unleashes carbon dioxide into the atmosphere, reduces the capacity of forests to serve as carbon "sinks", and eliminates the forest habitat that supports much of the biological diversity of the planet. The release of greenhouse gases into the atmosphere threatens to bring about climate change, leading to global warming, sea-level rise, increased intensity of windstorms, changes in rainfall patterns and hydrological flows and potential disruption of climate-determining ocean currents.

The need for global collective action

These transboundary environmental problems are especially challenging because they demand cooperation—or what academics call "collective action"—on an international scale (Olson 1965; Ostrom 1990; Esty and Ivanova 2002). Where natural resources are shared among many countries (as in the case of oceans and the atmosphere) or pollution spreads across international boundaries or even blankets the Earth (in the case of greenhouse gases and CFCs), individual countries cannot manage the resource or limit the harm by acting on their own. Even if Germany, for example, were to eliminate all greenhouse gas emissions tomorrow, it would still face a threat of climate change because of the emissions other nations continue to release. Problems of the "global commons" highlight the challenge of controlling pollution and managing shared natural resources in a world of ecological interdependence. In this context international environmental protection—including management of the global natural commons—is a global public good (Kaul and others 2003). As with other public goods and consistent with the "logic of collective action", it tends to be underprovided (Olson 1965).

The realities of national self-interest make it difficult to get harm causers or natural resource users to confront the transboundary impact of their actions. National efforts to address global problems unilaterally generate benefits that are very diffuse (spread across the world) and costs that are highly concentrated (on producers and consumers in the country taking action). Thus, from a narrowly conceived cost-benefit point of view, investments by an individual country to reduce international environmental harms are hard to justify. Protecting shared natural resources and preventing environmental spillovers at a global scale only makes sense in the context of a shared sense of destiny—countries moving together as a community to address common threats.

In a global marketplace, moreover, countries have economic incentives to "free ride" on the environmental efforts of others. Any nation that disregards transboundary problems and ducks its share of the burden of a global policy intervention can reduce the pollution control costs borne by its own industries. In doing so the shirking nation may improve the competitive position of its companies in international markets. But when some nations choose this path, others may respond by declining to carry out their share of international environmental obligations. The commitment to cooperate quickly unravels, leaving global problems unabated. This "lose-lose" dynamic leads to a "tragedy of the commons" (Hardin 1968). Without international cooperation on management of the shared resources of the global natural commons in a sustainable fashion, we risk overexploiting resources and permitting pollution spillovers that might be individually rational (from a single nation's comparison of costs and benefits), but collectively damaging when viewed from a worldwide perspective.

To protect the atmosphere, the oceans and the other shared resources of the global commons, the world community must find ways to manage its ecological interdependence. This challenge lies at the heart of any effort to achieve sustainable development and future prosperity across the planet. Failure to address transboundary environmental harms creates risks of "superexternalities" (spillovers of harms across national borders), market failure, allocative inefficiency in the global economy, reduced gains from trade and reduced social welfare—not to mention unnecessary environmental degradation (Dua and Esty 1997). This chapter explores the challenge of sustainable management of the global natural commons and proposes ways to achieve the requisite global cooperation.

In recent decades significant investments have been made in pollution control and natural resource management at the local and national levels. The European Union spends several billion dollars each year on environmental programmes, and the individual member states spend billions more. In the United States the federal government annually spends about $45 billion on environmental protection, leveraging private sector spending of more than $200 billion a year. State and local governments spend another $25 billion a year on environmental programmes. Although national environmental investments have not been as large in the developing world, substantial financial resources are being devoted to pollution control and natural resource management in almost all countries.

Nonetheless, these nations have not made comparable commitments to address global issues. The landmark Stockholm Conference on the Human Environment of 1972 highlighted the transboundary character of some aspects of environmental degradation, and the UN Conference on Environment and Development (UNCED, also called the Earth Summit) held in Rio de Janeiro in 1992 and the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002 further refined our understanding of the international dimension of the challenge of sustainable development. Still, only modest investments have been made in the policy structures or strategies necessary for a robust international environmental regime. Creating effective and efficient institutions, cooperation mechanisms and programmes to respond to global environmental problems remains a major challenge for the rising generation of world leaders.

Strategies

In some cases environmental damage can be traced to dysfunctional markets. The fundamental policy goal is to "internalize" externalities so as to create accurate price signals that promote efficiency in resource use. Where, for instance, price signals are obscured by subsidies, more efficient (and less environmentally harmful) resource use can be achieved simply by ending the market-distorting and environmentally harmful subsidies (Van Beers and de Moor 2001). The potential opportunities here include subsidies to energy, agriculture, fisheries, timber and water.

In other cases markets do not function because property rights are unclear or hard to defend. In such cases establishing and enforcing tradable property rights to natural resources may improve the management of the resource and promote sustainability. In a number of places across the world fisheries have been revived through the establishment of a regime of fish quotas that can be bought and sold.

In other cases environmental externalities are best addressed through regulation, such as government-mandated emissions standards, ambient pollution limits or pollution control technology requirements. Such "command and control" regulation has recognized drawbacks in its administrative burden and tendency toward an inefficient "one size fits all" approach. But simple forms of governmental intervention may be optimal where the administrative burden or complexity of alternative regulatory approaches makes their use unrealistic.

Finally, externalities can be internalized through "economic instruments" or market-based regulatory mechanisms. Economic-incentive approaches, including subsidies (for environmental good behaviour), taxes or fees (on environmental harms) and tradable permits (for extraction of limited resources or pollution rights), offer potential efficiency gains. Likewise, growing emphasis is being placed on access to information and public participation in decision processes (Esty 2004).

Where they can be used markets and market-based regulation represent a better approach to environmental problems, as they tend to deliver more protection per euro or dollar spent. But market failures—due to information gaps, transboundary spillovers, public choice failures and human cognitive limitations—remain prevalent in the environmental realm. As a result, successful environmental efforts require access to a range of regulatory tools and strategies. In addition, the optimal manner of regulation is likely to evolve over time with simple (command and control) strategies working best in the early stages of an environmental effort. Market-based approaches will often emerge as more appropriate as a jurisdiction's regulatory capacity increases and higher levels of development justify investments in more refined environmental programmes.

These strategies for addressing environmental harms can be implemented at the local, regional, national or international scales. Given the concentration of political power nationally, environmental activity in most countries has been centred on this scale. There are, however, important reasons to think that environmental gains might be achieved by decentralizing some activities to the local scale and by undertaking some aspects of environmental protection at a broader, perhaps even global, scale. Successful environmental protection involves a variety of activities, including identifying harms, measuring emissions, establishing causal linkages, clarifying policy options, analysing the costs and benefits of various intervention options, tracking policy performance, evaluating programmes and refining strategies. Some of these activities are best undertaken at more centralized scales, others on a more decentralized basis.

Recent international environmental action plans, including Agenda 21 developed at the Rio Earth Summit and the Plan of Implementation of the Johannesburg WSSD, recognize the need for complementary measures at various scales to achieve a successful overall environmental strategy. Ensuring that the appropriate global activities are being undertaken remains, however, an important challenge for

the world community. Underperformance with regard to transboundary issues continues to be a source of concern for many observers of the environmental scene.

Institutions

While environmental programmes must generally be implemented at local, regional or national levels, management of the global natural commons are logically done at the scale of the issue and thus on a worldwide basis. Furthermore, national and local efforts to protect the environment can be enhanced through international cooperation. In fact intergovernmental data exchange, comparative policy reviews (of the sort undertaken by the Organisation for Economic Co-operation and Development), the identification of best practices and policy and technology transfers are all essential to successful pollution control and natural resource management at the national scale. An international commitment to capacity building of this sort is especially critical to environmental progress in the developing world.

It is increasingly recognized, moreover, that the job of environmental protection cannot be left to governments or intergovernmental bodies alone. The business sector, communities, non-governmental organizations (NGOs) and even individuals all have important roles to play in spotting harms, defining policy options, presenting competing data and analysis and challenging status quo thinking. Developing a multidimensional global environmental regime is therefore essential.

International environmental protection is now carried out by a wide range of institutions, including the UNEP, the UN Development Programme (UNDP) and the UN Commission on Sustainable Development (CSD), as well as a diverse set of other UN agencies including the United Nations Educational, Scientific and Cultural Organization (UNESCO), the UN Food and Agriculture Organization (FAO), the World Health Organization (WHO), the World Intellectual Property Organization (WIPO), the World Meteorological Association (WMO), the International Oceanographic Commission and the International Labor Organisation. The World Bank and other multilateral lending institutions also play a major role in environmental analysis and support environmental programmes in the developing world. The Global Environment Facility (GEF) has provided important financial support

for international environmental efforts—specifically for the incremental costs of national environmental activities that offer global benefits.

Unfortunately the current international environmental regime is dysfunctional in important respects. Some of the failings can be attributed to a history of management shortcomings and bureaucratic entanglements, but other problems are deeper and more structural. Fundamentally, UNEP's focus and design predate a full appreciation of the international scope of pollution issues. Hampered by a narrow mandate, a modest budget and limited political support, UNEP competes with dozens of other bodies including the UN agencies mentioned above and the independent secretariats to numerous treaties, including the Montreal Protocol (ozone layer protection), the Basel Convention (hazardous waste trade), the Convention on International Trade and Endangered Species and the Climate Change Convention. With all of these bodies competing for limited governmental time, attention and resources, focus is dissipated. The world community's international environmental protection efforts are thus splintered, with responsibility scattered, funding squandered and accountability lost. Priorities are not set in a coordinated fashion. Synergies across issues are not achieved systematically, nor are budgets across the many problems areas rationalized.

Rules

The problem does not appear to be a lack of environmental attention. Although the environmental field is new, more than a thousand multilateral and bilateral environmental agreements have been concluded in the past few decades. Nevertheless, environmental law—particularly at the international level—is still nascent. Efforts to promote international cooperation have been hampered by the limits of international law generally and the pressures of national sovereignty specifically.

Although a number of treaties and international compacts already cover aspects of the global natural commons, these agreements often offer little more than a framework for international cooperation. Because of the constraint of sovereignty, substantive commitments to actions that will make a difference on the ground are undertaken only with unanimous consent. This means the process moves only as quickly as the most hesitant or recalcitrant actors are willing to proceed. In recent years, in the face of the difficulty of achieving consensus on concrete actions, a number of governments have turned to a partner-

ship approach that engages a subset of countries willing to act. Such an approach makes good sense for issues of limited scope. But for truly global problems, relying on "coalitions of the willing" is unlikely to be successful, especially where significant harm causers decline to participate or free riding is otherwise prevalent.

In many cases, moreover, international rules arise as guidelines and not binding obligations (Shelton 2000). International standards that emerge as "soft law" may harden over time into more enforceable obligations, but the lack of binding regulations—and thus the inability to deter free riding—hampers progress in many realms.

The lack of lawmaking capacity is not the only obstacle to international environmental cooperation at the global scale. Constraints on executive authority in the international domain and the hesitancy to enforce international standards also limit environmental progress. In this regard the environmental regime lags other elements of the international order. The trade regime, for example, has developed quite a robust institutional architecture in the World Trade Organization (WTO) with systematic structures for negotiation, rule making and administration (Esty 2006). In contrast, the international regime for the environment remains ad hoc, fragmented and largely ineffectual.

The pattern of institutional weakness leading to substantive poor performance is especially notable with regard to settlement of international environmental disputes. Although the International Court of Justice has an Environmental Chamber, it has never been used, perhaps because jurisdiction is only by consent. With no other well established mechanism to resolve international environmental disputes, issues go unresolved or emerge as trade and environment problems that fall to trade institutions to address. In contrast, the international trading system (including both the WTO and many regional trade agreements) has dispute settlement procedures that are frequently used and generally well respected.

Resources

Even though vast sums are spent on environmental protection at the national and local levels, international environmental programmes remain very modestly funded. The annual budget of the UN Environment Programme is only about $60 million. The Global Environment Facility commits approximately $300 million a year to environmental projects, addressing its focal areas of ozone layer depletion, climate

change, biodiversity, international waters, land degradation and, more recently, biosafety and integrated ecosystem management. The World Bank and other development banks' spending in support of environmental programmes probably totals less than $2 billion a year—with much of the funding going to local and national projects, not protection of the global natural commons. NGOs and philanthropic sources of support have put as much as $300 million into global environmental protection efforts in recent years. Even when additional funding from UNDP, financial resources associated with specific treaties (such as the Montreal Protocol Fund) and bilateral donors is counted, the total commitment to addressing problems of the global commons probably adds up to no more than about $3 billion a year.

The mismatch between the resources available and the challenge of protecting the global natural commons has been noted repeatedly. While some aspects of the challenge can be devolved to local and national governments, the elements that must be handled globally or are best handled at an international scale tend to be chronically underfunded. Action at the international scale is undoubtedly harder to organize and sustain. From a national perspective, the benefits of international programmes may seem remote or diffuse. Questions about control over and accountability for international initiatives further complicate such efforts. Nevertheless, the disparity in environmental commitment and funding between the national/local and the global scales is striking.

Assessment

Today's global environmental efforts lack institutional support and regulatory coherence. There is no established hierarchy among issues, and there are substantial overlaps, inconsistencies and gaps in responsibility and authority. While there have been some successes, notably the effort of the Montreal Protocol to reduce CFCs and other chemicals that damage the ozone layer, most international agreements and global action plans remain partly or even completely unimplemented (Rischard 2003).

The international environmental regime remains diffuse, dispersed, short on funding and lacking in political support. There is, moreover, little integration between environmental cooperation efforts and other policies necessary to achieve the ultimate goal of sustainable development. Some regional agreements (such as the European Union's revised Treaty of Rome) emphasize integration across policy domains, but

much more remains to be done. The difficulty of building environmental sensitivity into the trade regime offers a glaring example of a policy link that needs to be given more attention (Esty 2001). The success of environmental efforts and trade liberalization are inescapably bound together, but the current policy-making structure does not adequately address the tension between these realms, much less align the two policy domains to achieve potential synergies.

Even the most basic environmental functions are not pursued systematically on an international basis. For example, gathering data, tracking trends and monitoring environmental conditions are not done adequately. UNEP has achieved success in some aspects of this challenge, but many of the environmental indicator and data initiatives that have been undertaken remain isolated, fragmented and based on voluntary contributions of information by countries. Attempts to ensure methodological consistency and thus compatibility of data across countries have largely fallen flat.

The goal of sharing best practices across countries has also been advanced in a haphazard fashion. There is no international policy, technology or science clearinghouse that is positioned to provide information to countries across the world on best practices, management strategies and programme opportunities.

Options and recommendations

Reform of the international environmental regime could go in a variety of directions. Some observers—including French President Jacques Chirac, former WTO Director General Renato Ruggiero and *The Economist*—have argued for new architecture centred on a full-fledged Global Environment Organization (GEO) that would bring together various aspects of the existing regime, including UNEP, the CSD, various treaty secretariats and perhaps other bodies. Consolidation might provide opportunities for streamlining operations and would, at the very least, create the potential for scale economies, rationalized budgets and prioritization across issues. Shifting to a single location for global environmental governance would also make it easier for developing countries to stay on top of ongoing discussions and negotiations without having to deploy staff all across the globe.

An effective GEO need not be a big, new bureaucracy. To the contrary, a slimmed-down agency could bring together many of the functions identified above, supported by a decentralized (largely vir-

tual) structure of outside experts, including national government officials, academics, business leaders and NGO officials. One might even imagine a more loosely structured global environmental mechanism (GEM) that takes as its mission the idea of creating a global policy network (Reinecke 1998). Using modern communications technologies and a non-hierarchical organizational design, such a GEM might be better equipped to move quickly to address issues, bring analytic rigor to bear on hard problems and achieve entrepreneurial progress in promoting sustainable development across the world (Esty and Ivanova 2002).

Other observers see strengthening UNEP as the best way forward (UNEP 2001). While almost all who have looked at the issue of global environmental governance acknowledge UNEP's pervasive weaknesses, some observers believe that UNEP has not been given a fair opportunity to demonstrate what it could do with adequate resources and political backing. A range of other reform proposals has been advanced, including an effort to cluster environmental organizations and treaty secretariats in a way that would achieve greater synergies (Von Moltke 2001). Collocation of a number of bodies in a common locale—perhaps Bonn—would be one option.

While there is widespread disagreement about the best path forward, some points of convergence can be identified.

- Most observers would agree that any effort to achieve international cooperation to manage the global natural commons will require a multitiered, multidimensional structure that engages local, national and international authorities, as well as local communities, NGOs and the business sector.
- Given the wide array of environmental challenges that must be met, a successful regime will need to have multiple tools, including improved market structures, better regulatory programmes and market-based incentives.
- To the extent that even global problems must be addressed largely at the national and local levels, building capacity, particularly in the developing world, must remain an important priority for the world community. Successful capacity building requires both commitment and resources.
- Any effort to revitalize global environmental governance must ensure greater international focus. The current regime has gotten bogged down carrying out projects in dozens of countries. While independently worthy, these locally oriented

activities are better undertaken by national governments supported by UNDP or the World Bank. Instead the international environmental regime should give priority to solving global problems, including management of the oceans, the atmosphere and other shared resources.

Any new organization should include a number of core capacities including:

- Collection and dissemination of the data needed for good environmental decision-making.
- Support for national science and analysis to gauge risks, assess costs and benefits and evaluate policy options.
- Creation of a mechanism for identifying and leveraging financial resources, including private sector funding, in support of international environmental programmes.
- Means for improving the efficiency and outcomes from global environmental efforts, including tracking of compliance with international commitments as well as performance measurement and benchmarking.
- Establishment of a negotiating forum to support policy dialogues, cooperation initiatives and rule making at the global scale.
- Procedures to promote public involvement by NGOs, researchers, businesses and community members in policy debates.
- Capacity-building programmes, including a best practices clearinghouse to disseminate cutting-edge thinking on policies, technologies, systems and training.
- Creation of a dispute settlement mechanism.

To move forward expeditiously, the best option might well be the GEM with its network emphasis. First steps might focus on some of the core functions discussed here, such as data collection, a science-oriented knowledge exchange mechanism and the best practices clearinghouse.

Whatever path is chosen, the way forward will be difficult. But ecological interdependence remains a fact that must be reckoned with. The only question is whether management of the global natural commons will be undertaken in a thoughtful, structured and systematic fashion—or in an ad hoc, crisis-driven and uncoordinated manner.

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Assessing the United Nations Environment Programme

Chapter 5

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Many have called for strengthening governance of the global commons by transforming the United Nations Environment Programme (UNEP), mandated to serve as the authority on the environment, into a more powerful global environmental organization. It is imperative, however, to begin any reform initiative with a sound overview of progress to date and the reasons behind it. This chapter assesses UNEP's performance in three core functions: monitoring, assessing and reporting on the global environment; setting an agenda for action and managing standards, policies and guidelines; and developing institutional capacity to address existing and emerging problems.

