

Paul Morling

The Economics of Marine Protected Areas in the High Seas

Introduction

WORLDWIDE, AN ESTIMATED 200 MILLION PEOPLE MAKE THEIR LIVING directly or indirectly from fisheries, while many more depend on additional economic uses of oceans and coasts (de Fontaubert et al. 1996). Despite this reliance on the marine environment, our understanding of marine ecosystems and the knowledge of what they contain remains low. At the commencement in 2000 of the ten-year “Census of Marine Life” project to document all known sea life, the program director, Jesse Ausubel, stated that 95% of the oceans remain unexplored biologically and that we know more about the surface of the moon. Until recent times, this lack of understanding, together with the sheer vastness of the oceans, allowed for the common presumption that marine resources were inexhaustible. This presumption has been confounded by the collapse of many fisheries and growing evidence of the declining state of the world’s oceans. These factors, together with a growing awareness of the fundamental importance of conserving marine biodiversity and maintaining ecosystem services, have now created a critical need for more effective management of the marine environment. Marine protected areas (MPAs) are one means of returning marine ecosystems to healthier states and conserving valuable marine habitats.

This paper looks at the economic rationale for MPAs, with a particular focus on MPAs in the high seas—the area of the ocean lying beyond national jurisdictions. After a review of marine protection principles, the economic value of marine habitats, and critical issues facing the marine realm, the recent upsurge of interest in high-seas MPAs, as evidenced by international conventions and other efforts, is discussed.

MPAs Defined

IUCN–The World Conservation Union defines an MPA as “any area of the

intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment” (Kelleher 1999). Marine space can be designated in different ways depending on the management goals for a particular area so that the degree of protection may vary: from reserves prohibiting all extractive activities, such as fishing and mining, to areas that allow various forms of sustainable exploitation. In addition to achieving conservation goals, it is

increasingly being acknowledged that protected areas and reserves can also play a major role in fisheries management. Fishing overcapacity and the global scale of operations continue to have adverse effects on fish stocks, and it is becoming more widely recognized that long-term fisheries management needs to take into account wider environmental considerations (FAO 2002). From a conservation perspective, the pollution and damage associated with human activity further impinge on the functioning of marine environments.

The growing realization of the need to improve our stewardship of marine habitats has also heightened awareness of the inadequacies of their current level of protection. The current total area of MPAs is not known precisely, but is estimated to be below 1% of the total area of the seas, with as little as 0.01% protected from all fishing (Roberts and Hawkins 2000). The need to address the severe under-representation of MPAs in the development of a global network of protected areas is now widely recognized.

As noted above, an assumption underlying the growing support for MPAs is that they not only can increase human well-being through achieving conservation goals, but can also provide direct economic benefits through improved fisheries management. In international meetings, considerable attention has been paid to the serious social, political, and economic losses that can emerge with the collapse of a fishery. In 2001, the American Association for the Advancement of Science released a scientific statement, signed by 150 marine scientists, declaring that there is compelling scientific evidence that marine reserves conserve both biodiversity and fisheries, and could help replenish the seas. After some

time lag from the initial establishment of an MPA, the results of protection include increases in biomass and the average size of exploited fish species, as well as increased species diversity within the reserve, with transfer of benefits to fishing areas through adult spillover and larval export. Habitat protection through marine reserves is also, therefore, an important potential management tool for the long-term viability of the world's fisheries.

The Economic Value of Marine Habitats

A consequence of the traditional view of the sea as containing an unlimited supply of renewable resources has been to undervalue them. Traditional economics has also tended to undervalue marine environments by focusing narrowly on the marketable resources they support. By taking into consideration all the benefits afforded by marine environments—ecological, social, and economic—a more comprehensive assessment of their true worth to humanity can be made. Figure 1 outlines a taxonomy of the total economic value of marine environments.

Direct use values. These include both the values derived from the exploitation of marketable goods and the non-extractive use benefits we derive from the sea. Examples range from fishing and oil drilling to benefits such as energy, transport, ecotourism, and nature appreciation.

