

Biodiversity in the Seas: Conservation and Sustainable Use Through International Cooperation

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Editor's note: Marine and coastal biodiversity forms the foundation of natural ecosystems that produce and maintain important fisheries and other biological resources. Unfortunately, marine and coastal biodiversity everywhere is increasingly threatened by land-based sources of pollution, the over-exploitation of living resources, destructive harvesting techniques, coastal development, introduction of alien species, and global climate change.

Improved and strengthened laws and policies))effectively implemented and enforced))are needed to address these threats and make the transition to conservation and sustainable use of these resources. International and regional cooperation, including development and enforcement of international law, are particularly important. Oceanic currents do not honor legal boundaries. Rather, oceans, seas, and coastal zones are ecologically linked across wide distances. They are profoundly affected by freshwater flows and the transport of pollutants by air. The activities of one nation may harm the coastal waters of other nations, and may eventually affect waters thousands of kilometers distant. Large areas of the ocean environment, such as the high seas and the deep sea-bed, are " global commons" that stand outside national jurisdiction.

As the major global legal instrument on biodiversity, the Convention on Biological Diversity can and should be a major force to stimulate and support much-needed law and policy reforms to protect marine and coastal biodiversity. In 1995, the Parties to the Convention agreed on the Jakarta Mandate, a program for applying the Convention in marine and coastal areas. One essential means for advancing the Convention's goals will be to strengthen and implement existing international agreements relating to marine living resources, such as the U.N. Convention on the Law of the Sea and the U.N. Agreement on Straddling and Highly Migratory Fish Stocks.

This Brief is based largely on a report recently published by CIEL, the World Conservation Union (IUCN) and the World Wildlife Fund-US (WWF). The report, Biodiversity in the Seas: Implementing the Convention on Biological Diversity in Coastal and Marine Habitats, provides specific recommendations for policy and law, building on the principles embodied in the Jakarta Mandate. It also provides examples from around the world of cases in which communities and countries have successfully protected marine and coastal biodiversity.

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Diversity of Life in Marine and Coastal Environments

Marine and coastal biodiversity encompasses the enormous number of marine and coastal species and their genetic variety. It includes the global oceans' cornucopia of living resources, myriad coastal and open sea habitats and ecosystems, and the ecological processes that support all of these.¹ The oceans cover more than 70% of the planet's surface area. Coastal ecosystems, such as estuaries, wetlands, and mangrove forests, also contain significant diversity and are important to the economies of coastal communities.

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Much of the world's storehouse of biodiversity is found in highly diverse marine and coastal habitats. Coral reefs, among the planet's largest and oldest structures created by living organisms, are home to some of the densest concentrations of species known, as well as unusually complex webs of interspecies interactions. Even the soft sediments of the deep sea bottom)thousands of meters below the surface, dark, and subjected to tremendous pressure))are now thought to be a dwelling place for thousands, perhaps millions, of species of crustaceans, molluscs, worms, and other small invertebrates. Around deep sea hot springs, communities of organisms have adapted not only to darkness and high pressure but also to temperatures approaching the boiling point. Recently, scientists exploring the dim middle depths discovered numerous new species that are part of almost unknown, yet apparently productive, ecosystems.

While the number of identified marine species is smaller than terrestrial species counts, marine animals are more diverse than land animals at the higher, phyletic levels of evolutionary and taxonomic differentiation. All but one of the phyla (or major branches on the tree of life) of animals are found in the sea. In comparison, only about half of all phyla occur on land. Marine animals exhibit a correspondingly greater range of body forms and structures than do terrestrial species. Ocean creatures (along with freshwater aquatic organisms) also exhibit survival strategies not found among terrestrial organisms.