UNEP, despite a clear mandate to serve as the anchor institution for the global environment, has had only partial success. It has been fairly effective in monitoring and assessment and in launching environmental agreements. It has also served as the forum for environment ministries from around the world and helped build their institutional capacity. But it has fallen short in managing coherent and coordinated policy processes. It has failed to establish itself as the institutional home for the many international environmental conventions. Without a centre of gravity, international environmental governance has grown more complex and fragmented.

Contrary to popular belief, UNEP was not deliberately set up as a weak and ineffective institution; it was expected to grow into its mandate as it proved its effectiveness. Four structural choices, while considered appropriate at the time of UNEP's creation, have inhibited its performance and growth. First, UNEP's authority was severely constrained by its classification as a United Nations (UN) programme rather than a specialized agency. Second, its governance structure led to more attention to the needs and demands of member states than to its mission. Third, its financial structure enabled countries to pursue self-interests rather than

the common good. Fourth, its physical distance from the centres of political activity limited its ability to coordinate environmental agencies and, most important, to attract top-tier policy staff.

There is a need for a much stronger voice and conscience for the global environment. UNEP offers a potentially strong comparative advantage in environmental monitoring, assessment and information sharing. And it is the natural forum for the creation of a coherent international system. UNEP could also lay the foundation for a policy forum where various clusters of agencies and networks convene to negotiate and exchange experience. Its leadership in the Environmental Management Group could give it the policy space for such an initiative. UNEP has undertaken many projects to support national environmental efforts and has developed an understanding of key needs. A more strategic, priority-driven and long-term capacity development approach drawing on UNEP's work as an information clearinghouse and a policy forum, rather than an operational agency, could facilitate implementation of key agreements.

This chapter makes recommendations to UNEP, national governments and the International Task Force on Global Public Goods.

- *Initiate a strategic review of UNEP.* UNEP should compare its actual performance to expected results, verify key constraints and opportunities and identify ways to measure impact. An independent review would help collate reports on the status of reform efforts, set short- and long-term goals and establish time frames to complete reforms.
- *Consolidate financial accounting and reporting.* UNEP should indicate expenditures in terms of mandated functions or by environmental issue. Through more coherent financial reporting, it could build and maintain the confidence of its donors.
- *Restructure organizational governance.* UNEP should set priorities for global environmental needs and make its internal management more effective. An inclusive structure like the Global Ministerial Environment Forum and a smaller, more efficient executive board should be created for these separate functions.
- *Create an information clearinghouse.* Governments should submit comparable data to a comprehensive and consolidated information source on all environmental issues, trends and risks around the globe—building on UNEP's comparative advantage in environmental monitoring, assessment and information sharing.
- *Create a capacity clearinghouse.* Governments should track and plan technical assistance activities, match the supply and de-

mand of services and highlight best practices on a wide range of projects. A capacity clearinghouse should be established drawing on the strengths of operational agencies (such as the United Nations Development Programme and the World Bank) and normative agencies (such as UNEP) as well as on the expertise and resources of the Global Environment Facility (GEF).

- *Cluster institutions.* Governments should combine the efforts of agencies according to their comparative advantage. One approach would be to have an agency take the initiative in a certain issue area and form clusters around it—say, biodiversity, climate change, fisheries, desertification and other existing and emerging issues. The Environmental Management Group could be a useful platform.
- *Initiate an assessment of global environmental governance.* The International Task Force on Global Public Goods should help clarify the environmental mandates of existing organizations, elaborate a substantive vision for global environmental governance and outline ways to address priority issues. It could provide a replicable template for similar assessments of other global public goods and lay a solid foundation for UN reform.

While the number of institutions, policies and programmes charged with the stewardship of the global commons has risen dramatically over the last 30 years, the state of the global environment continues to show negative trends and increasing risks (Speth 2004). As a result many have called for strengthening the global environmental governance system[1] and, in turn, transforming the UNEP into a more powerful global environmental organization. The proposal by the French and German governments for a United Nations Environment Organisation (UNEO), for example, is gaining increasing attention and is emerging as a serious political option.[2]

Institutional reform must ultimately be rooted in an understanding of where and why the global environmental governance system has succeeded, where and why it has failed and what the leverage points are to encourage better effectiveness, efficiency and equity. The story of UNEP holds valuable lessons for any reform initiative. UNEP was established in 1972 in response to a common understanding that "the work in the field of environment needed a common outlook and direction" and that it was necessary to create "a central co-ordinating mechanism in the United Nations to provide political and conceptual

leadership to contemplate methods of avoiding or reducing global environmental risks, of working out joint norms and of avoiding or settling conflicts between states on environmental matters. Such a mechanism should be given enough authority and resources to ensure effective coordination of ongoing and planned activities" (Rydbeck 1972, p. 3).

UNEP was thus created as the core, or anchor institution, of the global environment to gather and transmit information, catalyse action and coordinate activities within the UN system. Anchor institutions are the primary, though not the only, international organizations in a global issue area. They typically perform three main functions: monitoring, assessing and reporting on the issue in their purview; setting an agenda for action and managing the process of setting standards, policies and guidelines; and developing institutional capacity to address existing and emerging problems.[3] They define the problems, develop new policy ideas and programmes, manage crises and set priorities for shared activities that would not exist otherwise.

Contemporary reform initiatives for environmental governance fall into two categories: those that take UNEP as a departure point for systemwide reform, such as the UNEO initiative, and those that advance a radical system overhaul, such as the proposed World Environment Organization, Global Environment Organization and Global Environmental Mechanism (GEM).[4] While the institutional landscape is indeed cluttered and fragmented, it is imperative to begin any reform initiative with a sound overview of progress to date and the reasons behind it.

This chapter assesses UNEP's performance and identifies key factors shaping its performance. Analyses of UNEP offer a wide range of opinions on its reputation and effectiveness, yet few statements are grounded in systematic evidence. UNEP is considered by some as "one of the most impressive UN organizations in terms of its actual achievements" (Najam 2001), "generally well regarded" (Imber 1993, cited in Najam 2003), "relatively effective" (Conca 1995, cited in Najam 2003) and "given its mandate, its resources and its authority … a remarkable success" (von Moltke 1996). It is also characterized as "relatively obsolete, eclipsed in resources and prestige … underfunded, overloaded and remote" (Haas 2004) and a "peanut-sized" (Speth 2002) "weak agency" (von Moltke 1996) with "wasted scarce resources [and] a credibility gap" (UN 1997). However, lacking a systematic evaluation, recommendations for reform have often been derived from narrow perspectives and subjective opinions.

This chapter presents an evaluation of UNEP's performance in the three core functions of an anchor institution: monitoring and assess-

ment, agenda setting and policy processes and capacity development. It identifies structural factors that have limited UNEP's performance and must be seriously considered by the architects of the environmental governance system for the twenty-first century. Products of early historical decisions, including the formal status, governance, financing structure and location, have all influenced UNEP's ability to fulfil its mandate. In addition, its organizational structure has limited effectiveness. This chapter also outlines institutional options and advances a set of concrete recommendations for UNEP, national governments and the International Task Force on Global Public Goods.

Methods

This chapter does not cover the strengths and weaknesses of UNEP in the performance of all of its mandated functions. Nor does it assess the effectiveness of UNEP in specific programmes and projects. Instead it assesses UNEP's existing role and future potential as an anchor institution for the global environment. The methodology centres on a twofold approach: empirical analysis, including original surveys, research and interviews, and desk review, including examination of both primary and secondary literature.

Two original online surveys, one on UNEP's performance in its information and assessment functions and one on internal operations, were developed and carried out in December 2004. The performance survey aimed to highlight UNEP's challenges and successes that may not be obvious through research of published literature alone. It was distributed to 85 environment ministers and 65 staff at non-governmental organizations, international organizations and *Global Environmental Outlook* collaborating centres, generating an 18% response rate.[5] The internal operations survey aimed to obtain information on the staff of the organization, how staff are affected by the internal functioning of the organization and implications for UNEP's performance.[6] The survey was distributed to all UNEP professional staff, generating a 38% response rate from the headquarters in Nairobi.

More than 100 interviews—conducted in person, by telephone or by email—targeted current and former UNEP staff; international environmental policy experts from academia, government, non-governmental organizations and international organizations; and political advisers and independent consultants. All interviewees will remain anonymous.

This original work was undertaken as part of a graduate class at the School of Forestry and Environmental Studies at Yale University in

the fall of 2004, developed and co-taught by the author. Student teams worked for three months in 2004 on the four key functions in UNEP's mandate: monitoring, assessment and information provision; coordination of the environmental activities in the UN system; capacity building and technical support; and catalysing environmental action. Three additional teams analysed UNEP's governance, financing and human resources. The recommendations advanced in this chapter are based on the analysis of the class, numerous interviews and feedback from participants at Yale presentations. However this chapter reflects the opinions of the author.

Monitoring and assessment

UNEP was established to "keep under review the world environmental situation" and "promote the contribution of the relevant international scientific and other professional communities to the acquisition, assessment and exchange of environmental knowledge and information" (UN 1972a). In the area of monitoring and surveillance UNEP is expected to "provide policy advice, early warning information on environmental threats, and to catalyse and promote international cooperation and action, based on the best scientific and technical capabilities available" (UNEP 1997b). UNEP does not perform any direct monitoring and surveillance of its own. Rather, it collects, collates, analyses and integrates data from UN agencies and other organizations—including convention secretariats, universities, science institutes and non-governmental organizations—to form broader environmental assessments.[7]

UNEP's global environment assessment authority

UNEP is considered relatively effective in its assessment of global environmental issues (Haas 2004). Its flagship environmental assessment publication, the *Global Environmental Outlook* (*GEO*), has been recognized as "one of the two most respected environmental outlook publications currently available" (UNEP 2005f, p. 11). The *GEO* process has become an important model to develop and improve the scientific credibility, political relevance and legitimacy of UNEP's assessment function (UNEP 2005f, p. 12). The *GEO* uses an approach based on collaborating centres, involving universities, research centres, international institutes and non-governmental organizations in 30 countries

representing regions around the world. It also employs a periodic review process through an online user survey soliciting external feedback and an informal, self-reflective internal review.

This "comprehensive global state of the environment report" (UNEP/GRID-Arendal 2005) has been widely cited as useful for identifying major emerging environmental issues and for placing national issues in a broader perspective, raising the awareness of policy-makers, scientists and the general public on the large-scale processes and trends regarding the global environment. The most important contribution of the *GEO* process has been in influencing policy formulation, catalysing action and developing institutional capacity. Regional governmental forums and national governments have adopted *GEO* methodology for the production and improvement of their State of the Environment reporting. In countries where no such reporting was carried out (Barbados, Cameroon, Congo, Costa Rica, Cuba, Gabon, Ghana, Peru and Senegal, among others) the *GEO* process has catalysed national State of the Environment reports. Several collaborating centres reported that participation in the *GEO* process has improved the quality of products and services offered, increased satisfaction among centre stakeholders and enhanced their credibility and reputation.[8] In some centres it has also helped to develop new skills and knowledge for staff members and to attract additional staff.

One of the *GEO*'s key limitations is the lack of comparative data across countries. While the report provides comprehensive information by issue and geographic area, it does not show the comparative performances of countries around the world in addressing environmental challenges. The data, therefore, are not used to their full capacity for informing policy decisions. Recent efforts at developing environmental sustainability indicators illustrate the power of comparison across jurisdictions. For example, the Environmental Sustainability Index, developed by the Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network at Columbia University, benchmarks the ability of nations to protect the environment.[9] With 76 data sets compiled into 21 indicators, the Environmental Sustainability Index ranks 146 countries in environmental performance, allowing comparison across a range of issues.

Measuring environmental quality in absolute terms is arguably impossible. But relative measures are achievable. National governments find it useful to compare their performance with that of others that are similarly situated. Identifying leaders and laggards pressures underper-

forming countries to improve results. No country scores very high or very low on all indicators. Therefore "every society has something to learn from benchmarking its environmental performance against relevant peer countries" (Esty and others 2005, p. 2).

Strategic challenges and improvements

UNEP is the natural forum for creating a coherent international system for environmental information and assessment. It offers the advantage of building on an existing institution with a clear mandate to serve as an information clearinghouse and with a relatively strong scientific track record. While the *GEO* process and outputs are notable, a number of strategic challenges remain. And improvements are necessary to enhance UNEP's monitoring and surveillance.

Fragmentation and the resulting duplication among UNEP's various monitoring and assessment activities have prevented it from becoming the anchor institution for the environment. Information and scientific assessment is spread across its eight divisions. Collecting, processing and disseminating information are further allocated to a number of other UNEP-operated global scientific data centres. This problem is compounded at the international level where environmental assessments are duplicated by other UN agencies and non-governmental organizations. Stakeholders recognize this as a serious problem (UNEP 2005f, p. 10),[10] yet there is little discussion about the failure to effectively coordinate activities or to formulate concrete strategies to overcome existing constraints. Collaboration and coordination do not just happen. They must be encouraged, facilitated and sustained. A fundamentally different system of incentives for international organizations and governments is required, where long-term vision and strategy are rewarded over narrowly focused projects with immediate outputs.

UNEP should focus on improving the quality of incoming and outgoing information. Inconsistent use of quality assurance and quality control protocols in information and data management lead to unreliable output and relevance (UNEP 2004a, p. 13). Missing data limit UNEP's ability to compile complete international environmental assessments, draw conclusions and make scientifically based policy recommendations, sometimes compromising the credibility of its work (UNEP 2004a, p. 23). In the *GEO* process these problems are largely due to the lack of sufficient capacity and resource constraints. Methodological issues related to data management and analysis, indicator

development and integrated policy analysis have also further hampered information quality. Addressing many of today's pressing environmental issues requires integrating socio-economic factors with more traditional environmental science data, thus creating a demand for a more comprehensive approach and extensive institutional capacity in both the contributing and receiving organizations.

While UNEP has made significant improvements in providing information about its work to the public, significant institutional investment is required to enhance this core function. An online bookstore—www.earthrpint.com—was established in 1999 as a central location for authoritative environmental publications by UNEP and other international organizations. In 2005 it contained close to 3,500 publications on 30 topics. Despite Web site visits of about 35,000 on average per month, only a mere 1,137 customers made purchases during the first six months of 2005 (UNEP 2005b, p. 1). The *GEO* portal—www.unep.net—offers a wide array of environmental data free of charge. UNEP has the potential to become a coherent information clearinghouse highlighting best practices and promoting information sharing among countries, but its current capacity needs to be boosted.

Throughout all levels of monitoring and surveillance, UNEP needs to increase its capacities in expertise, resources and flexibility in order to effectively perform a collaborative and coordinated assessment process. The capacity for collecting and analysing comparative data must be significantly improved. Most importantly, UNEP must attract the most qualified experts in key environmental issues—water, air, climate, biodiversity, forestry and desertification—as well as a number of policy staff to explicitly strengthen the links between environmental trends and policy options. For example, the *GEO* team at headquarters comprises only three professional staff whose expertise cannot cover the full range of issues. A team of highly qualified technical experts is also urgently needed to develop, design and maintain the data portals and Web sites. Attracting staff and investing in programme activities will require at least doubling the Division of Early Warning and Assessment's annual budget of $16 million.[11] Currently, with 76% of the funds spent on staff salaries,[12] little is left for programmes.

When UNEP's work becomes the standard for quality, relevance, timeliness and accessibility, the organization will begin to serve as the anchor institution for the global commons. This, however, will require targeted and stable investment from both UNEP and governments.

Setting agendas and managing policy processes

Another critical function of an anchor institution includes setting agendas and managing policy processes to address critical issues and to gain agreement on standards, policies and guidelines. UNEP was designed as an advocacy organization at the international level. It was expected to be proactive and set the global agenda by identifying emerging concerns and galvanizing action by governments, international organizations, non-governmental organizations and businesses. UNEP's mandate calls on the secretariat "[t]o submit to the governing council, on its own initiative or upon request, proposals embodying medium-range planning for United Nations programmes in the field of the environment" (UN 1972a). Setting goals and priorities has, however, been problematic for UNEP.

UNEP's anchor role also demands that it serve as the centre of gravity in a complex system of international environmental governance. Resolution 2997 clearly outlines UNEP's coordination function to "provide general policy guidance for the direction and coordination of environmental programmes within the United Nations system" (UN 1972a, p. 43) and endows the organization with specific institutional mechanisms by establishing an Environmental Coordination Board.[13] However UNEP has not been able to fulfil its coordination mandate agreements effectively in its two key areas: coordinating multilateral environmental activities and those of other international organizations. With the increasing number of treaties and institutions responsible for their administration, coordinating overlapping efforts has emerged as an issue of paramount importance. UNEP has not succeeded in becoming the central forum for debate and deliberation regarding the environment like the World Trade Organization (WTO) for trade and the World Health Organization (WHO) for health. Moreover, in contrast to other international organizations, including the International Maritime Organisation, the International Labour Organisation and the UN Economic Commission for Europe, UNEP has not been able to provide an institutional home for the conventions that have emerged under its aegis. The resulting fragmentation of policy processes has reduced the effectiveness of global environmental governance (Bernstein and Ivanova 2005).

Some analysts have called UNEP a victim of its own success, since most multilateral environmental agreements came into existence as a result of UNEP's catalytic role. In the last 30 years UNEP has played a

highly regarded lead role in establishing an extensive system of international environmental law (Haas 2004). It has catalysed the creation of multilateral environmental agreements, assisted developing countries in creating environmental law and developed soft-law guidelines for a wide range of sectors. Despite the successful creation of international treaties, "the flourishing of new international institutions poses problems of coordination, eroding responsibilities and resulting in duplication of work as well as increased demand upon ministries and government" (UN 1998, p. 34). Once launched the conventions became autonomous entities, each with its own conference of the parties, secretariat and subsidiary bodies which, in many cases, have influence that often exceeds that of UNEP.

UNEP has undertaken efforts for greater coherence and coordination of multilateral environmental agreements but with limited success (Andresen 2001). For example, UNEP initiated a process of harmonization of reporting requirements for the five biodiversity-related conventions (Convention on Biological Diversity, CITES, Convention on Migratory Species, the Ramsar Convention on Wetlands and the World Heritage Convention) and the two regional seas conventions with biodiversity-related protocols (Barcelona and the Cartagena Conventions). While a common Web site and a biodiversity clearinghouse mechanism have been established, there has been little substantive progress towards the practical implementation of a common reporting framework.

Coordination of the environmental activities of international organizations has also posed a significant challenge. The constant creation, abolishment and recreation of coordination mechanisms to assist UNEO in this anchor role illustrate the magnitude of the problem. The Environmental Coordination Board was established in 1972 by General Assembly Resolution 2997. In 1977 General Assembly Resolution 32/197 on the Restructuring of the Economic and Social Sectors of the United Nations merged the Environmental Coordination Board under the Administrative Committee on Coordination. Subsequently, each agency assigned a Designated Official on Environment Matters (DOEM) to coordinate environmental matters with the executive director of UNEP. In 1995 UNEP abolished the DOEM and substituted the Inter-Agency Environment Management Group. This group only met twice and was replaced by the Environmental Management Group (EMG) in 1999. The EMG has not yet lived up to its potential as a joint coordinating body within the UN system largely independent of UNEP.