Indirect use values. Marine environments are complex and dynamic ecosystems that function as an integral part of the global biosphere. In economic jargon, they are multifunctional resources that supply tradable outputs and perform a large number of ecological functions, which not only support economic activity but also the plan-

**Total economic value (TEV)
of marine environments**

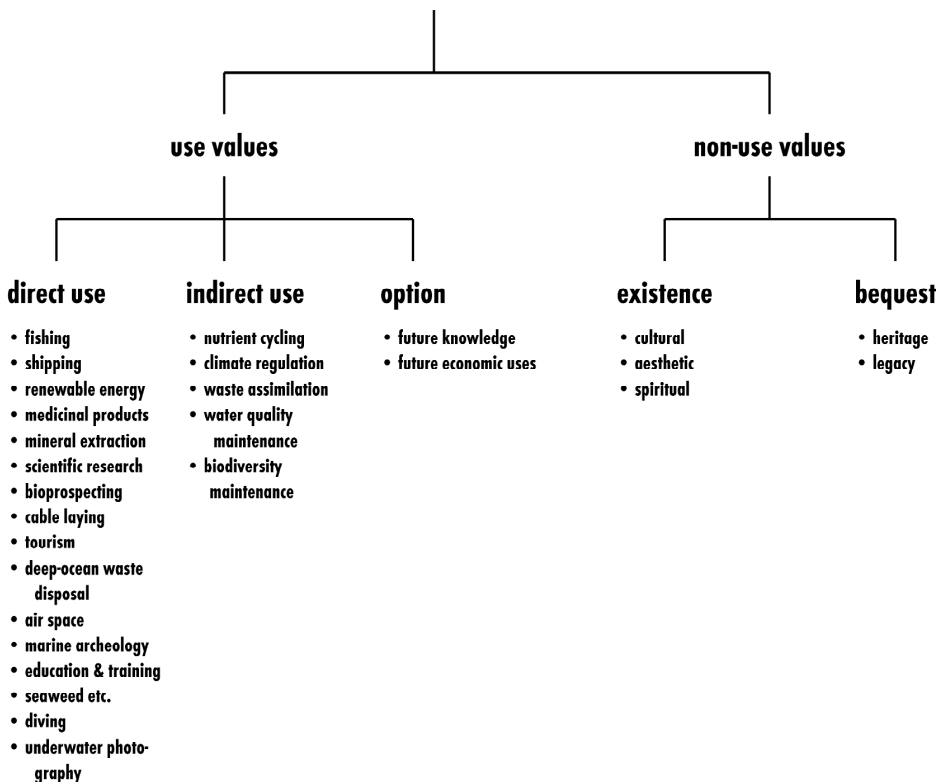


Figure 1. Total economic value of marine environments.

et’s life-sustaining biological systems. In economic terms, ecosystem services can be thought of as transformations of natural assets (soil, water, air, and living organisms) into products that are important to humans’ well-being. The economic benefits associated with direct uses of the sea, such as fisheries, are well understood; our dependency on indirect services, such as nutrient cycling and waste treatment, is not. As a result, the value of maintaining biodiversity and biological resilience is often unrecognized or discounted.

A major reason why marine biodiversity and many ecosystem services play no part

in the cost-benefit calculus driving economic activity is because they are often “public goods.” A public good has two defining characteristics. First, one person’s use of it does not preclude anyone else’s (i.e., it is “non-rival”); second, it is impractical to exclude other people from using it (it is “non-excludable”). These two characteristics mean goods and services, such as climatic regulation, are not amenable to allocation by market methods and, in the absence of regulation, such goods will inevitably be undervalued and overexploited.

However, ecological services generate

benefits to human society well beyond the economic activities they support. Globally, they are far more important than the narrow financial benefits generated by the sale of marketable marine goods and services. In 1997, Costanza and colleagues estimated the indirect use values of marine ecosystems at US\$8.4 trillion per annum for open ocean ecosystems and \$12.5 trillion for coastal ecosystems. Although these estimates are somewhat crude in nature, they give a clear indication of the critical importance of marine habitats.

Option values. Little is known of what the oceans might provide in the future in the way of new products. There is therefore an option value in conserving marine habitats for purely economic reasons, given the high prospect of developing new resources or new opportunities to create wealth. Economic activity often impinges on biodiversity, resulting in permanent changes to habitats and natural resource availability. When considering changes to habitats for which little is currently known, adopting the precautionary principle means recognizing these option values and the potential scale of permanent loss that may be associated with short-term economic gain.