Why Marine and Coastal Biodiversity Is Important

As the Biodiversity Convention recognizes, biodiversity is important for the maintenance of life-sustaining systems of the biosphere, as well as for food, health products, and other needs of the planet's growing human population. Marine and coastal ecosystems, and the diversity of species that compose their stru-

capture, provide a wide range of such resources and services. Food from the sea, in particular fish, crustaceans, and molluscs, is a major source of human nutrition. Fish account for about 16% of the average individual's intake of animal protein worldwide and the proportion is higher in many developing countries. Marine species provide many other products as well, including edible seaweed, ingredients for food and cosmetics, and industrial chemicals and dyes. Worldwide, an estimated 200 million people make a living directly or indirectly from fisheries, and many others depend on additional economic uses of oceans and coasts.

Marine and coastal ecosystems also perform critical services for humanity. These ecological functions include storing and cycling nutrients, regulating water balances, buffering land and protecting it against erosion from storms and waves, and filtering pollutants. On a larger scale, the oceans are essential in regulating planetary balances in hydrology and climate through biological processes such as the ocean's photosynthetic pump, which removes the primary greenhouse gas, carbon dioxide, from the atmosphere and produces one-third to one-half of the global oxygen supply.

The ecosystems fringing the land))coral reefs, estuaries, lagoons, and shallow coastal waters))are particularly valuable for human populations. They are among the most biologically productive systems on the earth, acting as nurseries and feeding grounds for many fish. They also buffer coasts against storms and filter pollutants from water.

Harvested species do not live in isolation, but are part of and dependent on vast ecological communities and systems. The exploitation of target species affects ecological communities, which may provide other benefits to human communities. Conversely, harmful impacts on ecosystems will affect target species. Thus, exploitation of living marine resources, even of single stocks, is of concern to biodiversity. Conserving biodiversity is therefore an important part of managing valuable living resources.

Threats to Marine and Coastal Biodiversity

Human activities around the world are depleting marine and coastal living resources and degrading marine and coastal ecosystems in ways that are harmful and sometimes irreversible. In the oceans, as on land, the scope of this depletion and degradation has no precedent in human history. Loss of biodiversity and the attendant decimation of stocks of living resources, widespread appearance of ecosystem imbalances, and impairment of ecological processes may well undermine the adaptive potential of species and ecosystems and their ability to meet future human needs.

The major direct threats to marine and coastal biodiversity can be divided into five related categories: pollution (primarily land based, but also from other sources); over-exploitation of marine living resources; introduction of alien species;

development and its side effects; and global change, in particular climate change, but also including ozone depletion.

The sea's vastness and its enduring mysteries make it difficult for humanity to appreciate its vulnerability and the limits of its resources and resilience. Oceans are relatively inaccessible to human investigation. The marine environment is far less well understood than is its terrestrial counterpart. Many societies still operate on the assumption that the oceans offer a wealth of limitless resources and possess an infinite capacity for resilience in the face of environmental pressure and change. The mounting evidence that human activities are inflicting serious damage demonstrates the fallacy of this assumption. All regions on the planet))including polar, temperate, and tropical latitudes in both developing and developed countries))face increasing threats to their rich natural heritage of marine and coastal biodiversity.

The Convention on Biological Diversity

The 1992 Convention on Biological Diversity has the following objectives: conservation of biodiversity, sustainable use of its components, and equitable sharing of benefits derived from genetic resources. As of November 1996, the Convention had 157 Parties (i.e., countries that have agreed to be legally bound by the Convention).

The Convention establishes a framework of general, flexible obligations that Parties must apply at the national level. For example, Parties must create national plans, strategies, or programs for conservation and sustainable use. They must identify and regulate activities that threaten biodiversity. They must take special measures to protect customary resource uses, and local and indigenous communities' traditional knowledge, innovations, and practices.

The Convention creates an international structure to support national implementation and to promote continued international cooperation. This includes a permanent Secretariat; a Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA); a Clearing-House Mechanism to support scientific and technical cooperation; and a multilateral fund to help finance implementation in developing countries, supported by developed countries and currently operated by the Global Environment Facility. Beginning in 1994, the Parties have held periodic Conferences of the Parties to elaborate and build on the Convention, for instance by negotiating protocols (follow-up treaties on specific issues). In 1997, they must begin to submit national reports on implementation to the Conference of Parties.