Four key reasons help explain the coordination challenge. First, the explosion in the number of international organizations has overwhelmed the series of UNEP-driven coordination bodies and mechanisms, which have yielded few results. As often pointed out by UN officials, "everyone wants to coordinate, but no one wants to be coordinated." Second, other UN bodies have refused to accept UNEP's mandate to coordinate all environmental activities in the UN system due to "institutional seniority". A number of UN bodies—the International Labour Organization (ILO), Food and Agriculture Organization (FAO), United Nations Educational, Scientific and Cultural Organisation (UNESCO), WHO, World Meteorological Organization (WMO), Intergovernmental Maritime Consultative Organization (IMCO), International Atomic Energy Agency (IAEA), International Civil Aviation Organization (ICAO) and United Nations Development Programme (UNDP)—possessed environmental responsibilities before UNEP was created and thus feel less of a need to defer to UNEP. Third, the fear of losing certain parts of one's work programme, budget and staff if duplication were eliminated leads agencies to jealously guard their "sovereignty" without a view of the broader public good. Fourth, UNEP's approach to coordination was perceived as controlling and threatening. For example, UNEP's earliest heavy-handed attempts (mid- to late 1970s) at coordination drove the WMO to send out a memo warning others of "this upstart agency's plans to take over everyone's work." This has led to strained relations and turf wars among the agencies, compromising UNEP's role as an anchor institution with the mandate to manage broader policy processes. Subsequently, "UNEP could no more be expected to 'coordinate' the systemwide activities of the UN than could a medieval monarch 'coordinate' his feudal barons" (Imber 1993, p. 83, cited in Najam 2003).

The existence of a clear and coherent institutional vision has enabled other international organizations to serve as stronger anchor institutions in their fields. The WHO, for example, has been able to reject funds that do not advance its long-term strategic vision and instead focus government contributions on a set of key priorities. UNEP's attempts to cover a vast number of priorities, often under pressure from governments, and its risk-averse attitude have prevented it from establishing a solid brand name that would give it the freedom to act as a leader by setting the global environmental agenda and taking action to attain it. Without a long-term strategy for accomplishing goals, it is difficult to raise the necessary funds. As the Office for Internal and Oversight Services ob-

served in 1997, a vicious circle of limited funds and limited effectiveness had deterred UNEP from enlarging its visionary capacity and raising the necessary resources throughout much of its existence.[14]

Although considerable improvements have been initiated in the last few years, a sense of prioritization is still lacking.[15] UNEP's planning process is in many ways driven by the influence of individual states asserting their own priorities. The organization's dependence on voluntary contributions creates governance challenges, particularly with respect to the establishment of priorities, allocation of resources and execution of programmes. The ultimate result of UNEP's limited ability to perform the role of anchor institution in agenda setting and management of policy processes has been proliferation of institutional arrangements, meetings and agendas and "substantial overlaps, unrecognized linkages and gaps" hampering policy coherence and synergy and amplifying the negative impact of already limited resources (UNEP 2001b).

Capacity development

UNEP has begun to reinvent its work programmes to appeal to donors and recipients alike by re-emphasizing capacity development initiatives. Though UNEP's mandate clearly prescribes its core strategies to be normative and catalytic, the organization now views implementation as its primary strategy.[16] However, by shifting from a normative and catalytic function to an implementation and operational role, UNEP has moved from being proactive to reactive to specific country needs and circumstances. With no country presence, small staff and minimal resources, UNEP is no match for such agencies as the UNDP or the World Bank. With field offices in every country around the world, annual budgets in the billions and strong reputations, the UNDP and World Bank set the agenda both locally and globally.

UNEP cannot and should not function as a full-fledged operational agency. However a purely normative role is also insufficient and even unnecessary, as concrete results are increasingly needed. The pressures to continue moving in a more operational direction will continue to grow. There is an overall "treaty fatigue", and governments increasingly call for concrete assistance with implementation. In particular, developing country governments now regularly demand financial and technical assistance with implementing multilateral environmental agreements rather than developing new norms or guidelines. Accomplishments on the ground

are the most evident successes, and completed projects have become the hard currency for governments. It is therefore much easier to mobilize funds for tangible products than for normative or catalytic activities. Many capacity-building projects are requested by governments, compelling UNEP to pursue the work despite its lack of human and financial capacity. Availability of funding from the GEF to the three "implementing agencies"—the World Bank, UNDP and UNEP—has also pushed UNEP towards increased operational activities. Since the late 1990s the GEF has accounted for the largest increase in UNEP income.

UNEP recognizes the challenges in finding a balance between its normative mandate and its operational demands. The High-Level Open-Ended Intergovernmental Working Group was established in March 2004 to improve UNEP's capacity-building efforts, resulting in the adoption of the Bali Strategic Plan for Technology Support and Capacity Building (UNEP 2005a). The Bali plan aims to strengthen the capacity of governments to participate fully in the development of coherent international environmental policy; comply with international agreements; achieve environmental goals and environment-related development goals, including the Millennium Development Goals; and develop national research, monitoring and assessment capacity as well as establish infrastructure for scientific analysis and environmental management (UNEP 2005a).

The essence of the Bali plan lies in coordination. The strategic premise is that efforts should build on existing institutions and be "coordinated, linked and integrated with other sustainable development initiatives through existing coordination mechanisms" (UNEP 2005a, para 5). The Bali plan underlines the need for improved interagency coordination and cooperation based on transparent and reliable information. It does not, however, clarify the roles for the UNEP, UNDP or World Bank, which have become more like competitors than partners. UNEP's role could be envisioned more as an environmental management clearinghouse designed to collect and disseminate information on best practices, policy successes and new technology to private and intergovernmental partners. This could include regional training and raising awareness. For some the strategy in the Bali plan marks the return of an issue-based philosophy and a shift from function-based organizational structure and priorities. For others the Bali plan is the only means to enhance UNEP's profile. Comprehensive in its nature, it addresses many of the most important challenges facing UNEP in the core areas of its mandate—but offers few solutions.

The EMG is the coordination mechanism most suitable for capacity coordination. Created by the UN in 1999 as a systemwide mechanism, it convenes various UN agencies, convention secretariats and the Bretton Woods institutions under the chairmanship of the UNEP executive director to "promote inter-linkages, encourage timely and relevant exchange of data and information on specific issues and compatibility of different approaches to finding solutions to those common problems, contribute to the synergy and complementarity among and between activities of its members in the field of environment and human settlements" (EMG Web Site). Its main focus in 2004 was capacity building to facilitate information exchange and experiences and identify synergies among UN agencies and treaty secretariats. However high-level political commitment has been difficult to attract.

Three reasons stand out as for the lack of strong engagement in the work of the EMG. First, a number of parallel forums exist in the UN system, putting excessive demands on the time and resources of top management.[17] Second, the EMG is still perceived as an instrument for UNEP's control rather than a cross-cutting mechanism for mutually beneficial collaboration. Third, the severely limited capacity of the EMG (two professional staff and an annual budget of $500,000) prevents the institution from taking bold initiative and effectively coordinating activities. In its early years UNEP devoted 30% of its annual budget to the activities of other organizations and was thus able to exert influence and coordinate their environmental work. Currently more than 90% of the EMG's $500,000 budget is devoted to staff salaries and internal operations. Thus, it is rendered virtually ineffective, although it has the institutional and structural capacity to serve as the foundation for a clearinghouse mechanism.

Coordination has been the weakest link in UNEP, and any new initiative for improvement must seriously examine prior arrangements and their effects. Through the EMG, UNEP could use its comparative advantage as a normative agency and serve as an authoritative think tank on various environmental concerns and capacity development. It could receive direct input from and reach out to international organizations, governments, non-governmental organizations, businesses and citizens. The EMG's location in Geneva presents a significant opportunity for speedy communications with 22 international organizations headquartered in Geneva, including the WTO, ILO and WHO; treaty secretariats; numerous governments represented at the UN office in Geneva; and non-governmental organizations and businesses from around the world. Notably, Geneva has

a high concentration of developing country representatives because of the high density of international agencies.[18]

In addition, UNEP holds a unique leadership advantage at the regional level. It is at this level that UNEP can be proactive in both normative and operational manners. Through its network of established regional offices, UNEP can facilitate the adoption of regional norms adapted from global agreements and serve as a matchmaker between donors and recipients in environmental capacity building.

Limiting factors

International organizations have transformed from pure transaction mechanisms helping countries achieve collective goals to autonomous entities shaping preferences and delivering results (Barnett and Finnemore 2004). However their legitimacy is being openly challenged. They are increasingly seen as "unelected elites [with] no sense of common peoplehood and trust" (Brooks 2005). In the absence of direct elections at the international level, legitimacy cannot be granted through traditional democratic representation. It is instead attained through expertise and the ability to generate "right answers" through a system of checks and balances or through fair and transparent rule-making that instills confidence and aids acceptance (Esty forthcoming). International organizations are therefore likely to regain their legitimacy when they begin to effectively deliver results and enact transparent, accountable and participatory rules and processes. Whether UNEP will lead as an anchor institution will depend on its ability to address several underlying dynamics limiting its authority, autonomy and effectiveness.

Formal status

UNEP's status as a UN programme rather than a specialized agency has been blamed for many of its limitations. In the UN hierarchy programmes have the least independence and authority. Specialized agencies are separate, autonomous intergovernmental organizations outside the jurisdiction of the UN Secretariat and the General Assembly.[19] Besides their role in elaborating common vision, rules and standards, they perform many operational activities within the sector they govern. The vision for UNEP in 1972, however, was for a new type of governing body.

Contrary to popular belief, UNEP was not established as a programme to intentionally diminish its power. Recognizing the complex nature of environmental issues, governments sought to create a lean, flexible and agile entity that could pull together and effectively deploy the relevant expertise of the various agencies. The new entity was expected to grow into its mandate as it proved its effectiveness and be "essentially flexible and evolutionary so as to permit adaptation to changing needs and circumstances" (UN 1972b).[20] Establishing a specialized agency was deemed counterproductive because it would make the environment another "sector" and marginalize it. As Maurice Strong, secretary-general of the 1972 Stockholm Conference, put it, the core functions could "only be performed at the international level by a body which is not tied to any individual sectoral or operational responsibilities and is able to take an objective overall view of the technical and policy implications arising from a variety of multidisciplinary factors" (UN 1972b). Furthermore, there was a strong sense of disillusionment with the unwieldy bureaucracy of the specialized agencies. A new design was clearly necessary. This new body was to operate at the core of the UN system, best accomplished with the status of a programme.

While not intentionally diminishing its power, the decision to make UNEP a programme has impacted its authority. UNEP has not been able to claim the autonomy necessary to become an effective anchor institution for the global environment. As new institutions sprang up across various levels of governance and many existing ones added substantial environmental mandates, UNEP could claim little authority over them. For example, the creation of the Commission on Sustainable Development and the Global Environment Facility (GEF) in the early 1990s marginalized it politically and eclipsed it financially. The increased emphasis on environmental work at the World Bank, while commendable, has led to overlapping. UNEP has been unable to coordinate and create synergies among the multiple bodies in the environmental arena because its political power and resources were dwarfed by newer institutions. Thus, while its organizational status did not incapacitate UNEP, the effect was largely negative. As one senior UNEP official exclaimed, UNEP "just does not have a voice in front of the larger UN agencies."

Governance

Ultimately UNEP's governance structure serves two very distinct roles: an external function to advance international environmental govern-

ance by monitoring global environmental trends, setting a consensus global environmental agenda and establishing global priorities; and an internal responsibility to oversee UNEP's programme, budget and operations. Its governance structure combines these roles, for which the governing council is responsible. This leads to overly politicized institutional governance and a work programme that reflects individual states' interests rather than a focused, strategic vision. It also leads to insufficient leadership as the governing bodies are constrained in their vision by UNEP's own limitations.

Three bodies share governance responsibilities for UNEP: the governing council, comprised of 58 member states; the secretariat, headed by the executive director; and the committee of permanent representatives, comprised of ambassadors to Kenya serving as permanent representatives to UNEP. More often than not these representatives have little environmental knowledge or expertise and have a number of other duties to perform.[21] The responsibilities of the committee of permanent representatives include reviewing UNEP's draft programme of work and budget, monitoring the implementation of governing council decisions and preparing draft decisions for consideration by the council (UNEP 1997a). The committee of permanent representatives considerably limits the autonomy and power of the secretariat in Nairobi either through direct intervention in UNEP's work (meeting four times a year to discuss the work programme and budget) or through influence on UNEP's staff, whose loyalties often lie with their national governments. Advancement within the ranks of national administrations often depends on a good recommendation from the ambassador at one's duty station, creating pressure to pursue narrow national interest within the organization.

A further complication is that while the committee of permanent representatives directly influences UNEP's work through the constant oversight of the organization's operations, the final say on decisions regarding the work programme and budget lies with the governing council. Meeting once a year in Nairobi, the governing council is supposed to craft a visionary agenda for international environmental governance and set the parameters within which UNEP is allowed to operate—for example, its two-year budget and work programme. A national representative, often the environment minister, attends the meeting. Although a permanent representative to UNEP might have worked on a programme for months, his or her recommendations and decisions can be contested and even reversed by the national representative. Therefore, unless the committee of permanent representatives' relationship with

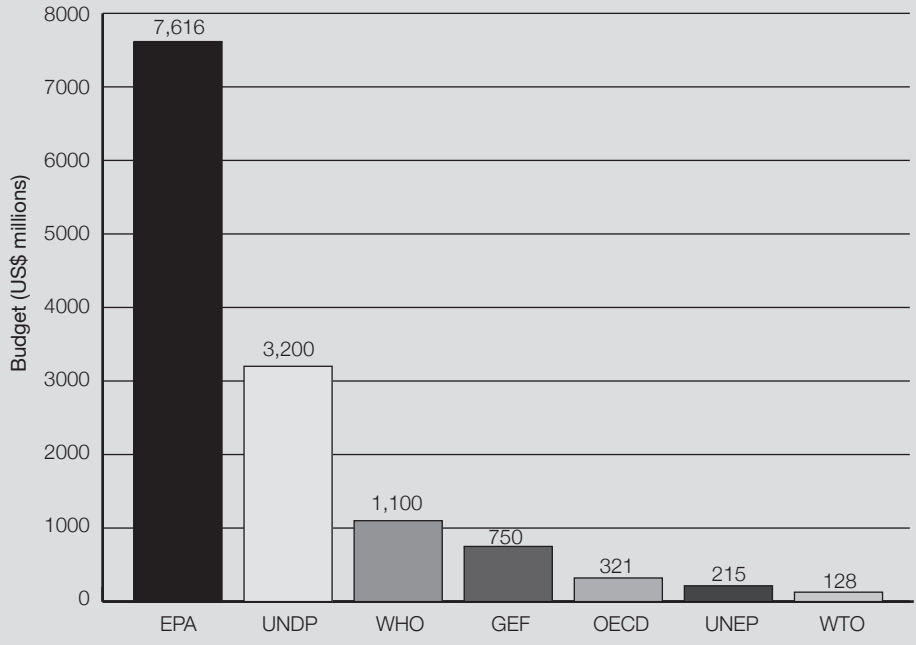
the governing council is clarified, there will be little room for substantially improving UNEP's performance.

Financing structure

UNEP's limited financial resources are another primary reason analysts use to explain its ineffectiveness.[22] Its annual budget of $215 million is indeed miniscule compared with the UNDP's 2003 budget of $3.2 billion (UNDP 2004, p.26) and the Environmental Protection Agency's (EPA's) budget of $7.6 billion (EPA Web site). However it is larger than the WTO's budget (see figure 5.1).[23]

While the disparity in resources is striking, the nominal sum of the budget is a symptom. One of the root causes of UNEP's problems may be the organization's financial structure. Unlike most other international organizations whose budgets are based on predictable mandatory

Figure 5.1 **UNEP's annual budget is much less than many other international organizations' budgets**



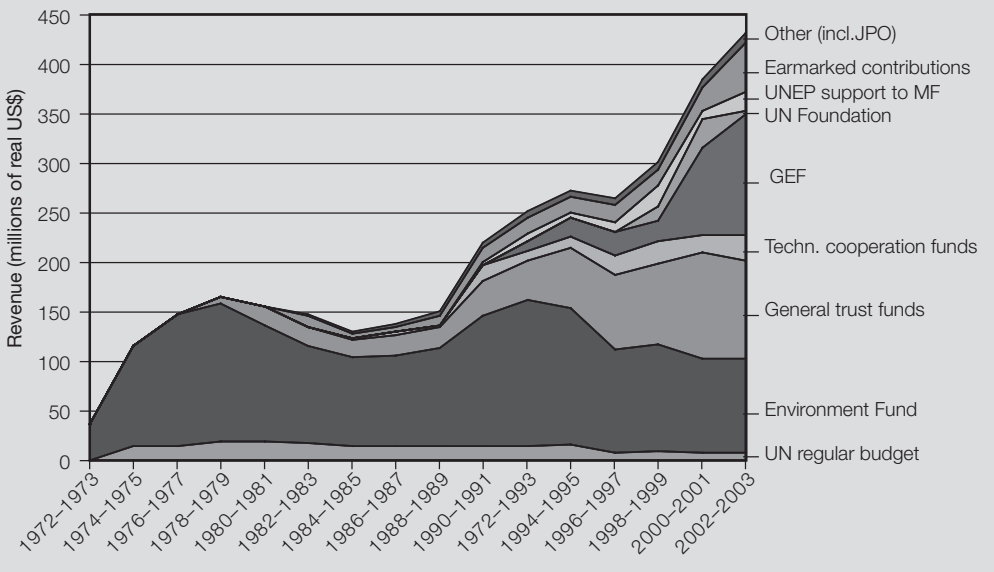
Note: All data are for 2003 except for the OECD and WTO, which are for 2004. The GEF annual budget was estimated from the $3 billion in replenishment funds in 2003 used for its work programme over a four-year period.
Sources: EPA Web site; UNDP (2004); WHO (2003), p. 113; OECD (2004), p. 9; WTO Web site; UNEP — DeBock and Fergusson (2004) based on UNEP financial reports and audited financial statements, UNFIP/UNF project grants and UN general resolutions adopting revised budget appropriations for the relevant biennium periods.

assessed contributions, UNEP is completely dependent on the voluntary contributions of individual states. Only a dozen countries have regularly made annual contributions to the Environment Fund—the central financial mechanism at the discretion of the secretariat—since its inception in 1973.[24] UNEP's unreliable and highly discretionary financial arrangement compromises its financial stability, its autonomy and its ability to plan beyond current budget cycles, thus creating a risk-averse attitude within the organization's leadership. UNEP's actual agenda is set by the priorities of donor countries, resulting in fragmented activities and unclear prioritization.

Contributions to the Environment Fund have decreased 36% in the last 10 years—also decreasing in real terms since the 1970s and 1980s. Contributions to trust and earmarked funds for specific activities, on the other hand, have increased dramatically. The proportion of restricted financing now accounts for more than two-thirds of UNEP's revenue (see figure 5.2).

