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Biodiversity in the Marine Environment: Resource Implications for the Law of the Sea

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ABSTRACT

Professor Joyner begins by explaining what biodiversity is and how it is currently being threatened. He then describes the existing international prescriptions that relate to the preservation of biodiversity, including the Convention on Biodiversity, the Convention on the Law of the Sea, the Convention on the Prevention of Marine Pollution by Dumping and Other Matter, and the International Convention for the Prevention of Pollution from Ships. Professor Joyner examines how these prescriptions protect or fail to protect biodiversity in the marine environment, both independently and in conjunction with related international environmental law. Finally, he assesses how international organizations, regional protection programs, and resource-specific protection measures are operating to prevent human disruptions of the global marine environment.

Professor Joyner concludes that there is a critical need for coordinated international planning and management in order to preserve the survival and vitality of marine ecosystems. In this regard, he maintains that economic development in the coastal zones of states must be more effectively regulated. Tighter pollution controls and greater economic costs must be placed on polluters. Furthermore, states must adopt a precautionary approach to ocean pollution policy. In the final analysis, however, Professor

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Joyner places the blame for inadequate protection of marine biodiversity not on frail international law, but on society's emphasis on short-term gain and the failure of states to uphold their international obligations.

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I. INTRODUCTION

Biological diversity (or biodiversity) encompasses the whole variety of life on earth.[1] It is the total web of life on the planet,

1. Biological diversity has been defined as "the variety and variability among living organisms and the ecological complexes in which they occur." OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, TECHNOLOGIES TO MAINTAIN

inclusive of plant, animal and micro-organisms that inhabit the soil, air, and ocean depths. Marine biodiversity refers to the variety of ocean and coastal plants and animals. This variety exists at various levels of organization, ranging from genetic differences among individuals to whole ecosystems. Not surprisingly, biological variation in the global marine environment is especially vast; oceanic and coastal ecosystems cover seventy-one percent of the earth's surface.[2]

In recent years, biodiversity and the science of conservation biology have become salient concerns of the international community. The critical need to prevent further loss of genetic, species, and ecosystem diversity is now realized. The bulk of attention, however, remains focused on terrestrial species and land-based ecosystems. Relatively short shrift is given to marine species and ocean-based ecosystems. As a result, the huge realm of the marine environment, with its immense biological diversity, is going largely unappreciated.

The diversity of marine life is enormous. It embraces an expansive array of biological communities, from estuaries and coastal wetlands to beaches and tidal flats, as well as reefs and deep water environments. Even so, while ocean space occupies nearly three-quarters of the earth's surface, "more than 90 percent of this area remains unexplored and unmapped."[3]

A popular assumption nonetheless prevails that, save marine mammals (especially whales and seals), ocean species are not generally threatened. Hence, the reasoning goes, environmental efforts to protect the seas should be concerned more with resource management and development than with survival of endangered species or whole ecosystems. Widely acknowledged and rarely challenged, this supposition is premised on a trilogy of interrelated beliefs: first, the oceans cover nearly three-quarters of the earth's surface; second, marine species are dispersed widely; and third, insufficient data is available to determine whether or not most species are endangered. These beliefs, on balance, are

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BIOLOGICAL DIVERSITY 3 (1987). The term is also used to describe "the degree of nature's variety, including both the number and frequency of ecosystems, species, or genes in a given assemblage." JEFFREY A. MCNEELY ET AL., CONSERVING THE WORLD'S BIOLOGICAL DIVERSITY 17 (1990).

2. JAMES W. NYBAKKEN, MARINE BIOLOGY: AN ECOLOGICAL APPROACH 82-83 (1982).

3. *Marine Biodiversity: Hearings on the Review of Current Scientific Knowledge of Biodiversity as it Relates to the Marine Environment Before the Subcomm. on Oceanography, Great Lakes and the Outer Continental Shelf and the Subcomm. on Fisheries and Wildlife Conservation and the Environment of the House Comm. on Merchant Marine and Fisheries*, 102d Cong., 1st Sess. 4 (1991) [hereinafter *Marine Biodiversity Hearings*] (statement of David Cottingham).

facts. The inadequacy of data, however, does not automatically mean that species are not threatened. It also does not mean that select ecosystems thrive in risk-free situations.