The Convention also establishes new principles for the international transfer of genetic resources, which are useful in biotechnology and as sources of medicines and other new products. Parties have the sovereign right to control access to their genetic resources. At the same time, those seeking to use genetic resources from other coun-

tries must negotiate access and promote equitable sharing of the benefits, including technologies, with the providers of those resources.

A Call To Action: The Jakarta Mandate

Can marine and coastal ecosystems be maintained so that humans and the rest of the biosphere continue to derive values from them? Generally, the response will require three complementary types of action, analogous to the three objectives of the Biodiversity Convention. The first is conservation))of ecological processes, threatened populations of organisms and species, productivity, and habitats))coupled with management of human activities that have deleterious impacts so that the integrity of ecosystem processes and functions is maintained. The second is sustainable use. This requires the determination of sustainable levels of resource use and management of use to keep within those limits. The third is fair and equitable sharing of the benefits of effective management and conservation so that people who use and depend on resources are rewarded for sustaining the resource base without impairing the ecological processes that maintain it. The Jakarta Mandate, a declaration adopted by the Conference of Parties to the Convention on Biological Diversity at its second meeting in Jakarta in 1995, identifies marine and coastal biodiversity as an area for priority action. The Mandate singles out coastal management, marine protected areas, fisheries, mariculture, and the introduction of alien species for special attention. Implementation of the Jakarta Mandate will require national action and regional and international cooperation.

The Mandate also calls for meetings of experts to elaborate on action items. The first of these meetings is scheduled to take place in Indonesia in 1997.

CIEL recommends three actions in addition to the items included in the Jakarta Mandate. Our recommendations emphasize certain requirements of the Biodiversity Convention and will strengthen implementation of the Mandate. We have also outlined five general principles to enhance the effectiveness of the eight action items.

CIEL recommends the follow categories of action, which correspond in general terms to the recommendations of the Jakarta Mandate.

1. Parties should **institute integrated coastal area management**, incorporating community-based coastal resource management systems. They should emphasize cooperation to implement the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (Articles 5, 6, 8, 10 of the Biodiversity Convention).
2. Parties should **establish and maintain marine protected areas** for conservation and sustainable use (Articles 8(a), (b), (e)).

3. Parties should **use fisheries and other marine living resources in a sustainable manner**. This should include adoption of measures such as improving fisheries management through ecosystem-based approaches, reducing bycatch, eliminating subsidies that encourage over-fishing, and protecting sustainable artisanal fisheries through enforcement of community-based resource management systems and traditional sea tenure (Articles 6(b), 8(c), 8(j), 10(b), 10(c), 11).

4. Parties should **ensure that mariculture operations are sustainable**. Steps should include, for example, environmental impact assessments, protection of traditional property and use rights, and assessment of the impacts of international trade and investment policies (Articles 6(b), 8(c), 8(g), 8(h), 10(b), 10(c), 14(1)(a), (b)).

5. Parties should **prevent introduction of harmful alien species and take measures to control or eradicate such species when they are introduced**. Steps should include precautionary measures to minimize risks of introduction from ballast water and mariculture, and regional cooperation on response plans, contingency plans, and notification procedures (Articles 8(h), 8(l), 8(g), 14, 19(3)).

CIEL also urges action in the following areas to support the recommendations of the Jakarta Mandate.

6. Parties should **identify priority components of biodiversity, monitor their status and threats, and identify measures for conservation and sustainable use** (Articles 7, 8(l), 10(b)).

7. Parties should **build the capacity to use and share equitably the benefits of marine genetic resources and biochemicals** within national jurisdictions (Articles 8(j), 10(b), 15-16, 18-19).