Two important aspects illustrate the political dynamics and consequences for UNEP's performance. First, a threefold increase in overall funding since the 1980s—including trust funds, earmarked contributions and other revenues—shows recognition of the need to address

Figure 5.2 **UNEP's two-year revenue is increasing, but contributions to the Environment Fund are decreasing, 1973–2003**



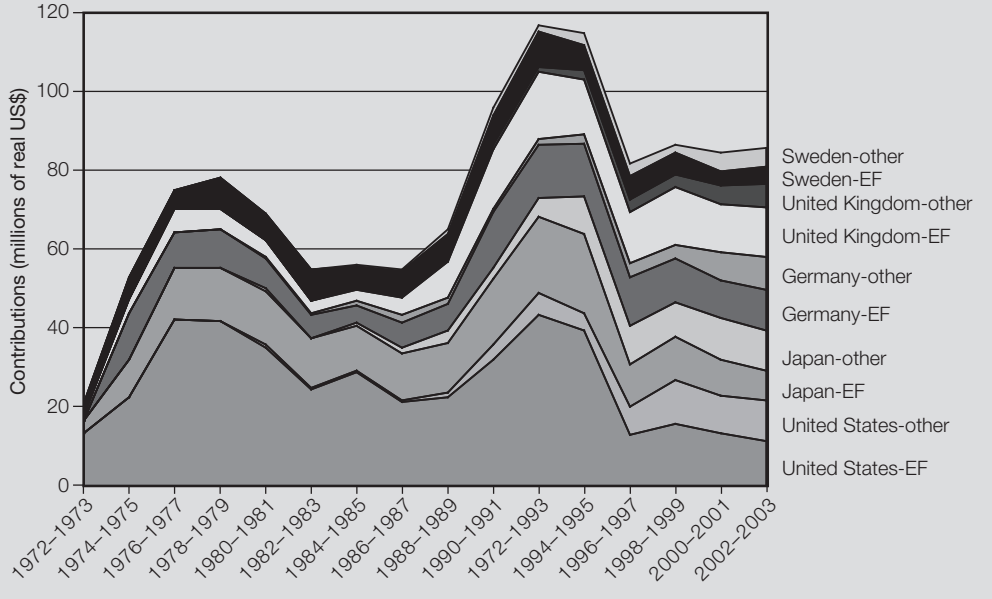
Source: DeBock and Fergusson (2004).

environmental concerns through an international mechanism. Second, the decline in contributions to the Environment Fund shows that confidence in UNEP has diminished. Greater direct control of the organization's expenditures through earmarked funding demonstrates governments' reluctance to entrust the organization with prioritizing and delivering results. For example, the United States' dramatic withdrawal of support in the mid-1990s—after a peak in contributions around the time of the Rio Earth Summit—was a criticism of UNEP's leadership and effectiveness.

Funding from the top five donors to UNEP—the United States (historically the top donor), Japan, Germany, the United Kingdom and Sweden—illustrates the diversification trend in financial contributions (see figure 5.3). For all countries, contributions have shifted from the Environment Fund to other earmarked mechanisms, which receive about the same amount.

Over the past few years UNEP, under Executive Director Klaus Töpfer, has made significant progress in attracting financial resources. The pilot phase of the voluntary indicative scale of contributions created in 2002 has broadened the donor base and encouraged many

Figure 5.3 **Top five donor country contributions to UNEP**



Source: DeBock and Fergusson (2004).

countries to increase their contributions. In 2003 more than 100 countries contributed to UNEP—twice as many as in the mid-1990s. A number of countries have also increased their contributions compared with the mid-1990s. Canada's contributions to the Environment Fund, for example, increased from a record low of $662,000 in 1997 to almost $2 million in 2004. (It contributed more than $1 million during 1994–96, the tenure of Executive Director Elizabeth Dowdeswell, a Canadian national.) However Canada's largest contribution was in 1977, when it gave $2.5 million in nominal dollars, or about $6 million in real 2000 dollars. Canada's indicative scale of contribution for 2004–05 amounts to only $1.7 million. Though praised as a valuable financial tool, the indicative scale of contributions may be doing a disservice to the organization. Several countries are easily meeting their financial targets and have no incentive to contribute more. For example, Bulgaria paid its $6,000 voluntary assessed contribution in 2003 and 2004 but contributed more than $20,000 in 1990. Mozambique's contribution to UNEP as recently as 1998 totalled $10,000, while the assessed contribution it is currently paying is only $600. Zambia, Zimbabwe, Egypt, Gabon, Austria, Australia, Kenya, Japan, Hungary, Switzerland, Sweden and many others face similar circumstances (UNEP 2005d).

Organizational structure

Several internal organizational issues also hamper the effectiveness of UNEP operations. An assessment conducted by the UN Office for Internal Oversight Services in 1997 (UN 1997, p. 3) identified several key areas where improvements were needed:

> The functional responsibilities of various major departments are not entirely clear, and there seems to be no clear delegation of authority. The internal instruments for collective guidance are cumbersome, dilute responsibility and impede efficiency. Furthermore, there is no coherent and comprehensive presentation in the programme budget of the global involvement of UNEP in environmental matters. Oversight of implementation and assessment of results is fragmented, making it hard to develop clear and coherent policies for the allocation of resources or to ascertain that resources are being utilized efficiently.

A number of these issues have been taken up; however many problems require deeper and more systematic reform. On joining UNEP in 1998, Executive Director Klaus Töpfer reformed the organizational structure by shifting the main divisions from issue-based to functional. For example, instead of divisions on water, air, climate change or biodiversity, UNEP uses a functional chain comprising early warning and assessment, policy development and law, policy implementation and so on.[25] This structure has resulted in many overlapping mandates and has scattered issue expertise across the organization. It has led to excessive competition among divisions—and between UNEP and other institutions—thus reducing UNEP's comparative strengths and unnecessarily burdening its human and financial capacity. These problems are compounded both by internal and external communication and coordination difficulties and by what staff call a "mind numbing", "stifling" and "paralysing" bureaucracy.[26]

Location

The decision to base UNEP in Nairobi was neither a "strategic necessity without which developing countries might have never accepted an environmental organ to be created" (Najam 2003, p. 374), nor a way to marginalize the organization and "cannibalize" its mandate.[27] It was not ill-intended, premeditated or the result of a secret bargain. Quite the opposite, it was the outcome of an open ballot vote at the UN General Assembly in December 1972. Solidarity among developing countries, which far outnumbered developed countries, led to the first international organization established in the developing world. The decision was openly political, seeking to affirm the role of developing countries as equal partners in multilateral affairs.

UNEP's location has influenced the organization significantly. Its ability to effectively coordinate and catalyse action has been inhibited by its geographical isolation from other UN operations, inadequate long-distance communication and transportation infrastructure and lack of sufficient face-to-face interaction with counterparts in other agencies, treaty secretariats and key international organizations working on environment-related activities (see figure 5.4). UNEP's headquarters are located far outside political "hot spots", posing a challenge to its ability to fulfil the coordination role specified in its mandate.

UNEP's offices in Paris, New York and Geneva, however, have tried to step into the liaison role. Their "proximity to other organizations and

important governments seems to make these programmes among the brighter lights of UNEP achievement" (Eastby 1984, p. 241). It is important to note, however, that this spatial analysis is focused particularly on UNEP's coordination function, and that for other aspects of its mandate—such as capacity building—the location may present an opportunity rather than a challenge. UNEP's expertise in institution building is greatly needed in Africa. However pressing environmental challenges demand immediate action on the ground—a mandate UNEP does not possess. A demand for greater operational responsibilities for UNEP has thus emerged from both the developing world and the organization's staff.

The most important implication of UNEP's location is that Nairobi is not necessarily a desirable location for staff, making it difficult to attract and retain top-notch professionals. Nairobi's increasingly treacherous security situation worsens this problem. In addition, UNEP's remoteness requires frequent travel and prolonged absences of the executive director and many senior staff, imposing a heavy financial burden and, most important, creating a leadership vacuum. To be effective, leadership must be present and responsive to staff needs and organizational priorities.

Figure 5.4 **Density of international organizations working on environment-related issues**

Source: Created by Emily Hicks of the Yale student team using data assembled by the Global Environmental Governance Project at Yale University.

Conclusions and recommendations

Collective action in response to global environmental challenges continues to fall short of needs and expectations. The question, therefore, is not *whether* to revitalize the global environmental regime, but *how*. The interdependence of current environmental challenges contrasts sharply with the fragmented and uncoordinated environmental institutions. We need an approach that acknowledges the diversity and dynamism of the environmental challenge and recognizes the need for specialized responses. A much stronger voice and conscience for the global environment is necessary—in short, an accountable, legitimate and effective anchor institution.

UNEP has a clear mandate to be the anchor for the global commons, but has done so with only partial success. It has been relatively effective in monitoring and scientific assessment and launching policy processes for environmental agreements. It has also often served as the only international partner of frequently marginalized environment ministries and provided a critical forum for them to meet their counterparts, helping to develop institutional capacity around the world. However UNEP has largely fallen short in managing coherent and coordinated policy processes. It has failed to establish itself as the institutional home for the numerous international environmental conventions. Without a centre of gravity, the system of international environmental governance has grown increasingly complex and fragmented. UNEP's inability to lead has been compounded by short-sighted budget considerations, attractive offers by countries eager to host new treaty secretariats and indifference at the highest political levels.

At the core of this dynamic, however, are four structural factors that, although considered appropriate at the time of UNEP's creation, have inhibited its performance and growth. First, UNEP's authority was severely limited by its status as a programme rather than a specialized agency. Second, its governance structure emphasized the needs and demands of member states over the mission of the organization. Third, its financial structure enabled countries to pursue their own interests rather than the common good. Fourth, UNEP's physical distance from the centres of political activity hindered it from coordinating environment-related agencies and, most important, attracting top-tier policy staff.

UNEP is still the leading international environmental organization. Only UNEP's mandate adequately reflects all the functions of an anchor institution for the global environment. In fact current institutional

reform proposals do not substantially depart from the existing mandate. Table 5.1 lists the functions of UNEP and the proposed United Nations Environment Organization and illustrates the degree to which they fit into the anchor institution framework. The key question that needs to be answered, therefore, and to which this chapter attempts to contribute, is how well UNEP has performed these functions, and what explains its performance. Only with a clear understanding of the organization's effectiveness and the reasons behind it can we begin to offer sensible and feasible proposals for institutional reform.

UNEP offers a potentially strong comparative advantage in environmental monitoring, scientific assessment and information sharing—

Table 5.1 **How UNEP and UNEO measure up to the functions of an anchor institution**

	Anchor institution	UNEP[a]	UNEO[b]
Monitoring and assessment	• Data collection and indicator development • Monitoring and verification • Assessment • Information reporting and exchange	• Review the world environmental situation • Provide policy advice and early warning information on environmental threats • Catalyse and promote international cooperation and action	• Monitor and provide early warning on the state of the environment • Provide information, facilitate communication and mobilize stakeholders
Agenda setting and policy processes	• Goal and priority setting • Rule-making and norm development • Coordination • Dispute settlement	• Promote international cooperation and recommend policies • Provide advisory services for international cooperation • Bring up any matter that requires consideration by the governing council • Develop international environmental law • Coordinate environmental programmes within the United Nations system, reviewing implementation and assessing effectiveness	• Provide a political platform for international legal and strategic frameworks • Improve coherence and coordination, including the convergence of norms, implementation of international obligations and financing
Capacity development	• Education and training • Financing • Technical assistance • Institution and network building	• Provide policy and advisory services in key areas of institution building to governments and other institutions • Advance implementation of agreed international norms and policies and stimulate cooperative action	• Build capacity in developing and transition countries • Strengthen regional governance

a. Mandated functions as elaborated in G.A. Resolution 2997 and the Nairobi Declaration of 1997.
b. See www.france.diplomatie.fr/frmonde/onue-en/ and Tarasofsky and Hoare (2004).

an advantage that should be fully developed and used. However it can no longer aim to be the single authority on every environmental issue because expertise has been diffused. Instead UNEP can offer a coherent international policy forum where various clusters of agencies and networks negotiate and exchange experience. Its leadership in the Environmental Management Group can grant it the policy space for such an initiative. A more strategic, priority-driven and long-term capacity development approach drawing on UNEP's advantages can help implement multilateral environmental agreements.

Policy options for governments and the International Task Force on Global Public Goods

Five problems beleaguer the current system for global environmental governance: incoherence, inefficiency, information inadequacy, inequity and insufficient funding (France, Ministry of Foreign Affairs 2005). Radical reform may indeed be urgently needed to address these problems, but such reform seems unlikely in the near future. Political emphasis is increasingly on working within existing institutions rather than attempting bold new designs. As Secretary-General Kofi Annan urged in his 2005 report *In Larger Freedom*, "[i]t is now high time to consider a more integrated structure for environmental standard-setting, scientific discussion and monitoring treaty compliance. This should be built on existing institutions, such as the United Nations Environment Programme, as well as the treaty bodies and specialized agencies" (UN 2005, para 212). The French and German initiative to create a United Nations Environment Organization may provide the impetus for restructuring the system. Simply upgrading UNEP into UNEO, however, will not suffice. Reform should be multifaceted and layered, focusing on the core functions of effective global environmental governance and devising appropriate institutional arrangements. In some cases this will mean building on existing frameworks—in others, developing new approaches.

Launch a comprehensive assessment of global environmental governance. Reforming global environmental governance requires a holistic assessment of the current system's strengths and weaknesses and of UNEP's effectiveness in fulfilling its mission as an anchor institution. An evaluation of global environmental governance will help to clarify the mandates of other organizations, as well as reveal their comparative advantages and provide a vision for reduced competition and a productive division of labour. This broad assessment should be undertaken with the

goal of producing an analytically sound and politically visionary set of recommendations on how to strengthen global environmental governance. It should elaborate a substantive vision, including identifying priority issues and ways to address them. Such an assessment does not need to wait for the approval of governments or UNEP. It can be initiated by the International Task Force on Global Public Goods.

Create a global environmental information clearinghouse. While gathering data should primarily be the function of national organizations, a central body to establish data protocols and a repository for comprehensive and comprehensible information is necessary. A common data portal with policy-relevant information and analysis will reduce information overload and improve understanding, generate political attention and motivate national action. A global commons monitoring report building on the Millennium Ecosystem Assessment could be developed on the basis of the consolidated data, providing a public account of global commons health as well as indicators for country and institutional performance in environmental sustainability. It would directly contribute to the broader global public goods monitoring report suggested by the Secretariat of the International Task Force on Global Public Goods (2005).

Scientific assessment, monitoring and early warning are UNEP's major strengths and can provide the foundation for an effective global information clearinghouse. But UNEP's current administrative, managerial, scientific and financial capacities need to be enhanced. This requires a coherent strategy, a clear action plan and substantial investment. It demands that UNEP expand the number of staff involved (currently about 30)—aiming for top-quality expertise—and at least double the $16-million annual budget of early warning and assessment. The newly proposed environment watch framework, which aims to create a coherent conceptual framework for UNEP's environmental assessment activities, should be assessed carefully in this context.[28] If the framework is feasible and shows promise, it should indeed be further developed.

Create a global environmental capacity clearinghouse. Disparate activities of the numerous multilateral and bilateral agencies have come to drain national capacity. A consolidated source of information on capacity building for environmental governance must be created, tracking and planning technical assistance activities, matching the supply and demand of services and highlighting best practices on a wide range of projects. The capacity clearinghouse will make international agencies more efficient and effective, provide reliable information on needs and capabilities to donor countries and ensure a higher quality and quantity of aid

to recipient countries. Drawing on the strengths of operational agencies (the UNDP and World Bank) and normative agencies (UNEP), as well as on the expertise and resources of the GEF, it could be linked to the proposed GPG Financing Framework (ITFGPG Secretariat 2005). The institutional home for this mechanism must be carefully chosen based on advantage, authority and legitimacy.

The EMG in Geneva is one possible host, provided that it is endowed with the necessary internal capabilities. The EMG focused on capacity building in 2004 in its interagency coordination efforts and could build further on this initiative. It could begin by establishing a comprehensive database of capacity-building needs and resources. UNEP could add significant value by systematically assessing and prioritizing country needs as well as cataloguing and evaluating resources offered by governments and international agencies. It could also provide capacity-building services in such areas as strengthening national environmental institutions.

Cluster institutions. Institutional clustering is based on the notion that a combined effort of agencies will produce greater results than smaller, fragmented and often competing efforts of individual organizations (El-Ashry 2004; von Moltke 2001a,c). Positive environmental results are more likely attained if duplication is reduced, synergies captured and scarce resources pooled. A clustering effort is at heart a coordination approach and requires three core capacities in the anchor institution: legitimacy through expertise, results and procedural fairness; top-quality communication and location at the centre of political activity; and a system of incentives (financial as well as reputational). In the contemporary context of institutional proliferation, it is imperative that expertise and resources are pooled together under the lead of one or two expert institutions. One approach would be to have an agency take the initiative in a certain issue area and form clusters around it.

In the first decade of its operations, UNEP did in fact serve as a lead agency in forming such clusters through thematic joint programming with other agencies.[29] However success did not last because of the discrepancies in the budget cycles of the organizations involved, scattering of resources and remoteness of UNEP (Eastby 1984, p. 241–43). Coordination efforts within the GEF and the Joint United Nations Programme on HIV/AIDS (UNAIDS) have had better results (GEF 2005 and UNAIDS 2003). While considerable challenges remain, the GEF has performed relatively well as a "networked institution" because of the availability of funding for other agencies, top-quality staff and

communication and its close proximity to major donors. On the other hand, though UNAIDS has "well established itself as a leader and centre of knowledge … and has made significant achievements in advocacy, policy consensus … and coordination", it has been greatly constrained by the lack of incentives for the core participating agencies to develop a genuinely integrated approach (UNAIDS 2003).

Policy options for UNEP

Though it is ultimately governments that must take the initiative to institute reforms, there are several steps that UNEP can take to enhance its role as an anchor institution, ranging from smaller scale immediate efforts such as improved financial reporting to broader initiatives such as external strategic review.

Initiate an independent strategic review of UNEP's role. An independent strategic review should examine UNEP's role and performance, assessing the history of the organization, outlining current and future needs and trends and defining scenarios for action based on its progress, constraints and opportunities. It would facilitate a transition to more accountable leadership and improved management practices. Several international organizations have been evaluated regularly. The GEF, for example, has undergone three external evaluations in 14 years. Performance studies are commissioned by the GEF Council to "assess the extent to which the GEF has achieved, or is on its way towards achieving its main objectives, as laid down in the GEF Instrument and subsequent decisions by the GEF Council and the Assembly."[30] For UNAIDS, the essence of its "Five-Year Evaluation" was also to determine the extent to which it was meeting expectations on issues surrounding the HIV/AIDS epidemic and on the coordination of the UN interagency collaborative response (UNAIDS 2003). UNEP's executive director should initiate a similar strategic review by an independent commission.

Consolidate financial accounting and reporting. Comprehensive and clear financial reporting is critical to building and maintaining donor confidence. While UNEP currently reports its sources of funding, expenditures are not reported in a consolidated fashion. Expenditure reports should indicate expenditures in terms of mandated functions—capacity building, information collection and dissemination coordination—and by environmental issues so that member states and donors can understand how money is used.