II. THE NATURE OF MARINE BIODIVERSITY

When applied to the global marine environment, the term biological diversity can take on different meanings. It may refer to a marine ecosystem's diversity—the range of different interacting ecosystems present in a region, state, or the world. Biological diversity may also refer to the taxonomy of species according to their respective biodiverse rank in that marine ecosystem (i.e., genus, family, order, phylum). Yet another meaning relates to genetic diversity and the range of possible heritable characteristics (i.e., genes) found in a marine population or species.[4]

Marine biological communities may also be divided into two broad categories: pelagic and benthic. Pelagic communities live in the water column and have little association with the bottom. Among the pelagic members are drifters (i.e., plankton) and swimmers (i.e., nekton). The greatest marine biodiversity is found among benthic communities, which are associated with coral reefs and the deep ocean floor. Benthic communities also live in the intertidal coastal shore, on the continental shelf and its slope, on the deep abyssal plain, and in isolated ecosystems, such as coral reefs, seamounts, and deep sea trenches.[5]

Few dispute the importance of sustaining biodiversity in the marine environment. The loss of genetic diversity impairs a population's ability to adapt; the loss of species diversity impairs a community's ability to adapt; the loss of functional ability impairs the entire biosphere's ability to adapt. These realities are no less true for biodiversity in the marine ecosystem than for biodiversity generally. Put tersely, the earth's biological and physical processes are interactive and interdependent. Losses of biological diversity in a marine ecosystem may lead to damaging environmental change elsewhere. Such a loss, which is often preventable and is always lamentable, carries an unknown

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4. WORLD RESOURCES INST. ET AL., GLOBAL DIVERSITY STRATEGY: GUIDELINES FOR ACTION TO SAVE, STUDY, AND USE EARTH'S BIOTIC WEALTH SUSTAINABLY AND EQUITABLY 2 (1992).

5. BOYCE THORNE-MILLER & JOHN G. CATENA, THE LIVING OCEAN: UNDERSTANDING AND PROTECTING MARINE BIODIVERSITY 38-39 (1991) [hereinafter THE LIVING OCEAN].

genetic price, sometimes leading to species extinction of marine organisms.

III. THREATS TO MARINE BIODIVERSITY

Considerations of marine biodiversity are now salient conservation issues. The current rate of change that humans are now inflicting upon the planet's biosphere is historically unparalleled. It appears likely that alterations in one area will produce alterations in other areas. It is true that chemical and geophysical changes have always occurred on earth, which means that life remains in a continual process of flux and transition. But nature allots adequate time for species migration and genetic adaptation to survive newly evolving conditions and environments. Transformations that come too rapidly can lead to biological crashes. Life in the oceans at the close of the twentieth century has become increasingly vulnerable to human-made environmental consequences of the postindustrial society.

The marine realm is constantly changing. Species naturally prosper and pass on; ecosystems naturally expand and contract. Critical here are effects brought about by the interference of human activities. In recent decades, direct stresses on marine biological diversity can be traced to certain human activities that threaten marine populations, species, and ecosystems. Four such causal activities appear paramount.

A. *Destruction of Natural Marine Habitats*

The physical alteration of marine habitats takes many forms, including destruction of coastal wetlands for housing and recreational areas, siltation from agriculture, and seabed disturbance from trawlers. Most destruction of marine habitats has taken place in coastal areas. Humans have constructed on, plowed through, dredged out, and buried entire marine communities. Port and harbor development, industrial facilities, recreational areas, and urban sprawl have caused irreversible loss of coastal habitats. These patterns of habitat devastation can be seen in the destruction of coastal wetlands in the United States,[6] mangrove forests in tropical countries,[7] and coral reefs in

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6. RALPH W. TINER, JR., WETLANDS OF THE UNITED STATES: CURRENT STATUS AND RECENT TRENDS (1984).

7. *See* Miguel D. Fortes, *Mangrove and Seagrass Beds of East Asia: Habitats Under Stress*, 17 AMBIO 207-13 (1988).

Malaysia, Thailand, Indonesia, and the Philippines.[8] Significantly, the habitats in the far reaches of the oceans remain relatively undisturbed. Even these habitats, however, might suffer serious damage from widespread deep sea mining for ferromanganese minerals or waste burial in continental shelves or in the deep seabed.[9]

B. *Water Pollution*

Marine biological diversity is seriously threatened in the oceans even where habitat destruction does not play a major role. Since species in the deep ocean remain relatively unknown, it is difficult to assess how many and which species are most seriously threatened with extinction. Still, anthropogenic threats to marine biological diversity do exist in deep-water ecosystems. These threats are caused by the encroachment of man-made chemical pollution.[10]

It is the fundamental nature of the oceans that makes water pollution such a threat to the marine ecosystem. Chemical effluents of industrialized societies are soluble and reactive in water. Organisms that live and feed in water environments are susceptible to the impacts of these chemicals. In the marine environment, the chemistry of pollution mixes directly and reacts readily with the chemistry of life.