Technological advances in food production and pharmaceuticals rely heavily on the natural genetic diversity of marine plants and animals because marine organisms have evolved complex chemical compounds and processes for defense and predation, or for survival in such extreme environments as deep-sea hydrothermal vents. These compounds and their underlying genetic diversity have huge potential economic importance that would be foreclosed by the loss of marine biodiversity. The scale of the loss can be gauged from a recent U.N. estimate that the combined market for

products derived from genetic resources in the cosmetics and drug industries is currently worth approximately US\$100 billion (Zakri and Johnston 2004).

Bequest values. Bequest values refer to the conservation of natural resources for future generations to enjoy. These values can arise because of the uncertainty surrounding the supply of resources or the long-term consequences of altering the natural environment. Bequest values therefore incorporate the precautionary principle, recognizing the prudential benefits of risk-averting behavior in the face of uncertainties and environmental irreversibilities.

Existence values. These relate to individuals' desire to see environmental resources conserved, even though they never intend to use them (either directly or indirectly). Markets cannot capture the spiritual, cultural, or aesthetic regard in which people globally hold the natural world. While it is hard to measure such values directly, they underlie the numerous contributions made by broad and disparate groups of individuals worldwide to conserve or enhance marine habitats and the species that rely upon them.

Critical Marine Issues

Overfishing. World fish consumption has increased from 45 million tons in 1973 to more than 94 million in 2000, at which time the estimated first-sale value of the global catch amounted to US\$81 billion. The U.N. Food and Agricultural Organization's (FAO's) catch database of 116 oceanic species (epipelagic and deep-water species that occur principally in the high seas) reveals that catches of oceanic species almost tripled from 3 million tons in 1976 to 8.5 million in 2000.

Evidence of overfishing is also summa-

alized by the FAO in its state of the world's fisheries report, published in 2002. The report states that about 18% of stocks or species groups are overexploited, with an increasing likelihood that stocks will decline further and catches will decrease unless remedial management action is taken. The FAO also reported that 10% of stocks have already become significantly depleted, while approximately 47% of the main fish stocks or species groups were fully exploited and therefore producing catches that have reached, or were close to, their maximum sustainable limits. By the FAO's reckoning, nearly half of the world's marine stocks offer no reasonable expectations for further expansion. The scale of overfishing is also underlined by research from the fisheries group at the University of British Columbia, who have developed models to estimate the total biomass of commercial fish in large regions. Their results show that across the whole North Atlantic, the biomass fell by more than 80% between 1950 and the late 1990s, while recent research has found a similar drop in fish stocks off West Africa.

Faced with increasing evidence of overfishing, efforts to manage fisheries have accelerated. However, fisheries managers and multilateral fisheries conventions have largely ignored ecosystem concerns and have tended to concentrate instead on regulating those species being targeted by specific fisheries.

Discards; birds and mammal bycatch. This refers to fish and other marine life that are incidentally caught alongside targeted species. Bycatch is typically discarded dead at sea, and includes seabirds, marine mammals, turtles, juveniles of the targeted species, and even fish sought after in other fisheries. Based on a review of

over 800 papers, Alverson et al. (1996) estimated that between 17.9 and 39.5 million tons (average 27.0 million) of fish are discarded each year in commercial fisheries—roughly a quarter of the total catch. The authors note there are inadequate data to determine the real biological or ecological impacts of discards, but economically they represent losses of millions if not billions of dollars. Economic losses associated with discards include the monetary value of: (1) marketable species that are too small or otherwise prohibited from landings; (2) species for which no current market exists, but which are caught along with commercial or recreational species; (3) species-specific fleet sectors discarding another fishery's target species; (4) marine mammals, turtles, and birds for which human society expresses high existence values; and (5) the opportunity cost of the effort expended in catching and disposing of bycatch.

For seabirds, longlining is a global problem because longline fishing vessels set more than one billion hooks each year, resulting in the death of more than 300,000 seabirds annually. According to BirdLife International, birds affected include both highly charismatic and vulnerable species, with 22 species of albatross and petrel threatened with extinction. This includes 17 of the 21 albatross species. For other marine mammals, the Cetacean Bycatch Resource Center states that accidental capture and entanglement in fishing gear is the biggest threat to whales, dolphins, and porpoises worldwide, killing more than 300,000 animals per year.