Restructure organizational governance. Currently, UNEP's governing council/Global Ministerial Environment Forum performs both of the governance functions UNEP needs: providing leadership to international environmental governance and overseeing UNEP's programme and budget. Performing both roles leads to circumscribed leadership and circular decision-making, in which programmes and budget—not global needs—drive priorities and strategies. If UNEP is to live up to its mandated leadership role, an inclusive structure like the governing council/Global Ministerial Environment Forum is required to review global issues, assess global needs and spot gaps and identify global priorities and develop strategies to address them. Internal oversight is best performed by a smaller, more efficient body with greater discipline and focus on the programme of work, budget, management oversight and evaluation.

We recommend the creation of an executive board of no more than 20 members, and if committed to innovation, it could comprise representatives of member states and civil society. Membership should be rotating and ensure regional representation.[31] This would mean eliminating or restructuring the committee of permanent representatives and the governing council. While politically challenging, such restructuring is fundamental to effective reform. The leadership of governments will be critical in this task.

In designing a new global environmental architecture, form should follow function. The institutional recommendations proposed in this chapter will not add a new layer of international bureaucracy. Quite the contrary, they will consolidate the existing panoply of international environmental institutions and shift towards a more modern "virtual" environmental regime. We envision a multi-stage approach building on the strengths of current institutions—especially UNEP as an anchor—addressing weaknesses and creating innovative arrangements where necessary. Our recommendations are:

- For the International Task Force on Global Public Goods—launch a comprehensive assessment of the global environmental governance system.
- For governments—create a global environmental information clearinghouse within UNEP, a global environmental capacity clearinghouse and cluster institutions.
- For UNEP—initiate an independent strategic review, consolidate financial accounting and reporting and restructure organizational governance.

Notes

1. Among the more comprehensive reviews of global environmental governance issues are Desai (2004); Esty and Ivanova (2002b); Kanie and Haas (2004); Speth (2003, 2004); and Vogler and Imber (1996).
2. See www.france.diplomatie.fr/frmonde/onue-en/ and Tarasofsky and Hoare (2004).
3. The anchor institution terminology builds on a concept advanced by Alexander Shakow (2006). The definition of main functions also draws on the analysis of the outcomes of the 1972 Stockholm Declaration in terms of key functions of the central international environment organization and on more recent works on this topic. See Haas (1993); Head (1978); and Esty and Ivanova (2002a).
4. For proposals for a World Environmental Organization, see Biermann (2000, 2001, 2002a,b); Biermann and Bauer (2004, 2005); and Charnovitz (2002). For proposals for a Global Environment Organization, see Esty (1994, 2000); Ruggiero (1998); and Runge (2001). For a proposal for a Global Environmental Mechanism, see Esty and Ivanova (2002a).
5. These two groups were targeted as the primary audiences of UNEP's scientific assessments and information. Questions related to UNEP's strengths and weaknesses as an information source, effectiveness of information outreach and priorities for improving monitoring, assessment and information provision. The response rate partially hinders the ability to gain a comprehensive sample of opinions about the information function. The Yale survey response rate, however, is similar to the 20% return rate to UNEP's efforts at evaluating the impact of the *Global Environmental Outlook* report (see UNEP 2004b).
6. The overall response rate was 20%, and the response rate of the various offices contacted was as follows: 60% of professional staff in New York; 38% in Nairobi; 17% in Washington, D.C.; 11% in The Hague; 9% in Geneva; and 5% in Paris. There are several UNEP offices with a small number of staff, and responses have not been obtained from them.
7. A coordinated global network of collaborating centres contribute to the *Global Environmental Outlook* process, where top-down integrated assessment is continuously combined with bottom-up environmental reporting inputs. A significant amount of analysis of spatial and statistical data comes from UNEP's Global Resource Information Database. Other data centres such as the Global Environmental Monitoring System–Water and World Conservation Monitoring Center work very

closely with governments and other scientific institutions to collect necessary data.

8. It is important to note, however, that these are self-reported trends. A more accurate measure of enhanced credibility and reputation would be through a survey of change in perception by organizations working with the UNEP collaborating centres.

9. See www.yale.edu/esi.

10. An example cited by governments in the report (UNEP 2005a) is in the area of health and the environment, in which various UN institutions and other organizations are active and likely duplicating efforts.

11. See UNEP (2005d), where the budget for 2004–05 is $32.5 million. The proposed amount for 2006–07 is $37.7 million.

12. See UNEP (2005d, p. 45). Total expenditures for established posts are $24.9 million of the $32.5 million 2004–05 budget.

13. The Environmental Coordination Board was made up of executive heads of the UN agencies under the chairmanship of the UNEP executive director and mandated to meet periodically to ensure cooperation and coordination among all bodies concerned in the implementation of environmental programmes. In addition, the Environmental Coordination Board was responsible for reporting yearly to UNEP's Governing Council and fell under the auspices of the Administrative Committee on Coordination.

14. See United Nations (1997). The Office for Internal Oversight Services also noted that "[t]he basic issue facing UNEP is the clarification of its role…. It is not clear to staff or to stakeholders what that role should be. The lack of clarity has had consequences for how programmes have been conceived and managed, for the ongoing downsizing of programmes and for staff morale and esprit de corps. Management's first responsibility should be to focus on this new role, anchoring it to fewer priorities so as to increase the organization's effectiveness and its potential for impact."

15. The 2006–07 UNEP Draft Programme of Work, for example, contains a detailed description of outputs for subprogrammes, including citation of relevant mandate(s) and any trust funds or earmarked contributions to support the output. It comprises a vast array of projects, publications, meetings, processes, services, symposia, studies and training events. However the programme is largely comprised of many small, ad-hoc and often short-term initiatives established independently of one another, rather than a set of harmonized initiatives developed to ac-

complish a set of focused priorities over the planning period. See www.unep.org/gc/gc23/index-flash.asp.

16. The work programme for 2006–07 concludes that "[w]hile it is recognized that there is a need for further policy development and guidance, there is consensus that the future emphasis of the work of UNEP must be focused on implementation, taking into account the gender perspective" (UNEP 2005d, para 58).

17. For example, the Chief Executives Board, the High-Level Committee on Programmes, the High-Level Committee on Management, the UN Development Group and the UN Executive Committees on Economic and Social Affairs and on Humanitarian Affairs all convene senior officials of intergovernmental organizations for coordination purposes.

18. For instance, the Intergovernmental Organization of Developing Countries (the South Centre) is headquartered in Geneva, despite its primary mission to "promote South solidarity, South consciousness and mutual knowledge and understanding among the countries and peoples of the South." For the mission and functions of the South Centre, see www.southcentre.org/introduction/Introindex.htm.

19. Some of the specialized agencies include the FAO, WHO, WMO, World Bank, IMO, UNESCO and United Nations Industrial Development Organization (UNIDO).

20. Even recently declassified materials of the UK government show that, while there was interest in restricting the scope of the Stockholm Conference and reducing the number of proposals for action infringing on its domestic decision-making processes, the United Kingdom did not set out to create a weak environmental organization. Rather it accepted that the time had come for new institutional arrangements. In the words of an official from the United Kingdom's Environment Department, a "new and expensive international organisation must be avoided, but a small effective central coordinating mechanism ... would not be welcome but is probably inevitable" (cited in Hamer 2002).

21. The United States and Sweden have specially appointed permanent representatives, often with solid environmental backgrounds, whose only responsibility is to work with UNEP.

22. See Najam (2003), who argues that "UNEP has been denied authority and resources." Von Moltke (1996, p. 25) explains, "Given an impossible mission and a derisory budget, UNEP has slowly built an organization from program pieces."

23. WTO's total budget for 2004 amounts to CHF 127,776,500 or approximately $127,800,000 (1 USD = 1.266 CHF). For a breakdown of the WTO's budget for 2004, see www.wto.org/english/thewto_e/secre_e/budget04_e.htm.
24. Based on UNEP (2004c) and the analysis of "UNEP Environment Fund Contributions by Donor Country" in late 2004 by the Yale research team.
25. For the functional organigramme of UNEP, see www.unep.org/Organigramme/.
26. Based on results of a preliminary organizational survey performed by the Yale research team in late 2004.
27. Von Moltke (1996, p. 54) asserts, "Lacking enthusiastic supporters, UNEP's mandate was cannibalized. The principal means of achieving this goal was to provide limited funds divided between a minimal institutional budget and a modest 'fund', to assign it a 'catalytic' function and to locate it away from the decision-making centres of the UN system."
28. UNEP is currently developing environment watch, "a system for improved monitoring of the globe's environment which will also strengthen links between researchers and policy-makers" (UNEP 2005e).
29 Joint programming brought together the Designated Officials on Environmental Matters three times a year in addition to periodic meetings between those involved in a certain "cluster". This process was "beginning to resemble comprehensive UN planning in program and resource distribution" (Eastby 1984, p. 241).
30 See http://thegef.org/MonitoringandEvaluation/MEPublications/MEPOPS/OPS3_Interim_Report_2-15_v2.pdf.
31 For a detailed discussion of an executive board, see Forss (2004).

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Appendix: Feedback from the Yale presentations

The findings and recommendations from the Yale course were presented at two events in February 2005—at the International Affairs Office of the US Environmental Protection Agency and at a side event during UNEP's 23rd Governing Council and Global Ministerial Environment Forum in Nairobi. The presentations focused on an analysis of UNEP's operations within the international environmental governance system by identifying key areas of achievement and challenge and revealing possible steps forward with an eye towards improved international environmental governance.

The fresh perspective of the Yale presentation received overwhelming positive feedback from the audience and buzz in the corridors of the governing council. Some 90 participants from governments, civil society and UNEP staff attended—including Executive Director Klaus Töpfer, Deputy Executive Director Shafqat Kakakhel and multiple heads of UNEP divisions and regional offices. Dr. Töpfer openly welcomed the Yale assessment of UNEP and acknowledged the need for UNEP reform. There was clear consensus on the need for an effective and well functioning international environmental organization. Some urged the analysis to take a more fundamental look at UNEP, examine carefully whether its mandate was realistic and analyse fully the fundamental reasons behind UNEP's performance. The recommendations for an external strategic review, a strengthened EMG and a reorganized governance structure were openly supported. No objections were raised to the broader recommendation of an information clearinghouse for UNEP.

Whether a function of the Yale effort or not, real policy impacts occurred at UNEP. Results of the senior management group retreat after the governing council included the initiation of a management review of UNEP by an external consultant with support of a small team designated by the executive director. This effort can very well be the first step towards the broader strategic review advocated in this paper.

Capacity Building for Global Environmental Protection

Chapter 6

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Strengthening the capacity of developing countries to address emerging global environmental problems in the context of sustainable development has been a central concern of key multilateral and bilateral donors since at least 1992, when the Rio Conference on Environment and Development adopted the "Agenda 21" on sustainable development. Many projects and programmes have been implemented to strengthen the capacity of developing countries to address a wide range of environmental and development objectives. But only recently have efforts been made to more systematically assess the capacity-building needs of developing countries for implementing global environmental agreements across different focal areas.

This chapter attempts to sort through an array of information on capacity building and related efforts in the environment field. The objective is to identify priority issues and to provide some answers to the question of what kind of capacity-building support for providing global environmental goods would be most useful and how it could be provided most effectively.[1]

The key multilateral institutions engaged in development cooperation, and therefore also in capacity building for development in developing countries, are the World Bank and the United Nations Development Programme (UNDP). These institutions also act as the dominant implementing agencies of the Global Environment Facility (GEF), the only multilateral mechanism that provides funding specifically for global environmental protection. In their capacity as GEF implementing agencies, the World Bank and UNDP translate the GEF's strategic and programmatic guidance into programme and project proposals and implement activities on the ground. To a lesser degree, the United Nations Environment Programme (UNEP) is also active in building capacity in the environment field, mainly through regional workshops.

Political oversight of GEF activities in the global environment comes from the conferences of the parties to the various conventions, particularly the Climate Convention and the Biodiversity Convention. The GEF serves as the

designated financial mechanism for the purpose of implementing these conventions. But the GEF is institutionally independent from the conventions and therefore can, in principle, go beyond the guidance of the conventions, albeit not against it.

Methodology and scope

This study focuses on these multilateral institutions, particularly the GEF, because they manage the largest amounts of funding available directly for global environmental purposes, and they have undertaken most of the conceptual and theoretical work related to building capacity for managing global environmental commons. Bilateral governmental programmes as well as non-governmental activities are not examined, although they often supplement multilateral programme activities and sometimes cover niches not addressed by them.

In this context, capacity-building needs and opportunities are considered at two levels of intervention:

- The capacity of developing countries at the national level to address global environmental issues.
- The capacity of developing countries to participate in international governance, for example, in efforts to formulate and negotiate international norms and rules concerning the management of global environmental public goods.

Capacity building at the national level is by far the more complex and challenging objective, and also the level on which practically all international and bilateral projects focus. But the participation of developing countries in the international negotiating process may significantly affect the political will and the interest in global environmental public goods in recipient countries.

The GEF is the key funding mechanism for helping developing countries address global environmental problems and implement international agreements. Capacity-building components are woven throughout all GEF activities. They are part of enabling activities that respond to the communication requirements of the conventions, and they are often included in other projects. So far only a few free-standing capacity-building activities are under way, all of them with very modest budgets (worth no more than $2 or $3 million). One recently launched activity is designed to strengthen national GEF focal points, and another is a technical national communication support programme.

Capacity building has always been recognized as a key long-term objective supporting the global environmental conventions. But the GEF Council has long been reluctant to fund projects that cannot be expected to produce measurable results and global environmental benefits. Nonetheless, as project results have been mixed in terms of measurable global environmental benefits, a need for a more comprehensive cross-sectoral approach to long-term capacity building has been recognized in recent years. In November 2003 the GEF approved a comprehensive Strategic Approach to Enhancing Capacity Building to be implemented by UNDP (GEF 2003d). This strategic approach lays out a comprehensive multilevel plan for capacity building for global commons. Because of its very recent approval, it is only now triggering a range of related activities.

Capacity building and development

Obviously, public and private sector reform and capacity building are not objectives restricted to environmental issues. They relate to all areas of civil society, the public sector and political institutions and processes.[2] To various extents, capacity building has been a key objective of most lending and grant-giving activities of the World Bank and UNDP, as well as of regional development banks. It has been at the core of development cooperation in general. Continued weakness in public institutions and governance in many countries has led to several recent high-level reaffirmations of the importance of long-term capacity building. They include the Millennium Development Goals adopted at the UN Millennium Development Summit in September 2000 and the Monterrey Consensus adopted by the International Conference on Financing for Development in March 2002.

United Nations Development Programme. During the 1990s the UNDP built its grant-giving programme around capacity development as the central purpose of technical cooperation.[3] In 2003 the UNDP provided $3 billion in non-refundable grant resources to developing countries, with a focus on the least developed countries. Most of the UNDP's funding goes towards technical assistance programmes, heavily focusing on developing long-term individual and institutional capacities in key public policy areas.

The UNDP's role in the development process and in capacity building was reinforced by the UN General Assembly during the Millennium Development Summit in 2000. At the 2002 World

Summit on Sustainable Development, the UNDP launched the Capacity 2015 platform, building on a previous capacity development programme for implementing Agenda 21. Capacity 2015 works through a series of partnerships to build capacities at the local level to realize both the Millennium Development Goals and the goals of Agenda 21.

Access to GEF funding has provided the UNDP with the means to strengthen its ability to address global environmental objectives in the context of its development priorities. Recently this has led to the free-standing capacity-building initiatives funded through the GEF, the Capacity Development Initiative and the more recent Strategic Approach to Enhance Capacity Building.

World Bank. World Bank funding generally comes in the form of concessional but repayable loans, and the Bank's lending operations focus on public infrastructure capital investments in the framework of country assistance strategies. But capacity development is also a key aspect of its operations. A recent assessment of the World Bank's experience with capacity building in Africa provides a comprehensive overview of the issues facing capacity-building efforts there as well as an overview of the World Bank's programmes in this area (World Bank 2005).

The World Bank has had to reassess its long-term approach to addressing chronic weaknesses in public sector institutions by shifting more towards long-term capacity-building interventions to address capacity constraints and persistent obstacles to change. Some recent shifts have, for example, led to increased support for poverty reduction support credits in the context of a broad strategic framework for identifying long-term capacity-building needs.

The World Bank provided some $9 billion in lending and $900 million in grant support for building capacity in Africa between 1995 and 2004, particularly for building public sector capacity. This work is supported by the World Bank Institute, which helps countries share and apply global and local knowledge to meet development challenges. Other, smaller World Bank–supported efforts are the African Capacity Building Foundation and the Institutional Development Fund.

Bilateral donors and capacity building. Bilateral donors are also focusing more on building capacity. The Organisation for Economic Co-operation and Development (OECD) estimates that 25%, or some $15 bil-

lion, of official development assistance goes to educational, training and awareness-raising activities (Baser 2006).

Definition of capacity and capacity building

"Capacity building" is synonymous with "capacity development".[4] The GEF's use of capacity building in the context of global environmental objectives reflects terminology from the convention process. The UNDP has been using capacity development in its technical assistance programmes. Whatever the terminology, a broadly shared definition does not exist. Any activity that improves the ability of a country to address its needs in the future helps create capacity, but it is not always clear which activities really do so. A recent survey of World Bank task managers found many views of capacity building (World Bank 2005).

A useful general definition, based on input from various sources, can be found in the *GEF Guidebook on Capacity Building* (GEF 2001, p. 3):

> *What is capacity?* Capacity is the ability of individuals, groups, organizations and institutions to address and manage environmental problems as part of efforts to achieve sustainable development.
>
> *What are the levels of capacity building?* There are three levels of capacity building—the individual, institutional and systemic levels. The systemic level is where the individual and the institution operate and interact with the external environment.
>
> *What is the aim of capacity building?* To build capacity, where none exists, and develop, strengthen, enhance, improve and retain the capabilities of countries to achieve the objectives of global environmental management, especially in the context of the conventions to which they are parties.

Dimensions of capacity building

Capacity building is a mainstay of development cooperation that cuts across all issue areas. It relates to all governance issues (such as strengthening of government institutions, legal systems and democratic decision-making procedures), and it relates to support for less formal participatory mechanisms and for access to primary and higher education and specialized post-graduate training. Developing countries must contend with

a shortage of analytical and technical skills, insufficient understanding of political and social factors affecting development, weak consultative mechanisms, lack of political leadership and commitment, weak management and little public demand for public services. Capacity-building programmes promote changes in all of these areas.

Most international documents identify capacity-building needs at systemic, institutional and personal levels, usually related to one issue, such as climate change adaptation or access to genetic resources and technology transfer. Little work has so far been done to build capacity across sectors and focal areas, as it relates to general sustainable development objectives.

A key challenge is providing enabling environments that broadly support capacity development at the institutional and personal levels. There are many possible intervention targets for building capacity at different levels (see table 6.1). Some general activities can serve multiple sectors and subjects. Others are more narrowly focused on a focal area or on specific operational priorities within focal areas.