8. Parties should **take responsibility for transboundary harm and global threats to marine biodiversity**. They should prevent harm caused by activities within their jurisdiction to biodiversity in areas beyond national jurisdiction and within other Parties' jurisdictions, due to transboundary marine or air pollution, such as discharges of oil and other pollutants, as well as pollution that affects global climate and the ozone layer (Articles 5, 8(g), 8(h), 14(2), 19(3)).

Ecological, social and economic circumstances vary widely among Parties to the Convention. Nevertheless, scientific and technical assessments and experience suggest that adherence to the following five general principles identified by CIEL can help Parties implement the Convention in each of the above eight action areas.

1. Consult widely and ensure **public participation** in decision-making (see the Biodiversity Convention's Preamble and Articles 8(j), 10(c), 10(e), 11, 14, 16(4)).

2. Combine national action with **regional and global cooperation**, as discussed below (Preamble and Articles 5, 17, 18, 20-21, 23-30).

3. Provide needed **technology and financing**, especially to

developing countries, and promote scientific and technical cooperation (Articles 16, 18, 20). Parties from developed countries have obligations in this respect under Articles 16 and 20 of the Convention.

4. **Integrate implementation** of all eight actions, which are interrelated, while proceeding in realistic steps, such as through pilot projects (Articles 6, 10(a)). All countries need to make major reforms, but many, especially developing countries, have limited resources for reshaping policies and institutions and will need to move forward incrementally in some areas.

5. Adopt a **precautionary approach**. This will involve shifting the burden of proof so that those who propose a new undertaking that could harm the environment, including existing biodiversity, must demonstrate that no harm will result (Preamble).

Mafia Island Marine Park: A Practical Example of a Community-based Marine Protected Area

Mafia Island lies in the Indian Ocean off the coast of Tanzania. Its coral reefs are biologically rich, containing more than 380 species of fish and hundreds of coral and sponge species. Island ecosystems provide food, shelter, and breeding grounds for seabirds, sea turtles, and marine mammals. The island's 5,000 inhabitants depend on these resources, using traditional methods to collect finfish, molluscs, seaweed, and other organisms.

While local exploitation has had some impacts, Mafia Island's reefs remain relatively unspoiled. The islanders, aware of over-fishing along the coast to the north, have become staunch conservation advocates, seeking to protect the living resources on which their economy depends. In 1988, they began a series of workshops with the government and conservation groups, including WWF. What they achieved was the establishment of a large, multiple-use marine park covering much of the island and its waters. Use regulations range from core zones where no resources may be taken, to general-use zones where controls are minimal. Inherently destructive harvesting techniques, such as dynamite fishing, are banned throughout the park.

Residents conduct enforcement patrols and are being trained to collect scientific information needed to evaluate the effectiveness of conservation measures. Islanders also vigorously advocated changes in national law to support their decisions, including passage of general marine parks legislation in 1994 and legislation authorizing the Mafia Island Marine Park, in 1995.

Note: Additional examples illustrating the eight action items and five principles may be found in CIEL's report, Biodiversity in the Seas.

Links Among the Biodiversity Convention and Other Instruments and Institutions

Carrying out the Biodiversity Convention and the Jakarta Mandate will generally require national and local action, but these efforts must have regional and international support². This means sharing information, cooperative research, financial and technical assistance, and development and implementation of supportive laws and policies in areas ranging from trade to pollution control.

While the Biodiversity Convention is important for conservation and sustainable use of marine living resources, it is only one of a number of relevant international instruments. The oceans have long been recognized as a shared resource))or " global commons")) and the marine environment and its living resources have been the subject of international cooperation over many years. Thus, successful implementation of the Jakarta Mandate will involve international cooperation through a mosaic of interrelated instruments.