Perverse subsidies and overcapacity. Fisheries management effectiveness is further undermined by subsidies that are provided to maintain fisheries-sector income. A World Bank paper estimated that world-

wide fishery subsidies total between US\$14.5 and \$20.5 billion annually, conceding that even these figures “probably err on the low side, perhaps by a considerable margin” (World Bank 1998). This is equivalent to about 25% of the annual value of the world’s commercial marine fish catch, exacerbating the problems of overfishing and overcapacity. The European Union (EU) alone spends around two-thirds of its fisheries budget subsidizing commercial fleets. Subsidies include payments for national access to fish in foreign waters, direct grants for fishers and their vessels, tax breaks for fuelling fishing boats, funds for the construction and maintenance of port facilities, and support for ship building and fish processing. Once a fishery is overfished, subsidized vessels inevitably turn to previously unexploited or uneconomic fisheries or go further offshore. Ineffectual trade policies aggravate these problems.

The seabed. Fishing alters marine ecosystems directly, by removing a large fraction of the biomass, and indirectly, by altering the food supply of the remaining marine predators. It also incurs further environmental costs in terms of the physical damage done to the seabed. Recent scientific explorations of seamounts and cold-water coral reefs have revealed their unique and complex biodiversity, with as many as 50% of the species observed during recent seamount cruises being new to science (Rogers 2004). Seamounts are volcanic peaks that rise to more than 1,000 m above the surrounding ocean floor. They are characterized by high levels of biodiversity and endemic fauna and serve as feeding grounds and sites of reproduction for many open-ocean and deep-sea species of fish, sharks, mammals, and seabirds. They are highly productive environments attracting many

pelagic fish species and shoals of fish, shrimp, and squid that feed above them.

The major threats facing seamounts and the wider benthic landscape is the practice of bottom trawling. Seabed trawling is a destructive technique in which the nets can destroy bottom habitats, like thousand-year-old cold-water coral reefs, in a single trawl. There is a clear need to account for this externality, yet bottom trawling on the high seas is almost completely unregulated.

Other threats to marine ecosystems.

Illegal, unreported, and unregulated (IUU) fishing remains a serious problem undermining the sustainability of fisheries. The FAO estimates that in some important fisheries IUU fishing accounts for up to 30% of total catches. It occurs in both small-scale and industrial fisheries, in marine and inland water fisheries, as well as in zones of national jurisdiction and on the high seas (Doulman 2001).

The negative impacts of overfishing are often exacerbated by the use of fishing gear that fails to minimize environmental externalities for which the fishers are not held financially accountable. Various gear types and fishing methods are attracting attention for their detrimental impacts on the abundance of target species, bycatch, features of the physical marine environment, and general habitat complexity. In some instances, it is apparent that inexpensive modifications to gear and techniques could reduce environmental damage by decreasing the capture of undersized fish and the bycatch of birds and mammals.

Increasing economic activity and fishing capacity have increased the scope and range of human impacts on the marine environment. The U.N. estimates that 90% of the ever-increasing volume of world trade is transported by ships. The doubling of

large-scale fishing vessels since 1970 has generated rapid growth in the number of fleets plying non-local waters, and technological advances in oil drilling as well as fishing are continually increasing the pressure on deep-sea habitats and species.

Fishing may be the principal anthropogenic factor affecting the structure and functioning of marine ecosystems, but many other activities, such as shipping and seabed mining, have adverse environmental impacts not paid for by private operators. In addition to these direct activities, pollution and climate change also affect the quality and resilience of the marine environment (UNEP 2002). Taken together, these impacts have altered the composition of ecological communities, impairing their structure, function, and productivity.

Lack of coordinated management.

The incentive to overfish is created by the common access to the oceans and by the ability of economic agents to avoid paying the true cost of the damage they do. Market failings, such as the absence of property/use rights, and externalities, such as pollution, necessitate some form of market intervention to ensure that marine resources are managed in a way that maximizes their social benefits to society, rather than private financial benefits. Despite some fish stock management strategies and international agreements, current practices have given rise to uncontrolled harvests, especially in international waters, and to the destructive and wasteful capture methods noted earlier, which, in turn, result in the continued over-exploitation of many marine species. To date, domestic and oceanic fisheries provide a classic example of how not to manage communal goods.