How to allocate resources for building capacity

Three dimensions are critically important in deciding how to allocate resources for capacity building for global environmental benefits. How should available funds be distributed among countries, focal areas and programme priorities within a global focal area?

The global commons argument stipulates that all countries are responsible for providing the global environmental good because all countries are ultimately affected by the deterioration of it. However

Table 6.1 **Intervention levels for capacity building (Examples)**

General	• Cross-sectoral systemic capacity building for sustainable development (CSD national reports) • Capacity building for poverty reduction (World Bank, UNDP) • Strengthening GEF focal points (GEF) • National environmental action programmes (World Bank) • Regional information dissemination (UNEP)
Focal area	• National communications in response to conventions (GEF enabling activities) • Negotiating skills • Conference participation
Special/technical	• Renewable energy and conservation technology • Development of Clean Development Mechanism projects • Adaptation • Management skills for protected areas • Sharing of benefits from genetic resources • Indicators and monitoring

costs and benefits of action or inaction are far from being distributed symmetrically across regions and countries. Within both the climate change and biodiversity focal areas, some countries are decidedly more important for solving the problem or are more immediately affected by a failure to do so, and require special attention.

The Performance-Based Resource Allocation Framework (RAF) adopted in September 2005 by the GEF Council is an attempt to move in the direction of more targeted resource allocation. But as the debate that preceded adoption of the RAF shows, the politics of deciding on indicators for developing such rankings are difficult, and it remains to be seen if this particular RAF translates into a more strategic and effective resource allocation by the GEF (Clémençon 2006).

The second issue relates to how to distribute available international resources among the different global environmental objectives and finally within specific focal areas such as climate change and biodiversity conservation across various programme activities.

The GEF should adjust relative funding for climate change and biodiversity conservation in response to findings of its evaluation reports and in recognition of the degrees to which its support is crucial for achieving convention objectives. The GEF has more of a comparative advantage in biodiversity conservation than in mitigating climate change. In the climate change focal area, some of the technology-forcing and barrier removal programmes have produced few clear results (Eberhard and others 2004). These programmes furthermore are becoming less compelling as fossil fuel prices increase, market forces make investments in low-carbon energy technologies more attractive and Clean Development Mechanism projects are implemented. In the climate change focal area the GEF should focus much more systematically on long-term capacity building in the renewable energy and energy conservation sectors, as well as for helping countries adapt to climate change. It should gradually increase use of its scarce resources for biodiversity conservation and international waters as it invests less into capital investment projects in the energy sector.

GEF evaluation studies also indicate a need for greater emphasis on long-term capacity building relative to other intervention opportunities. This will require rethinking the role of free-standing educational programmes and targeted technical training and research projects in the GEF project pipeline. The GEF Council has generally insisted that such projects are linked to projects designed to produce measurable global environmental benefits. The development of performance indicators for

capacity-building initiatives has been identified as a priority and could help ease concerns about funding projects with long-term impacts that are difficult to fully appreciate.

The GEF and capacity building

The GEF is the principal—although not only—funding mechanism for global environmental projects, covering all the focal areas for which the international community has negotiated international agreements. The GEF responds to the guidance by the United Nations Framework Convention on Climate Change (FCCC) and the Convention on Biological Diversity (CBD). But as an independent institutional mechanism it can go beyond the guidance of the conventions.

Capacity-building components are integral to most projects, although there are no data on the proportion of GEF funding that goes towards capacity-building activities relative to other programme objectives. A free-standing, cross-sectoral capacity-building strategy is under way, but has not produced any actual projects yet.

GEF enabling activities and other support measures

The GEF has funded activities designed to enable developing countries to fulfil their basic reporting requirements under the climate change and biodiversity conventions. Similar activities have recently been undertaken with respect to the Convention on Persistent Organic Pollutants (POP) and are on the way for the Cartagena Protocol on Biosafety.

By now more than 500 enabling activity projects have been approved in biodiversity and climate change, averaging $200,000–300,000 (GEF 2003a). They are intended to put a country in a position to fulfil the reporting requirements under the conventions, but they have had capacity-building intentions as well. GEF Project Implementation Reviews, however, find that enabling activities have generally not focused enough on building capacities at the local and regional levels while supporting the preparation of the national communications (GEF 2003c).

Strengthening national focal points. The GEF has also adopted a programme designed to provide funds and services to help GEF focal points and council members in recipient countries carry out their consultation and coordination roles more effectively and raise awareness of the goals and opportunities offered by the GEF. Focal point support has averaged $14,000

(GEF 2004). An extension adopted by the council in June 2005 provides $256,000 for another four years. These are modest amounts, and a more systematic strengthening of GEF focal points linked to other capacity-building activities should be considered, even though recipient countries should be expected to provide more resources of their own to this objective.

National Communication Support Programme. In 1998 the GEF established the National Communication Support Programme to provide technical support to developing countries for their first and second national communications, second-phase enabling activities and National Adaptation Programmes of Action. On that basis global and regional initiatives were launched in 2001 on climate vulnerability and adaptation, greenhouse gas inventories, technology needs assessments and climate observing systems. Workshops have been conducted since 2002 and planned until 2006. In the end this programme is expected to produce 10 regional action plans.

GEF capacity-building initiative

In November 2003 the GEF Council adopted the Strategic Approach on Enhancing Capacity Building (GEF 2003d). The strategy is based on work done in the context of the Capacity Development Initiative approved by the GEF Council in May 1999. It reflects input from a wide variety of sources, including preliminary results from ongoing national capacity needs self-assessments (NCSAs). In preparation for national efforts regional reports on capacity-building needs were produced in 2000 for Africa, Asia and the Pacific, Eastern Europe and Central Asia, Latin America and the Caribbean and small island developing states.[5]

The 2003 strategic approach outlines the development of:

- Targets and indicators for measuring results and effects of capacity-building activities.
- Operational modalities and project criteria for implementing the strategic approach.
- Proposals for a technical support programme.

GEF support for capacity building is to be developed based on four "pathways":

- A self-assessment of capacity needs by countries.
- Strengthening the capacity-building elements in GEF projects.
- Development of targeted capacity-building projects.

- Country-specific programmes for addressing critical capacity building needs in least developed countries and small island developing states.

As expressed in the document and in council deliberations, the strengthening of capacity-building components within GEF project activities is considered the most effective pathway for "the sustainable development of hands-on capacity for action on the ground." The council stressed several other issues, such as the need to develop indicators to measure results and effects, the importance of targeted capacity building across focal areas and the need to determine support levels based on country needs assessments (GEF 2003d). The council also recommended defining minimum co-financing ratios for capacity-building projects to enhance ownership of projects.

The strategy provides some rough estimates for scaled-up capacity-building outlays. For fiscal years 2005–07 the GEF anticipates directing about 25% of resources towards capacity building within projects. In addition, the GEF Secretariat has suggested programming $50–60 million during the fiscal years 2005–07 for cross-cutting activities.[6]

National capacity self-assessment

Under the Capacity Development Initiative countries can apply for financial assistance of up to $200,000 to conduct NCSAs. NCSAs funded through the GEF/UNDP will be the departing point for more targeted cross-sectoral capacity- building efforts. By October 2005, 154 countries were participating in the NCSA, although only a few NCSAs had been completed (GEF/UNDP/UNEP 2005; GEF 2005b).

A perusal of final reports does not produce many new general insights that would differ significantly from previous more aggregate assessments done in preparation of the Capacity Development Initiative and the FCCC (see further down). But they attest to the diversity of geophysical, socio-economic and political conditions that result in the identification of very different capacity-building needs and priorities at the institutional and systemic levels.

The FCCC and capacity building

While the GEF and bilateral donors provide the funding, the conventions provide guidance on programme priorities. With respect to ca-

pacity building, the Conference of the Parties (COP) to the FCCC has made several decisions, starting in 2001 with the adoption of a framework for capacity building in developing countries, followed by a comprehensive review of its implementation. At its meeting in December 2004, COP10 highlighted a few areas on which future work should focus: creating and strengthening basic institutional infrastructure, developing information on best practices and securing adequate funding. The decision also lays out a timetable for the next review by the COP and its Subsidiary Committee for Implementation (SBI), which is to be initiated in 2008 and completed in 2009 (FCCC 2004d).

The FCCC decisions are directed at the GEF as well as at other donors, who fund and implement respective projects and programmes in support of the convention. But they contain little specific operational guidance. Of more interest are some of the background papers written or commissioned by the FCCC Secretariat, particularly the study "Range and Effectiveness of Capacity-Building Activities in Developing Countries Aimed at Implementing Decision 2/CP.7" and a technical paper by the same title (FCCC 2004a; Lafontaine and others 2004).

In their annexes the secretariat papers provide the most complete overview to date of capacity-building needs in climate change. They also develop a set of indicators to measure success in meeting such needs (FCCC 2004a, pp. 11, 12). The papers adopt the GEF's three-level understanding of capacity building (discussed above) as its conceptual framework (GEF/UNITAR 2001).

The analysis by the FCCC Secretariat finds that countries do not consider capacity-building needs in climate change a priority when asked about it in a broad context. An evaluation of Poverty Reduction Strategy Papers submitted by countries to the International Monetary Fund and the World Bank showed that countries define their sustainable development needs in terms of clean air, waste management and conservation. Only a small minority mentions capacity building for implementation of the FCCC. This is an important (but not surprising) finding that needs to be considered in capacity-building efforts in climate change. It suggests that such efforts should as far as possible be linked to broader capacity-building initiatives that are closer to the countries' priority interests.

Capacity building accomplishments on climate change. Several accomplishments are identified in the FCCC study. It finds that "relevant institutions dedicated to the achievement of the UNFCCC objective are

being put in place, that the quantity and quality of information created and disseminated relating to general and technical aspects of climate change have been increased, and that the capacity of various stakeholders to tackle a wide range of climate change issues has improved" (FCCC 2004a, p. 6). In various cited reports countries list many national organizations and programmes that have been created to address climate change issues at the national level. Initiatives have also included the successful training of large numbers of individuals from different sectors, particularly in preparing for the first national communication.

The FCCC Secretariat study also shows that bilateral activities have made an important contribution to building capacity for climate change in developing countries.[7] Bilateral cooperation has focused particularly on building institutional capacity to enable countries to meet specific obligations under the FCCC. A comparison of bilateral activities also shows that most countries include education, training and the exchange of information in their capacity-building and technology transfer initiatives.

Capacity-building efforts so far have produced several lessons. Two are particularly important:

- Tools that can help assess the effectiveness of capacity-building projects and programmes are likely to also help improve the implementation of these activities.
- Long-term learning-by-doing approaches that favour the development of partnerships and networks and that integrate capacity building into wider sustainable development efforts have the best chances of success.

Existing gaps. Several gaps in current attempts to address capacity-building needs for climate change are identified. They relate first to institutional capacity building, education, training and public awareness, and vulnerability and adaptation assessment.[8] At the individual level, developing countries indicate a need for improving training in negotiating skills and technical training in, for example, measuring variability in climate change. Reviews also indicate that when building individual capacity, the focus is on training but with insufficient attention to key incentives such as career development, which is critical to ensuring the sustainability of human resource development efforts.

Another need identified is integration of capacity-building interventions. Many countries continue to have great needs for developing integrated approaches to capacity building across the systemic, institutional and personal levels.

The FCCC process—and as a result the GEF operational criteria also—mandate that the capacity needs assessment process be country driven. While this is an indispensable prerequisite to ensure country ownership of the results and subsequent programmes, it also results in very diverse outcomes of the self-assessment process.

At the systemic level various assessment studies confirm some level of cultural transformation, such as changes in perceptions regarding the climate change issue among the general public. But they also show that much more is needed. And although institutional capacity has improved, it remains very weak in many countries. There is a critical need for better overall coordination, such as through the development of national institutional frameworks to coordinate actions for preparing and implementing Clean Development Mechanism projects, and related technical and methodological support.

The sustainability of capacity interventions is a critical issue.[9] Experience shows that it is crucial to create enabling environments at the systemic level to sustain capacity built at the institutional and individual levels. An enabling environment gives new institutions that deal with climate change issues an adequate voice and role in the national policy process, providing education, training, job opportunities and career development.

A priority issue is monitoring performance with an appropriate set of indicators. The FCCC Secretariat develops a comprehensive list of such indicators that should be considered by relevant funding institutions (FCCC 2004b, p. 13, annex III).

Capacity building and the GEF climate change portfolio

The most recent in-depth assessment of the GEF's accomplishment in the climate change area is the *GEF Climate Change Program Study* (Eberhard and others 2004). By the end of 2003 and since its establishment the GEF had allocated $1.63 billion to 207 large- and medium-sized climate change projects and activities, close to a third of its overall programme funding in this period. But at the end of 2003 only 43 projects had been completed.

The GEF climate change portfolio is managed through four operational programmes. One for the promotion of renewable energy accounts for the largest part of the portfolio, currently representing 44% of active project allocations. About a third of projects fall within the operational programme targeting energy efficiency. The two other pro-

grammes are environment-friendly transport, formally established by the GEF Council until 2001, and reduction of the long-term costs of low greenhouse gas–emitting energy technologies. Some 269 enabling activities, using 11% of GEF resources, facilitate implementing climate change response measures and preparing national communications.

For climate change mitigation activities the GEF is targeting large developing countries, key to future global emissions control. China has received $34 million (calculated as an annual average), Mexico $13 million and India $10 million. These countries are followed by Brazil ($7.2 million), Poland ($5.2 million), the Philippines ($5 million), Morocco ($3.7 million), Russia ($2.8 million), Tunisia ($2.3 million) and Indonesia ($2.3 million).

The GEF programme study does not address capacity building as a separate issue (as the technical FCCC report did), but it highlights many areas where capacity-building needs are high. It finds that the GEF has achieved some significant accomplishments, particularly in market transformation related to energy efficiency. Echoing earlier assessments, however, it finds that the GEF has been less effective in promoting the adoption of renewable energy technologies by removing barriers and reducing implementation costs. Given the small annual resource allocations, this is not surprising.

One finding stands out that has implications for capacity-building initiatives on climate change: the climate portfolio has suffered from mixed and unclear expectations about how to address the trade-off between long-term catalytic market transformation and immediate greenhouse gas mitigation objectives (Eberhard and others 2004). Capacity-building project components are not designed to achieve immediate reductions in greenhouse gas emission, but rather are intended to create enabling environments that will do so in the long run.

Several other issues relevant for capacity building emerge:

- The energy efficiency portfolio contains important capacity-building elements. A strategic focus should be on building capacity to support market transformation for energy-saving and clean technology applications.
- There is a strong need to improve effective learning from the many programme components. Particularly in renewable energy technologies, such as solar, more systematic learning is needed.

The great diversity of the portfolio makes it difficult to design systematic efforts to promote learning and targeted information dissemination. Capacity building at the systemic and institutional levels is necessary to make coordination and communication among various

stakeholders (government agencies, teaching and research institutions and the private sector) more effective.

Trust Fund for Participation in the FCCC process

The Trust Fund for Participation in the FCCC process was established by the first Conference of the Parties to the FCCC in 1995. It has been used to provide financial support for one delegate from each eligible party to each session of the COP and its subsidiary bodies. For some sessions this support has been extended to cover a second delegate from least developed countries or small island developing states (FCCC 2004c).

The number of individuals funded peaked at 177 for COP6 in 2000. Contributions are voluntary and have fluctuated over the years. They declined from $3.8 million for 2000–01 to $2.2 million for 2002–03. In 2000 and 2001 671 trips were funded for $3.6 million, and in 2002–03 only 466 trips were funded for $2.5 million ($5,364 per trip). The decline may reflect the fact that meetings in 2002 and 2003 were somewhat less eventful than the ones in 2000 and 2001, which resulted in the Marrakech Accords. Needs for 2004 and 2005 are calculated at $1.6 million a year, but contributions seem to be falling far short of these levels.

The CBD and capacity building

The Conference of the Parties to the CBD have not initiated a review process for capacity-building efforts comparable to the activities described for the FCCC. However capacity building permeates project design for biodiversity conservation perhaps more consistently than for climate change activities, where technology and market forces play more dominant roles. In both "protected areas" and "mainstreaming of biodiversity conservation in productive zones", stakeholder and community participation is often a core element of project activities and entails a form of capacity building.

Nevertheless, the lack of a separate, comprehensive examination of capacity-building needs and opportunities is a shortcoming that should be addressed. Such an analysis seems particularly desirable at the systemic level, where synergies may also be established with cross-sectoral efforts related to the GEF's capacity-building strategy and programmes supported by the World Bank, UNDP and other donors to help developing countries achieve the Millennium Development Goals.

CBD guidance on capacity building

In several programme areas of the CBD capacity building is a key element. The COP7 in 2004 adopted an Action Plan for Access to Genetic Resources and Benefit-Sharing because progress has yet to be made in implementing this key provision. The objective is to facilitate and support the development and strengthening of capacities of individuals, institutions and communities to effectively implement the provision on benefit sharing.

The Norway/UN Conference on Technology Transfer and Capacity Building in June 2003 focused on practical and technical follow-up measures as called for under the CBD (UNEP and Norwegian Ministry of Environment 2003).

Another initiative related to capacity building is the Global Initiative on Communication, Education and Public Awareness. Capacity building also relates to other cross-cutting issues on the CBD's agenda, such as to monitoring, indicator development, the Global Taxonomy Initiative, the ecosystem approach, education and public awareness.[10] All these programme activities rely heavily on developing the appropriate national know-how through education and training and developing institutional structures.

Mainstreaming and capacity building

In response to concerns from the CBD the GEF has recently put more emphasis on mainstreaming conservation objectives into overall development activities, recognizing that unless the institutional structures of a country are reinforced to mainstream biodiversity, they remain vulnerable to alternative development options. The World Summit on Sustainable Development in Johannesburg in 2002 also reiterated that the objectives of the CBD will be impossible to meet until consideration of biodiversity is fully integrated into other sectors. Mainstreaming has long been a buzzword, but various assessments show that it remains one of the most elusive strategic objectives of the GEF (GEF/STAP 2004a).

Mainstreaming involves integrating biodiversity values into national and international policy-making—on issues from national development policies to global financial markets—and includes legislation, land use planning, taxation reform and economic incentives. Mainstreaming is closely related to capacity building, and the two objectives in practice often overlap. Building capacity is essential for mainstreaming, but main-

streaming goes beyond capacity building and relates to actual policy outcomes. Mainstreaming and capacity building are similar enough objectives that they should be pursued in a closely integrated manner. Both objectives should be integrated first into the national processes for developing National Sustainable Development Strategies and National Biodiversity Strategy and Action Plans (both goals arising from Agenda 21).

However, as a recent review of country experiences in implementing such plans shows, these government documents are generally not influencing the main forces affecting degradation, because they mostly fail to establish systems and processes that engage the dominant sectors of society and government (Swiderska 2002).