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) is particularly important for international cooperation in regard to oceans. Article 22.2 of the Biodiversity Convention provides that it shall be implemented consistent with rights and obligations under " the law of the sea." While Article 22.2 does not explicitly refer to UNCLOS, most of that agreement is generally understood to embody the customary law of the sea. UNCLOS is a comprehensive framework containing legal principles for navigation, conservation and use of marine resources, marine environmental protection, and other human uses of the oceans. UNCLOS was opened for signature in 1982 and came into force in 1994. More than 100 nations have ratified or acceded to UNCLOS.

Also significant are the Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks, adopted by the U.N. General Assembly in 1995, and the Code of Conduct for Responsible Fisheries, adopted by the U.N. Food and Agriculture Organization also in 1995, both of which were developed within the framework of UNCLOS.

Relevant legal agreements and non-binding resolutions include the 1995 Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities; Chapter 17 on oceans of Agenda 21, the blueprint for sustainable development adopted at the 1992 Earth Summit; the U.N. General Assembly Resolution on high seas driftnet fishing, the Montreal Protocol on Substances that Deplete the Ozone Layer; the Framework Convention on Climate Change; the Barbados Programme of Action on the Sustainable Development of Small Island Developing States; the Convention on International Trade in Endangered Species; the International Convention for the Prevention of Pollution from Ships (MARPOL); the London Convention on Prevention of Marine Pollution by Dumping of Wastes; the Ramsar Convention on Wetlands; the World Heritage Convention; and the International Convention for the Regulation of Whaling. A number of regional agreements on fisheries and the protection of the marine

environment are also important.

Several international institutions, such as the Food and Agriculture Organization and the International Maritime Organization, will need to review and modify their activities and policies to pursue conservation and sustainable use within their respective mandates. Relevant institutions and agreements include some not traditionally associated with oceans governance. The World Bank, for example, has a major impact through its financing of development in fisheries, mariculture, and agriculture. International trade and investment have large and growing impacts on marine living resources. The expansion of shrimp farming in developing countries, for example, is a major cause of the destruction of mangrove forests. The demand comes primarily from developed countries, and much of the capital comes from foreign investment. Trade policies and institutions, such as the World Trade Organization, should take these links into account.

In this context, the Biodiversity Convention can be a useful coordinating mechanism. The Convention and its associated institutions (described on page 3) can serve as a catalyst and advisor to other, more established institutions. Conservation, sustainable use, and benefit-sharing of marine and coastal biodiversity touch on a vast range of topics))from international trade to development finance. Institutions whose core missions relate to such endeavors and not directly to marine and coastal biodiversity may overlook the importance of their actions to biodiversity. The Convention's institutions can fill a need for greater coordination and communication by pointing out to other institutions the implications of their activities for biodiversity and explaining how they can integrate the Convention's mandates within their existing structures.

Such an approach is essential for carrying out Article 5 of the Convention, which requires Parties to cooperate as far as possible and as appropriate in achieving conservation and sustainable use of biodiversity outside national jurisdiction, including the high seas and the deep sea-bed. The Jakarta Mandate also emphasizes the need for international cooperation. Our analysis in *Biodiversity in the Seas* underscores the importance of continued cooperation through implementation of existing international commitments.

End Notes

¹ The Biodiversity Convention defines biodiversity as " the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."

² National action, in the marine context, encompasses a wide area. A Party's marine jurisdiction is defined according to the law of the sea (see Article 22 of the Convention). Under the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which is understood to embody the law of the sea, coastal States' jurisdictional rights extend to a set of maritime zones, including inland waters, the

territorial sea, the contiguous zone, and the exclusive economic zone (EEZ). For each of these zones, UNCLOS establishes a set of rights and obligations for coastal States. For further discussion, see de Fontaubert, Downes, and Agardy, p. 3.

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Sources

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The discussion of the Biodiversity Convention on page 3 is adapted from: David Downes. 1996. "Global Trade, Local Economies and the Biodiversity Convention." in William J. Snape, ed. *Biodiversity and the Law*. Washington, D.C.: Island Press.

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