The Particular Problem of the High Seas: A Global Commons

The high seas are defined in Article 86 of the U.N. Convention on the Law of the Sea (UNCLOS) as areas of the sea not included in the exclusive economic zone (EEZ), the territorial sea, or in the internal or archipelagic waters of an individual country. Approximately 64% of the oceans lies beyond the 200-nautical-mile limit of the EEZs of coastal states. These areas, the high seas, include open oceans and deep-sea environments that are amongst the least explored and researched areas on Earth. While many of the foregoing critical issues are common to both waters within national jurisdictions and high seas, the global commons nature of high seas poses special problems for safeguarding their biodiversity. The problems posed by common access are well understood (the classic exposition being Hardin 1968). In terms of fish stocks, the absence of property/use rights or enforceable agreements means that it is in the interest of fishers to maximize their catch regardless of the overall status of the stock.

There is increasing urgency about the need to redress the declining state of the world's oceans. Market failures are compounded by our growing capacity for exploiting natural resources. Speaking of IUU fishing of Patagonian toothfish in the Southern Ocean in 1998, Australia's environment minister, Robert Hill, noted:

If the plunder continues, the world will lose a valuable natural and economic resource as stocks in fishing ground after fishing ground crash to commercial extinction. Illegal fishers are also killing huge numbers of seabirds, including thousands of endangered albatrosses. Stocks and eco-

systems are unlikely to recover for decades, if at all (Hill 1998).

Action to Date: UNCLOS as a Foundation for Regulation

While the recognition of the need to conserve marine biodiversity is relatively new, the need to address the public goods and common-access issues in relation to fisheries is not. Since the 1940s, improved understanding of the behavior of highly migratory fish species prompted the creation of a series of intergovernmental scientific fishing organizations, devoted to recommending quotas for maximum and optimum sustainable yield of certain fisheries. Two conferences on the law of the sea held in the 1950s produced a set of international conventions, but the real breakthrough came with the passage of UNCLOS in 1982, which, after a decade of negotiations, provided the world with a “Constitution of the Sea.” UNCLOS, one of the major achievements of international treaty-making, covers most uses of ocean space in a framework that integrates issues such as economic development, environmental protection, natural resource management, peace and security, and research and technology.

One of the most important achievements of UNCLOS is its declaration, in part XI, that the resources of the deep seabed are the “common heritage of mankind” (Article 136). The “Area”—the part of the sea covered by this concept—is defined in Article 1.1 as the “seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction.” The possibility of extracting minerals from manganese nodules at the bottom of the deep ocean, nodules which contain important mineral resources (e.g., nickel, copper, and cobalt), motivated the

creation of part XI. Highly advanced technology is required to extract the minerals found in the deep ocean. This means that developing countries might be unable to benefit from economically important shared resources. Part XI therefore created a detailed regime for deep-seabed mining, which provides for the sharing of benefits and transfer of technology, and the establishment of an International Seabed Authority. Part XI was modified in 1994 to address concerns of industrialized countries, but the concept of sharing the benefits of common resources and assisting developing countries still underpins part XI and UNCLOS.

Exploitation of the genetic resources found on the deep seabed for biotechnology purposes has raised additional legal issues, currently under consideration by both UNCLOS and the Convention on Biological Diversity (CBD). When UNCLOS was negotiated, little was known about life on the deep seabed, and specific provision was not made under part XI. Since then, discoveries related to the rich biological diversity of the deep oceans, such as ecosystems around hydrothermal vents, have highlighted their potential for biotechnology. There is widespread agreement that a legal lacuna currently exists in this regard.

Recent Initiatives on High-seas MPAs

In recent years the issue of MPAs outside national jurisdiction has received considerable attention. This has included recognition in the plan of implementation adopted by the 2002 World Summit on Sustainable Development; a call for urgent action to protect seamounts, cold-water corals, and other vulnerable high-seas features and ecosystems by the 2004 World Parks Congress; consideration by the CBD;

but, most importantly, consideration within the framework of UNCLOS.