Once the protected areas programme matures, mainstreaming biodiversity conservation in "production landscapes" is the next big challenge for the CBD. Building capacity on biodiversity should focus on this objective as well. Systemic and institutional capacity is needed to deal with trade-off decisions about biodiversity and development objectives that may not be compatible. Such cases will pose increasing problems, given that win-win situations (that is, situations in which both development and conservation objectives can easily be combined) may not be as common as was earlier believed (Christensen 2004; McShane and Wells 2004).

Like-minded megadiverse countries

Biodiversity is very unevenly distributed around the world. Non-governmental organizations and the scientific community have long been guided by this fact. In 2002 this recognition led to a political initiative by Mexico and the creation of the Group of Like-Minded Megadiverse Countries. Together these countries account for about two-thirds of the globe's biodiversity.[11] Because efforts to conserve global biodiversity must continue to target these countries, the CBD and the GEF have to find more systematic ways to do so.

The GEF programme study on biodiversity

GEF grant funding for biodiversity from 1991 through 2003 ($1.7 billion) has leveraged about $3.3 billion more in co-financing from other funding sources (Dublin, Volonte and Brann 2004). GEF funding covers 336 large or medium projects and 269 enabling activities. The Small Grants Programme administered by UNDP as a GEF project has funded 3,076 biodiversity activities costing on average $20,000.

Overall approximately 75% of GEF biodiversity projects have involved protected areas. Compared with resources spent on climate change activities, resources spent on biodiversity conservation projects go much less towards capital investment and much more towards technical assistance, and therefore often have some form of capacity building as a critical component.

The 2004 Biodiversity Programme Study provides a comprehensive assessment of the GEF's progress towards "attaining the impacts sought as contributions to the goal, objectives, and targets of the CBD" (Dublin, Volonte and Brann 2004, p. 2). The report does not focus specifically on capacity building, but it addresses a range of related issues, particularly sustainability of interventions after GEF funds run out and mainstreaming of biodiversity conservation objectives into economic development. It concludes that the GEF has contributed significantly to strengthening the ability of countries to implement CBD objectives, and particularly to creating individual capacity as well as institutional and systemic capacity through the legislative process.

But the study discusses at length key weaknesses related to making results last (making them sustainable beyond project completion). A significant shortcoming identified is the failure of the GEF to develop an effective process for integrating the many lessons learned into the preparation and implementation of new projects and improving information dissemination. These activities should be at the centre of building capacity for creating enabling environments.

The sustainability problem relates to several issues directly connected to capacity building. For example, a special in-depth look at 34 completed projects revealed that important outcomes were not sustained in two-thirds of the cases. This means that without continued funding and institutional and technical support, notable achievements and outcomes are likely to fade away. A key objective must be to improve the capacity of recipient countries to address this problem. Of course, such capacity must be matched with political will and appropriate funding decisions on the national level.

This brief discussion about the sustainability of GEF interventions on biodiversity highlights the problem of defining capacity building. Sustainability and financial capacity should be explicitly recognized as part of the capacity-building package.

Although prioritizing funding to the megadiversity countries has not been a stated policy of the GEF Biodiversity Programme, such countries have received a large proportion of the GEF's resources for

Table 6.2 **Total GEF funds allocated to megadiversity countries for biodiversity conservation, 1991–2004**

Country	GEF funds (US$ millions)	Number of projects
Brazil	77	7
Mexico	76	9
China	55	8
Indonesia	50	10
Peru	41	10
Ecuador	39	9
Colombia	39	9
South Africa	36	8
Philippines	31	7
India	31	4
Russia	31	5
Costa Rica	26	6
Papua New Guinea	26	3
Ghana	25	4
Bangladesh	23	3
Pakistan	23	3
Madagascar	22	2
Burkina Faso	21	2
Sri Lanka	21	5
Bolivia	21	3
Venezuela	11	2
Kenya	9	4
Malaysia	7	2

biodiversity conservation (see table 6.2). The 10 countries receiving the largest amounts are all classified as "megadiverse", and the amount received equals approximately one-third of the portfolio.

The GEF's Biodiversity Programme Study also assesses the achievement of mainstreaming outcomes by the three implementing agencies. It emphasizes that mainstreaming should become a more important aspect of GEF programming and that the current focus on specific sectors (agriculture, forestry, fisheries and tourism) should be expanded to address cross-sectoral needs. The assessment also postulates that the length of time required for mainstreaming is often underestimated and that successful projects have often relied on earlier capacity-building interventions. One aspect that seems to be missing is broad involvement of the private sector in drafting comprehensive biodiversity plans.

Funding for participating in the CBD process

The CBD has established a voluntary trust fund for facilitating the participation of parties in the convention process. Problems with financing the fund have been pervasive and even worse than in the case of the FCCC. In 2003 travel costs to five meetings for 264 participants were funded at a cost of $715,175 (average of $2,700 a person) (UNEP 2003a). All these meetings were three to four days long.

Participation in the FCCC and the CBD negotiating process

International funding to enable developing countries to provide global environmental goods has traditionally focused on achieving measurable global benefits at the national level. Capacity building through the GEF and other institutions has almost exclusively targeted in-country activities.

The problems many small and medium developing countries face in participating substantively in international debates on defining global public goods objectives have been recognized, and they go far beyond environmental issues (Chasek 2001; Kaul 2001; Fisher and Green 2004). The issue, however, has garnered little attention from funding institutions, although voluntary trust funds to cover some travel costs for participants from developing countries have been established in both conventions. The funding levels have been modest and have declined in recent years because only a few developed donor countries have been willing to contribute.

There are two reasons why an adequate level of participation in international negotiations is important for a country and for the international community. The first and most obvious is that a country should be able to represent its interests in the international setting. The second is perhaps less obvious. It relates to building personal and institutional capacities by linking the national and international levels through multiple channels of communication that reflect the changing reality of the international system, where civil society and non-governmental actors play increasingly important roles (Haas 1992; Lipschutz 1996; Wapner 1996).

A country needs to develop the means to effectively advocate and defend its national interests in international negotiations, where decisions may be made that affect it. All countries therefore devote most resources to the issues closest to their direct interests, usually high politics issues related to national security and economic relations. Developing

countries, particularly the poorest ones, are often poorly equipped to represent themselves effectively even on such key issues as trade (Baser 2006).

But countries should also participate in the process because it puts them in a position to develop national policies, particularly on issues where the definition of a coherent national interest may not be clear cut, as is arguably the case for global environmental issues.[12] While it is important to have seasoned negotiators who have acquired expertise in international negotiations over a long time, it seems equally important to continuously reinforce and rejuvenate the link between the national level and the international negotiating process. This objective can be furthered by providing individuals from different government agencies, non-governmental organizations and the private sector with the opportunity to gain first-hand exposure to international debates.

Participation in international negotiations should therefore be recognized as an important learning experience and part of individual- and institutional-level capacity building, because it allows a country to link its national policy debate more directly to international processes and discussions. Individuals who take part in international meetings carry their experience back to their countries, can provide input to national discussions on the subject and help engage national actors.

On a technical level, international meetings provide many opportunities for participating in events and workshops on various aspects of the negotiating process, thereby providing significant learning and training opportunities. These are also events that provide opportunities for networking with colleagues from all over the world and, perhaps most important, with colleagues from neighbouring countries.

This reason provides the more compelling rationale for putting more international effort into securing adequate representation of developing countries in international meetings. However it is rarely recognized as a priority over the functional imperative of diplomatic representation.

The current situation: personal styles and missing guidance from capitals. Personal styles of negotiators and lack of guidance from national capitals can negatively influence international negotiations.[13] This is more of an issue in international forums that deliberate issues that rank low in the overall scheme of things, as most environmental negotiations do.

Representatives who operate with almost no guidance from their capitals may become well versed, effective negotiators. Because of the intimate knowledge of specific negotiating processes that they typically accumulate over the years, they may help advance the overall objectives.

But they can also become loose cannons and dominate and obstruct talks, particularly on the more technical level, to which many national governments pay little attention. Nevertheless, such individuals may provide developing countries with a cost-effective way of exerting influence in the growing numbers of international meetings. Permanent missions to the United Nations in New York serve as the home base for many such representatives, allowing them to participate in many international meetings more easily and at lower costs.

Small delegations negotiating with little or no connection or substantive input from the national level may tend to act independently, not necessarily reflecting the best interest of their countries. They are also unable to support the multiple channels of communication between the international and the national levels that are conducive to encouraging a substantive national debate within their countries. In most cases small delegations represent just one government agency, often foreign affairs. When national coordination mechanisms are weak—more the norm than the exception—this works against building a network of individuals and institutions with an interest in the subject being negotiated.

Small delegations have also been shown to be susceptible to adopting positions advocated by other countries, industry interests or developed country non-governmental organizations (Chasek 2001).[14] In particular they may be inclined to simply support a G-77 position associated with the UN regional group system. Such positions are often dictated by old dichotomies between developed and developing countries but may not be in the country's best interest (Najam 2004). Issue linkage may support such positions—for example, when countries try to trade support for a position for some unrelated benefit. Of course issue linkage is not confined to small countries and small delegations. It is a proven strategy in foreign affairs. However, when low-priority issues are at stake, many countries with small delegations may be more susceptible to trading favours than countries whose negotiating positions are more firmly grounded in a national process.

A country with more resources is in a better position to develop positions that reflect real national concerns, although in many cases they may not change the basic dynamics driving negotiating behaviour. But larger delegations likely reflect a broader cross-section of their countries, and they are therefore also more likely to represent a national position more guided by scientific, technical and economic analysis.

In terms of building capacity for global environmental commons, a key question is how important a substantial delegation really is, par-

ticularly for small countries with little bargaining power. The value of UN-type conferences has long been questioned in many circles. Nevertheless, the experience of being part of this tedious and slow process at the highest international level has an important side effect. It creates ownership in the process and strengthens a country's capacity to address the issues at the national level, through capacity building and training. It arguably also helps continuously expand the international network of conference veterans who understand that there is no real alternative to this deliberative and interactive process and who can help communicate this understanding within their own countries, even long after they have ceased to be part of the meetings.

Current level of participation in the CDB and FCCC process. Sending larger delegations to an increasing number of international meetings is a tall order for many countries, even for small developed countries. It is particularly expensive for least developed countries. Not surprisingly, representation in the Conferences of the Parties to the Climate and Biodiversity Conventions has therefore been very different for developed and developing countries.

Large developed countries usually send delegations of 50–60 people to the Conference of the Parties of the FCCC. Even many small European countries (Sweden, Finland) tend to have large delegations of 20–40 people, about as many as the delegations sent by the most populous countries China, India and Indonesia in recent years. The size of national delegations drops to about 10 people for mid-sized developing countries, while least developed countries tend to be represented by only 2–4 people, often with no one from the national capital. Delegation size for least developed countries averaged only 2.7 people at COP7 and COP9, with many countries not represented at all (see annex). The average drops even further if those countries are excluded that are geographically situated close to a conference venue.

In the CBD process overall delegation sizes tend to be even smaller—often about two-thirds the size—than in the FCCC negotiations. This reflects the different economic and political significance of these negotiations in most countries' views. Delegation size for least developed countries averaged only two individuals during the Conference of the Parties (COP7) in Malaysia in December 2003. Again, most developed countries were represented by 20–40 representatives. Large delegations allow developed country parties to be represented by many different government agencies, and key agencies tend to send several representatives.

Delegation size depends on many factors, among them the subject on the agenda and the location of the meeting. The fact that COP meetings are hosted around the world not surprisingly tends to significantly boost delegation sizes of countries from the region, which may be a significant advantage.

In the end conference attendance is obviously a function of the resources available to cover official travel expenses and the relative political importance of the issue being discussed. In the big scheme of things travel expenses may not be large, but when resources are scarce, any costs are significant, particularly considered against what else could productively be done with the money. Conferences of the parties are only the tip of the iceberg of international conference diplomacy related to these environmental issues. Each negotiating process meets in formal subsidiary working groups outside the main meetings and spawns many ad hoc expert and regional working group meetings related to a range of technical issues.

The FCCC Web site lists 23 meetings related to the climate change negotiation process for 2004; the CBD site lists even more. Many are regional consultations and informal expert workshops. While some may be of marginal interest to many countries, others relate to issues of particular interest to developing countries—technology transfer, the Clean Development Mechanism, adaptation to climate change, fair and equitable benefit sharing and the Cartagena Biosafety Protocol, to name just a few.

Optimal level of participation and what it would cost. What would be an ideal level of participation in the climate negotiations? To answer this question, one should again distinguish between the two objectives of participating in international meetings discussed above: between formal diplomatic representation through key agencies and the participation of individuals linked to national governmental and non-governmental organizations in advisory or observer roles.

Departing from such a functional distinction of representation, the lead government agency should be represented by two people from the capital, a lead negotiator supported by an additional representative. If the environment ministry is not the lead agency—as is the case in many countries where foreign ministries tend to represent countries in international environmental negotiations—the environment ministry and the economics or finance ministries should be represented by one person each. Such a delegation would contain a core group of four, all of whom should be fully engaged in the working groups and informal

group meetings, thus ensuring substantive participation in all aspects of the conference, including regional group meetings and break-out sessions. Resident country representatives should normally not be counted as part of a country's core representation because they are often not tied into the national debate on the subject.

Some individuals from this core group should also participate in the subsidiary group meetings and in the key technical expert workshops to ensure that delegations to the COP meetings are well informed about these events.

The second part of the delegation should include representatives from civil society, such as from non-governmental organizations, research institutions and the private sector. These individuals may be selected because of specific topics discussed at a meeting or because of the role they play in the national implementation process. It may also be advantageous to include congressional observers in the delegations to at least the key meetings. This can help increase understanding of the issues at the national level and may go a long way towards strengthening enabling environments. Three people from civil society would seem to be the minimum.

Departing from an ideal composition, most countries—except for the smallest—should be able to send a delegation of at least seven to the annual FCCC COPs, perhaps four to the two subsidiary meetings and two to the five most relevant additional workshops. That totals 25 individual trips. The country could cover the 8 most important of the 23 meetings listed by the FCCC for 2004, for example. Lower-level technical meetings often constitute significant opportunities for learning, exchange of scientific knowledge and, particularly, networking with people with similar backgrounds and interests. But these are often the least well attended meetings.

As discussed earlier, the CBD Trust Fund has provided funding for participation in FCCC meetings, averaging $5,364 a person per trip for the two-week meetings. The CBD trust fund covered travel costs for several four-day working group meetings at an average cost of $2,700. Using an average cost of $4,000 as a baseline produces total travel costs for participating in the FCCC process for one average developing country of $100,000 (for 25 individual trips). Taking this simplified calculation a step further, and assuming similar costs for the CBD, brings costs to $200,000 annually. Adding representation in several related but arguably less visible and complex environmental negotiations, such as those on desertification, the Montreal Protocol, the

Persistent Organic Pollutants Convention, the Commission on Sustainable Development, UNEP and the GEF, might add an additional $200,000, for a total of $400,000.[15]

This is not the place to speculate in detail about what constitutes "adequate" participation of developing countries in key international environmental meetings. However this back-of-the-envelope calculation shows that the costs for such representation are not insurmountable, although they might be substantial in absolute terms. For the climate change and biodiversity processes alone, costs would be about $200,000 per country a year, suggesting that $20 million could secure an adequate level of participation in both the climate change and the biodiversity convention process for 100 developing countries.

This rough estimate ignores the obvious fact that large, populous countries should send larger delegations while very small countries might not need to be represented in all these negotiations at the level described. Pooling resources by building small constituencies and like-minded groups with strong and frequent regional coordination mechanisms presents important capacity-building opportunities that could supplement involvement at the international level.

How to strengthen participation in international processes

If the level of participation of developing countries in the global environmental governance process should be significantly increased, the tricky question is how costs for achieving this objective should be shared between developed and developing countries.

There are two sides; many argue—as developing countries generally do—that the spirit of the conventions suggests that developed countries should finance adequate participation of developing countries in the process with resources other than general development cooperation funding. Costs for participating in the global environmental negotiating process can therefore be regarded as incremental in the sense that the incremental cost financing principle is used by the GEF.[16]

Most developed country representatives, however, maintain that even if financial resources were readily available, developing countries share the responsibility to implement the conventions. Only if they use some of their own resources will they also have a real stake in the process.

Resistance to increasing assistance for covering travel expenses is no doubt also grounded in politicians' unease about funding what constituents in donor countries may regard as lavish travel expenses for

representatives from poor countries. This reluctance relates to widespread public beliefs in many countries that international conference diplomacy produces few tangible outcomes and that the money could be put to much better use (Hook 2003). A convincing case that coverage of travel expenses would produce global environmental benefits down the road still needs to be made to the general public and budget-minded politicians. There is also a need to clearly distinguish between financing for development cooperation and financing for global public goods (Clémençon 2000; Kaul and others 2002).

Any increase in funding for conference attendance should build on existing mechanisms. However the trust funds are voluntary, and it is difficult to see how this can be changed. It may be more expedient and politically less difficult to create a conference participation trust fund within the GEF, perhaps as part of the new cross-cutting capacity-building strategy, if not as a new window. A reasonable level of participation in the convention process of some 100 developing countries could be accomplished with about $20 million. If the GEF allocated $10 million a year for travel expenses, it could cover half those trips. What the ratio should be between international and national funding for conference participation still needs to be worked out.

Some conference attendance could also be linked to international fellowship programmes related to national educational and training in the subjects. Travel money should also be provided to support strengthening the individual and institutional capacities of specific national governmental and non-governmental organizations. Linking project work with some conference participation could also be pursued more systematically and accommodate some of these objectives.

An obvious concern is to create incentives to involve individuals from institutions that can really help build the type of lasting communication channels between the national and international levels discussed earlier. This will require developing clear eligibility criteria. Conceptual work is needed to flesh out various options.

Reforming the international environmental governance system. The fragmentation of international environmental institutions has been recognized as significantly raising the transaction costs of participating effectively in international governance (Young 1999; Chasek 2001; Haas 2004). Environmental organizations and convention secretariats are scattered around the world, as are the meetings of the parties to the conventions and related subsidiary and technical workshops to which different governments play host. UNEP headquarters is located in Nai-

robi, the Climate Change Secretariat in Bonn and the Secretariat for the Convention on Biodiversity in Montreal; other secretariats and organizations are in Geneva and New York. The practice of having many meetings hosted by different countries further increases the logistical problems and the costs of participating in these meetings, although it should be noted that it also helps to increase the ownership in the process and at times does enable a geographic region to be represented more numerously and at lower costs in a conference.

The situation in the environment field differs from that in other areas of international relations. Most trade negotiations take place in Geneva, while international development organizations are situated in Washington (World Bank) and New York (UNDP) and thus near the UN headquarters in New York. In both cases countries can cover related talks from their permanent UN missions in Geneva and New York, allowing them to maintain expert capacity there to deal with the ongoing talks. When it comes to environmental issues, UN missions are often called on to cover the negotiations, but they rarely have the expertise to do so substantively, and they tend to have little input from the capitals.

Many believe a more consolidated system would make it far easier for small and poor countries to cover negotiations more consistently. Some have advocated the creation of a strong umbrella environmental organization comparable to the World Trade Organization (Caldwell 1996; Esty 1994; Runge 2001). However an institutional revamping does not appear imminent. It would require strong political will by all countries concerned and concessions by some countries currently hosting convention secretariats and organizations.