The U.N. Open-ended Informal Consultative Process on Oceans and the Law of the Sea considered the issue of the “protection of vulnerable marine ecosystems” at its fourth meeting in June 2003. Later in 2003, the U.N. General Assembly’s annual resolution on oceans and the law of the sea reinforced the momentum. The assembly recommended that the fifth meeting of the Open-ended Informal Consultative Process, which took place 7–11 June 2004, organize its discussions around “new and sustainable uses of the oceans,” including the conservation and management of the biological diversity of the seabed in areas beyond national jurisdiction.

In February 2004, the Seventh Conference of the Parties to the Convention on Biological Diversity (COP7) noted that “there are increasing risks to biodiversity in marine areas beyond national jurisdiction” and that “marine and coastal protected areas are extremely deficient in purpose, numbers and coverage in these areas” (paragraph 29, decisions VII/5). The COP7 agreed that “there is an urgent need for international cooperation and action to improve conservation and sustainable use of biodiversity in marine areas beyond the limits of national jurisdiction, including the establishment of further marine protected areas consistent with international law, and based on scientific information, including areas such as seamounts, hydrothermal vents, cold-water corals and other vulnerable ecosystems” (paragraph 30). The COP7 recognized that the law of the sea provides a legal framework for regulating activities in marine areas beyond national jurisdiction.

The COP7 expressed its concern about serious threats to biological diversity,

stressing the need for rapid action on the basis of the precautionary principle and the ecosystem approach in marine areas beyond the limits of national jurisdiction. It called on the U.N. General Assembly and other international and regional organizations to take measures to eliminate or avoid destructive practices, consistent with international law. For example, consideration should be given, on a case-by-case basis, to the interim prohibition of destructive practices adversely affecting marine biological diversity associated with the areas identified above (paragraph 61).

The COP7 also addressed the issue of deep-seabed genetic resources in areas beyond national jurisdiction. In reference to article 3 of the CBD, the COP7 invited parties to the convention and other states to identify activities and processes under their jurisdiction that may have significant adverse impacts on deep-seabed ecosystems and species beyond national limits.

These positive developments have been given impetus by IUCN, its World Commission on Protected Areas (WCPA), and the Worldwide Fund for Nature (WWF), all of whom have identified the high seas as a gap in a global system of protected areas. In 2005, a strong focus on oceans-related issues at an international meeting of small-island developing countries in Mauritius is likely to add further impetus to the intensifying international debates on high-seas areas.

Threatened marine ecosystems, including those in the high seas, will be a major issue in forthcoming years, as will MPAs—one of the key remedial options for addressing the threat. In the short term, it is extremely important that governments move forward urgently to implement the U.N. Fish Stocks Agreement, through

regional fisheries management organizations (RFMOs), which are the main mechanisms for putting the agreement into practice. The agreement came into force in 2001. However, the agreement has only 51 parties and action by RFMOs seems to have been slow to date.

The Costs of Financing High-seas MPAs

The financing needs of protected areas, including MPAs, are emerging as a priority in international debates. For example, the 2004 World Parks Congress estimated that US\$25 billion in additional annual support is required just to maintain effectively the current global system of protected areas (covering approximately 12% of Earth's terrestrial surface and less than 1% of marine space). This stands in stark contrast to the actual worldwide expenditure on protected areas, estimated at US\$6.5 billion a year (James et al. 1999). The recent adoption of a new program of work on protected areas by the CBD necessitates a step change in the scale and range of financing arrangements if it is to be successfully implemented.

It is critically important that the full financial costs of individual MPAs are fully understood. These costs will include establishment, administration, employment, monitoring, and enforcement. On the basis of survey data on the financial requirements of 83 MPAs worldwide, Balmford and colleagues (2003) suggest that a global MPA network covering 30% of all the world's seas (both territorial waters and high seas) might cost between US\$5 billion and \$19 billion annually to run. The survey, however, highlights the fact that costs decrease as the distance from land and the size of the MPA increases, indicating that a viable, sus-

tainable system of high-seas MPAs could be financed for substantially less. The return on such an investment would be substantial, including the continued delivery of marine ecosystem services, improvements to fisheries, and the preservation of option values.

Financing Mechanisms and Sources

This concluding part of the paper introduces some of the options that may be relevant to future discussions about financing high-seas MPAs. An appropriate financing framework will depend to some extent on the legal basis and the precise nature of MPAs. However, the principles of UNCLOS reinforce the need for a shared approach, as does the principle of common but differentiated responsibilities. The failure of developed countries to fulfill inter-governmental commitments related to financing, such as those made in the CBD, is a major concern, and the need to explore a range of financing options is becoming widely recognized.

Multilateral agencies. The Global Environment Facility (GEF) covers a limited number of marine projects under its focal area on international waters, including some global projects. The GEF focuses on global benefits, which could make it well-placed to take on financing high-seas MPAs. Currently, however, the funding available through the GEF is woefully inadequate to address the needs for protected areas in developing countries, so an expansion of its activities might not be desirable. The perception of the GEF as being focused on priorities identified by developed countries may also make it a less desirable option. Other international bodies that might play a role include the World Bank and possibly regional development banks.

National governments. Many individual countries have contributed to the degradation of the marine environment, though no individual country can address the problems by acting alone. Effectively tackling global environmental problems requires a multilateral framework, which will ultimately depend on the support of individual countries. Many developed nations express, as part of their principles governing overseas assistance, a commitment to environmental sustainability, and they should ensure that their policies and activities, such as sectoral subsidies, support rather than undermine conservation efforts.

Charges for the use of global commons. Over the years, many proposals have been made for global fundraising mechanisms. For example, in 1987, the influential World Commission on Environment and Development emphasized the need to widen efforts beyond traditional sources of funding, including exploring automatic sources of funding. The commission identified revenue from international commons and natural resources, including ocean fishing and transportation, as an area warranting particular attention. The idea of an automatic levy of some kind has similarities to proposals related to taxation.

There is, as this paper has noted, a strong economic case for the introduction of such charges to ensure that economic agents meet the full social costs of their activities. The conventional economic solution is to make the consumer and polluter pay either through regulation, taxation, or other market interventions. Conceivably, a variety of revenue sources can be generated from ocean activity. They could relate to extractive and bioprospecting activity on the ocean bed, fishing, overflights, and shipping. Methods could include user charges

and permits for commercial activities. As noted by the German Advisory Council on Global Change, the introduction of charges for the use of global commons has two beneficial outcomes: the revenue raised, and the incentive provided to reduce environmentally harmful activities. Appropriate legislation, regulation, and governing authorities would need to be established to implement such market interventions.

Supranational tax. Taxation is the conventional national means of paying for public goods, and, in recent years, a "Tobin Tax" has been proposed as a means of increasing financing for a number of global concerns. Named after the Nobel laureate economist James Tobin, a global Tobin Tax would target international currency transactions. Initially proposed to reduce speculative currency transactions, which can have serious impacts on national economies, the tax would also generate considerable revenue given the size of foreign currency dealings. There is no precedent for such a measure, nor is there a clear relationship between foreign exchange transactions and activities on the high seas. On the other hand, the revenue raised through a globally agreed-upon tax of this type could be directed towards a variety of global objectives. Other national and supranational taxes have been mooted, including a tax on international trade and one on international aviation to account for negative externalities that affect areas beyond national jurisdictions, such as environmental pollution.

Mobilizing private and voluntary support. The existence value placed on marine environments is apparent by the significant worldwide efforts made to conserve it. If MPAs provide the conservation results currently pursued by voluntary groups and individuals, then it is conceivable that a por-

tion of resources needed to maintain a system of high-seas MPAs could come from a portfolio of well-designed and effective investment vehicles, private endowments, trusts, and donations from stakeholders worldwide. The GEF states it will consider as an operational objective “the Demonstration and Implementation of Innovative Financial Mechanisms.” This could involve

promoting the development and capitalization of conservation trust funds and facilitating systems of payments for environmental services. Innovative public-sector initiatives and programs, by providing the financial mechanisms and marketing the basic biodiversity characteristics of high seas, could increase the number of people willing to invest in its preservation.

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Paul Morling, Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire SG19 2DL, United Kingdom; paul.morling@rspb.org.uk