Others have made the point that even if this could be accomplished, institutional efficiency may be overrated, running counter to the diversity that characterizes international environmental issues (Haas 2004). The more centralized the system becomes, the less participatory it will become. Institutional consolidation in a strong international environmental organization may streamline participation of developing countries in the process and reduce resource needs for that purpose. But it will also hinder capacity building by further narrowing the range of people and institutions involved in the process. This will likely reduce interest in the process by those constituencies most needed for developing the long-term capacity to more effectively address global environmental problems.

Turf fights among government agencies over who covers what in international environmental negotiations are common. Many countries have instituted intergovernmental coordination mechanisms for implementing Agenda 21, which to some extent address this problem. Nevertheless, there is no substitute for systematically involving more people from developing countries with various institutional backgrounds. Only in this way can we expand two-way communication channels needed to advance the debate on global environmental public goods. This can also help improve the standing of environment agencies at the national level—an important objective, given the systemic weakness of environment agencies compared with other agencies.

This is not to argue against attempts to consolidate. The point is simply that the argument for consolidation does not change the need for increased levels of participation.

Focus on resource allocation. Increasing the number of individuals from developing countries who participate in the CBD and FCCC processes is a critical component of building capacity related to the provision of global environmental public goods. Obviously, travel support to countries would be granted based on some criteria related to a country's economic abilities and global environmental relevance. The GEF's new resources allocation framework, as well as the capacity-building assessments of the FCCC, might be helpful in this regard. The trick is to find a formula that is not too difficult to implement, that is politically uncontroversial and that is likely to actually achieve some of these capacity-building impacts.

Travel funds should continue to be administered by convention secretariats, which are closely involved with the logistics of the meetings for which travel support is extended. But there should be some coordination between the convention processes and administration of consistent eligibility criteria, a role that might be provided by UNEP with support from the GEF.

As an example, one could envision a three-tier system, where medium countries with an average score on global environmental relevance are eligible for financial support to be represented in international meetings. Countries with high global relevance scores should be eligible for additional support, while very small countries and countries with a low score should receive less individual support but could be supported as groups or constituencies. They should be able to send a sizeable national delegation to the main meetings but could be expected to pool resources to cover many of the expert workshops.

Considerable work is needed to develop the conceptual and operational framework for a more comprehensive conference participation support system for developing countries. Unfortunately this issue does not appear high on the agenda of any multilateral meeting.

Conclusion

Capacity development or capacity building, which relates to all aspects of public and private sector reform and governance, remains a key objective of international development cooperation. Several recent high-level international meetings have reinforced the need for increased attention to long-term capacity building for reaching Millennium Development Goals and achieving sustainable development.

Building capacity for protecting global environmental public goods is particularly challenging, because developing countries have only a marginal interest in putting resources towards strengthening their ability to deal with problems of minimal immediate national interest that they furthermore see as caused mainly by developed countries.

Several assessments relating to capacity-building needs and priorities show that although significant efforts have been undertaken, much remains to be done. Some capacity building related to global environmental public goods has taken place at the individual and institutional levels. Many individuals in developing countries have benefited from expanded education and training programmes covering global environmental issues, and awareness of these issues has increased in at least some countries. Institutional capacity has also improved significantly in many countries, measured by the number of organizations and government agencies that have been created or that now incorporate capacity to deal with climate change and biodiversity issues. But national experiences differ widely. Lack of funding and political will can undermine newly created capacity.

Capacity building at the systemic level seems the greatest challenge. At this level specialized individual and institutional capacities should tie into the overall political and economic system and help influence policies, legislative processes, implementation and enforcement of regulations and private sector activities. But systemic capacity on global environmental issues cannot be created independently from enabling activities that support better governance systems and stronger institutions in general.

Needs for capacity building remain large. GEF programme evaluations indicate that sustaining individual and institutional capacities is a challenge when political will and adequate resources are lacking. Various evaluations have also found that few projects achieve sustainability after resources run out in the overly ambitious time frames given (particularly in biodiversity).

What is new at the international level is the recognition that capacity-building activities must cut across all global environmental areas covered by the GEF and its implementing agencies and that they should focus on creating overall enabling environments. New also is a discernible shift away from near-exclusive focus on projects that produce immediate and measurable environmental output and a shift towards projects aimed at creating long-term capacity building as an objective.

Early in the process the international community was reluctant to finance through the GEF projects that had education, training and public awareness raising as their main goals.[17] The emphasis has always been on projects that produce measurable results. But as the GEF and other donors have implemented projects over the past decade, the realization has grown that focal-area projects may accomplish little over time if framework conditions (enabling environments) are not addressed more systematically.

Recommendations

Considering all the work on capacity building currently under way, most notably the National Capacity Needs Self-Assessments, it seems somewhat presumptuous to base recommendations on a desk study. The following recommendations therefore simply aim to contribute to the debate on some of the more strategic choices regarding how to address capacity-building needs for global environmental protection in the future through international cooperation.

What activities represent capacity building?

More conceptual work is needed to determine the key components of capacity building for global environmental goods. Such activities as mainstreaming, awareness raising, network building, partnership agreements, training seminars and stakeholder participation all seem strongly

contingent on earlier capacity-building activities, but at the same time they appear to be capacity building themselves.

It is often unclear how to distinguish capacity building and other project initiatives in the focal areas. The definition has operational implications, particularly for developing a comprehensive cross-cutting capacity building strategy that links to capacity-building components pursued within project frameworks. The work done by the FCCC to develop indicators for assessing capacity building is an important step towards creating a more meaningful conceptual framework for future activities.

Allocating resources for capacity building

Recognizing the mixed results with generating global environmental benefits through regular GEF project work, more funds should be allocated for long-term capacity-building initiatives within the focal areas.

The availability of financial resources for capacity building is a direct function of the general availability of resources for global environmental programme objectives pursued by the GEF and other multilateral and bilateral donors. These resources are scarce and should be increased significantly. New fund-raising mechanisms outside government, such as an international tax for global public goods, should be explored (Clémençon 2000; see also Clémençon this volume, Chapter 3).

Apart from the question of whether the volume of international resources is adequate, the relative distribution of available funds over focal areas and programme activities should be based on two strategic considerations.

First, is the allocation of resources between long-term capacity building and other shorter-term programme objectives within any given focal area (climate change, biodiversity) optimal? This question is particularly relevant for climate change. The GEF should allocate more resources for long-term programme objectives related to building capacity and raising awareness in energy conservation and developing investment opportunities in the renewable energy sector, and it should scale back or at least level off some activities related to market penetration and removal of barriers to renewable energy technologies.

Second is whether capacity building is equally important for all GEF focal areas. The GEF's recent programme studies on the focal areas and the GEF's Third Overall Assessment (2005) aptly illustrate the challenges countries face in generating global benefits in the context of limited programmes and projects. In the climate change focal

area, market forces—energy and technology prices—determine intervention opportunities and successful project outcomes to a very large degree. Recent energy price developments have generated improved market conditions for energy conservation and renewable energy technologies and lessened the need for grant financing. The value of GEF financing appears to become ever more unclear in some operational programmes that are strongly affected by changing market conditions. Energy prices have more than tripled since 2002, and this must have strategic implications for allocating grant resources for incremental cost financing in the climate change area.

On the other hand, GEF funding appears to be more critical to producing sustained project success in the biodiversity focal area. Biodiversity conservation depends on developing human capital and strengthening institutions, which critically depend on grant funding. Market incentives for conservation are the exception rather than the rule, even under optimal conditions. Capacity-building needs therefore appear considerably greater for biodiversity conservation than for climate change.

The GEF has yet to reconsider its traditional formula of distributing funds equally to climate change and biodiversity conservation. A new budget line for the GEF's strategic approach to enhance capacity building should allocate more resources for biodiversity than for climate change (for example, changing the 50/50 split to 60% for biodiversity and 40% for climate change).

Capacity-building assessment in biodiversity

An assessment of capacity-building priorities, achievements and gaps—comparable to the one undertaken by the FCCC—should be initiated by the CBD. It would be helpful to sort through the many CBD activities with capacity-building components, such as those related to the taxonomy initiative, indicator development, monitoring and implementation of convention objectives.

The CBD conference process is increasingly difficult to follow. Programme activities have mushroomed, as have expert meetings, both creating increased needs for individual and institutional capacity at the national level. Capacity building is part of many of these activities, but there seems to be no systematic effort to develop a coordinated approach to creating capacity at the individual, institutional or systemic level.

Cross-cutting and focal area capacity building

What exactly should cross-cutting capacity building for global environmental protection entail, how much synergy can it generate, and how does it tie into capacity building for general development undertaken by the World Bank and UNDP? More work is needed to develop a strategic framework for a free-standing capacity-building initiative funded through the GEF, one that recognizes the different needs and opportunities for cross-cutting initiatives at the individual, institutional and systemic levels.

Both the conventions and the GEF have recently begun to explore the synergetic effects of interlinkages between climate change, desertification and biodiversity conservation (GEF/STAP 2004b). Given the very different subjects and political environments that affect biodiversity, energy and climate, cross-cutting targeted interventions need to be carefully designed and coordinated with focal area capacity building at the institutional and individual levels.

The socio-economic and political variables affecting energy efficiency projects and community-based conservation projects are very different. Opportunities for energy efficiency are likely to be greatest in urban environments, while community-based conservation is a rural land management issue. Although there is often overlap, it is not clear how much synergy can be generated at the highest political level, except by putting both types of projects into the larger framework of sustainable development.

Projects that aim to strengthen government institutions and legislative processes should be focused more broadly than just on environmental issues. They should aim to integrate the global environmental component and secure tie-in with sectoral capacity-building projects.

Participation in negotiation processes

A conceptual and operational framework should be developed for a more comprehensive system of conference participation support for developing countries. The GEF's Strategic Approach to Enhance Capacity Building could provide the budgetary framework for financing an improved level of participation of developing countries through the voluntary trust funds. About $10 million annually—a quadrupling of existing resources—could significantly enhance involvement of devel-

oping countries in international environmental governance, particularly in the biodiversity convention process.

Most efforts now target in-country capacity building designed to create the interest and knowledge base for integrating international environmental objectives in national development priorities. Top-down incentives should complement such efforts. The participation of developing countries needs significant strengthening, not just because all countries should be adequately represented in international meetings, but also because participation has a significant capacity-building impact. It is likely to strengthen ownership in the process and interest at the national level. This is why even small developed countries are represented in the COP with 20 or more people, many times more than most developing countries—even the biggest ones—send.

Both the biodiversity and the climate change conventions have small trust funds to facilitate participation of developing countries in the convention process. But funds are voluntary, and funding levels have declined. Using GEF funds to supplement the trust funds would create a more stable and reliable budgetary environment less dependent on voluntary contributions. An alternative would be to establish the trust funds on a mandatory basis. Given the failure to do so and the declining willingness of the small number of countries now contributing voluntarily to continue, the GEF is more likely to get around the problem by raising funds through its established procedures.

The GEF should also consider building more conference and workshop participation opportunities into its overall work programme. This would help link global, national and even local capacity-building initiatives and reinforce ownership. The more individuals and institutions from a country who can participate in COPs and expert workshops, the more national follow-up will be encouraged.

Education and awareness raising

Educational programmes at all levels should be targeted more consistently as part of an overall capacity-building strategy. They should be complemented by efforts to advance professional careers in areas relevant to global environmental protection objectives. The GEF and bilateral donors should be less hesitant to fund comprehensive educational and training programmes related to global environmental management. Such activities clearly need cross-sectoral coordination and

tie-in with on-the-ground project work, private sector job opportunities, and should also be linked to the international process.

Engaging the private sector

Engaging the private sector remains one of the largely unfulfilled objectives of the Rio process. It was also a cornerstone of the type 2 partnership agreements coming out of the Johannesburg conference in 2002, which has involved few private sector actors.

A cross-sectoral capacity-building initiative should bring together stakeholders, including the private sector, to discuss cost-effective legislative and regulatory measures that integrate or even target global environmental objectives. At many levels public-private partnerships can be strengthened for the benefit of global environmental objectives. But such partnerships are most likely to succeed if they are integrated firmly within a broader development context. The World Bank, UNDP and other donors should more systematically integrate global environmental objectives in their strategies and programmes for implementing the Millennium Development Goals.

Capacity building and political will

Capacity building is not an end in itself, and it alone will not lead to better global environmental governance. Many developed countries with significant capacity on all levels and well developed democratic decision-making systems are arguably failing to adequately respond to the crisis in global environmental governance. Capacity-building programmes should therefore explicitly target opinion leaders at all levels of societies. They should more strategically pursue initiatives that help frame global environmental issues in ways more easily absorbed and processed by both the media and the public, particularly the younger generation, and that recognize the prevailing socio-economic and political power structure in a country.

Notes

1. This discussion has been informed by conversations with some individuals closely involved with the subject and the international institu-

tions. Since some of them preferred not to be cited, personal references were omitted entirely.

2. A more general discussion of capacity-development needs of developing countries is provided in Baser (2006).

3. For more information, see www.capacity.undp.org.

4. See also ECDPM, footnote 3.

5. This can be downloaded at www.gefweb.org/Documents/Enabling_Activity_Projects/CDI/cdi.html.

6. This may be a rather optimistic figure, given recent deliberations on GEF replenishment.

7. For an overview of bilateral capacity-building support, see FCCC (2004b, p. 16ff).

8. See decision FCCC-/CP.10, 17 December 2004.

9. See also the following section on the GEF climate change programme study.

10. UNEP/CBD/COP/7/21, UNEP/CBD/COP/7/17/Add.4 and UNEP/CBD/COP/7/INF/10.

11. The group includes Brazil, China, Colombia, Congo, Ecuador, the Philippines, India, Indonesia, Malaysia, Madagascar, Mexico, Peru, Papua New Guinea, South Africa and Venezuela. See www.megadiverse.org/two.htm.

12. Few countries have developed a coherent global environmental policy that is consistent over a range of issues. Even on such politicized issues as climate change, the positions of developed countries do not necessarily reflect strategic positions resulting from a deliberate national policy dialogue. See Smith (1994); Leggett (2001); Patterson (2000); Harris (2001); and Tolba and Rummel-Bulska (2002).

13. For this section, I draw on my own experience as a representative of Switzerland to international environmental meetings between 1989 and 1994 and on recent conversations with former colleagues.

14. Chasek (2001, p. 171) points out that in some cases non-governmental organizations based in developed countries have gone so far as to formally represent a small developing country in the climate negotiations.

15. While a number of areas need coverage, none are as complex and have triggered so many working groups as the FCCC and CBD.

16. Generally, only those components that turn a project into one that creates global environmental benefits can receive GEF financing.

17. My own recollection from participating in the GEF Participants' Assembly and Restructuring negotiations from 1990 to 1994.

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Annex: Participation in the convention process

Table A.1 **Participation of least developed countries in selected climate change negotiation meetings**

Least developed countries	COP3	COP7	COP9
Afghanistan	0	0	1
Angola	0	5	3
Bangladesh	5	3	8
Benin	3	4	3
Bhutan	4	0	7
Burkina Faso	3	4	4
Burundi	2	2	3
Cambodia	2	1	1
Cape Verde	1	0	0
Central African Republic	0	3	0
Chad	0	2	2
Comoros	4	2	1
Congo, Dem. Rep.	4	4	8

Continues

Table A.1 **Participation of least developed countries in selected climate change negotiation meetings (continued)**

Least developed countries	COP3	COP7	COP9
Djibouti	2	4	1
Equatorial Guinea	0	0	0
Eritrea	3	1	0
Ethiopia	2	3	2
Gambia	2	6	4
Guinea	3	3	2
Guinea-Bissau	2	1	4
Haiti	0	2	1
Kiribati	3	0	4
Lao, PDR	3	2	3
Lesotho	3	3	2
Liberia	0	0	2
Madagascar	0	2	2
Malawi	6	4	10
Maldives	2	5	3
Mali	2	5	4
Mauritania	1	3	2
Mozambique	0	3	3
Myanmar	2	1	1
Nepal	1	3	1
Niger	2	3	2
Rwanda	0	1	2
Samoa	3	6	7
São Tomé and Principe	0	2	2
Senegal	2	15	6
Sierra Leone	0	2	2
Solomon Islands	5	0	1
Somalia			
Sudan	2	4	3
Tanzania	0	0	0
Timor-Leste			
Togo	4	5	1
Tuvalu	7	2	3
Uganda	3	9	5
Vanuatu	2	2	2
Yemen	3	2	5
Zambia	5	4	2
Total	103	138	135
Average size of delegation	2.0	2.7	2.7

Table A.2 **Participation of megadiverse developing countries in selected meetings to the CBD**

	Population (millions)	Area (square kilometres)	COP1 Nassau	COP2	COP3	COP4	COP5	COP7
Bolivia	8	1,099						3
Brazil	166	8,547	nr	nr	nr	nr	nr	19
China	1,239	9,597						25
Columbia	41	1,139						8
Congo, Dem. Rep.	48	2,345						3
Costa Rica	4	51	1	1	3	4	4	2
Ecuador	12	284						5
India	980	3,288	4	4	5	4	3	8
Indonesia	204	1,905	2	4	3	1	0	33
Kenya	29	580						11
Madagascar	15	587	3	4	0	0	0	3
Malaysia	22	330	nr	nr	nr	nr	nr	75
Mexico	96	1,958	3	3	5	5	6	15
Papua New Guinea	5	463						4
Peru	25	1,285						12
Philippines	75	300	4	4	4	4	4	4
South Africa	41	1,221						26
Venezuela	23	912						4

nr is no report.

Table A.3 **Participation of least developed countries in the seventh meeting of the parties to the Biodiversity Convention**

Least developed countries	COP7
Afghanistan	0
Angola	2
Bangladesh	3
Benin	3
Bhutan	2
Burkina Faso	5
Burundi	2
Cambodia	5
Cape Verde	0
Central African Republic	1
Chad	1
Comoros	1
Congo, Dem. Rep.	3

Continues

Table A.3 **Participation of least developed countries in the seventh meeting of the parties to the Biodiversity Convention (continued)**

Least developed countries	COP7
Djibouti	1
Equatorial Guinea	0
Eritrea	0
Ethiopia	4
Gambia	1
Guinea	1
Guinea-Bissau	1
Haiti	1
Kiribati	6
Lao PDR	1
Lesotho	3
Liberia	2
Madagascar	3
Malawi	2
Maldives	1
Mali	2
Mauritania	2
Mozambique	3
Myanmar	1
Nepal	3
Niger	1
Rwanda	1
Samoa	1
São Tomé and Principe	1
Senegal	7
Sierra Leone	0
Solomon Islands	3
Somalia	0
Sudan	2
Tanzania	7
Timor-Leste	0
Togo	2
Tuvalu	1
Uganda	6

Continues

Table A.3 **Participation of least developed countries in the seventh meeting of the parties to the Biodiversity Convention (continued)**

Least developed countries	COP7
Vanuatu	1
Yemen	3
Zambia	3
Global	
Total	105
Average	2.1

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