Land-based pollution stems from dissolved nutrients, dissolved toxins, and suspended particulate matter.[11] These pollutants are washed into the oceans from agricultural runoffs, urban and industrial effluents, deforestation and construction, and through direct sewage outflow. In 1991, the United Nations Environmental Programme (UNEP) estimated that seventy-seven percent of the marine pollution derives from land-based sources.[12] Coastal marine ecosystems, UNEP concluded, are becoming increasingly threatened by atmospheric pollutants. Of that seventy-seven percent of pollution attributed to land sources, some forty-four percent is from land-based runoff; the rest comes

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8. *See* John W. McManus, *Coral Reefs of the ASEAN Region: Status and Management*, 17 AMBIO 189-93 (1988).

9. THE LIVING OCEAN, *supra* note 5, at 16-17.

10. *Id.* at 17-19.

11. *Id.* at 17.

12. UNITED NATIONS ENVIRONMENT PROGRAMME, THE STATE OF THE MARINE ENVIRONMENT 108 (1991), *cited in Marine Biodiversity Hearings*, *supra* note 3, at 4.

from atmospheric fallout.[13] Pollution in coastal areas, therefore, is of far more concern than in the open oceans.

The biological consequences of pollution are predictable because they are consistent and redundant. Along coastal regions, the process of eutrophication is particularly pronounced. Eutrophication occurs when pollution-produced nutrients—especially phosphorus and nitrogen from sewage, agricultural runoff, and atmospheric fallout—cause excessive microscopic plant growth as plant material decomposes, and drastically reduces the available supply of dissolved oxygen. Diminished oxygen supply concomitantly leads to the demise of intolerant species. Moreover, increases in water turbidity results from the increased load of suspended sentiments and excessive blooms of microalgae. This turbidity diminishes the light penetration into coastal waters, thereby threatening light-loving species. The end consequence is clear: eutrophication inevitably results in the reduction of biological diversity as species are killed off or driven out.[14]

Toxic chemical pollution may also be poisonous and kill marine organisms directly. Often, however, more subtle effects ensue. For example, deformities and disease increase as accumulations of high levels of toxins are compounded in the fatty tissues. Through the process of bioaccumulation, organisms increasingly concentrate noxious substances over time, which eventually leads to chronic aliments and deformities. A process called biomagnification may also occur when persistent toxins are passed along the food chain and accumulate in progressively higher concentrations in higher prey species. Consequently, animals that feed high on the food chain risk much greater levels of tissue contamination.[15]

It is true that the fluid and turbulent character of the oceans ensures that pollutants entering the marine environments are widely dispersed from their points of origin. Dispersal occurs not only through the water medium itself, but also through the food webs. Some marine scientists view such dissipation of toxic pollutants as processes of dilution and assimilation, reducing the effects that such pollutants might have on a marine ecosystem. While true in some cases, it is more accurate, in the main, to perceive this process as dispersion—sending out toxins to even further reaches of the ocean depths. While the toxicity of marine

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13. *Id.*
14. THE LIVING OCEAN, *supra* note 5, at 18.
15. *Id.* at 19.

pollution may be diluted in part, its reach is notably extended in fact.[16]

Related pollution threats are marine debris, trash, and garbage. Solid wastes ranging from discarded fishing nets and lines to plastic foam beads and polystyrene shipping containers may entangle, trap, drown, or choke fish, sea mammals, seabirds, and sea turtles. Floating plastic bags, which resemble jelly fish on which whales and leatherback sea turtles feed, can be lethal when ingested. Dumping and careless handling of fishing gear on ocean vessels, as well as seashore activities, are all too often sources of this solid debris problem.[17] The introduction of an alien species into an ecosystem is also a form of biological pollution. Although this threat to marine biodiversity is not widely appreciated, it is real nonetheless.[18]

C. *Over-Exploitation of Living Resources*

Over-exploitation of living resources occurs when organisms are targeted for harvest as well as when organisms are caught incidentally. Fishing methods in this century have become increasingly sophisticated and effective. This "progress" has led to accelerated quantitative, genetic, and social disruptions of numerous fish, shellfish, turtle, and mammal species. The impacts of increased over-fishing of targeted market species have been recognized. The devastation of the anchovy fishery off Peru during the 1960s is a vivid case in point.[19] So, too, are the depletions of cod and mackerel species in the Southern Ocean,[20] as well as the plight of whales worldwide during the last half of this century. In addition, gross incidental catches are often discarded and can produce serious disruptions in the food chain. The plight of dolphins in tuna catches off the west coast of the United States is a notable example of such waste of biodiversity resources.

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16. *Id.*
17. *Id.*
18. *Marine Biodiversity Hearings*, *supra* note 3, at 60-61 (statement of Elliott A. Norse).
19. THE LIVING OCEAN, *supra* note 5, at 20.
20. *See* Karl-Hermann Kock, *Fishing and Conservation in Southern Waters*, 30 POLAR RECORD 12-14 (1994).

D. *Global Climate Change*

The effects of worldwide industrialization have produced indirect impacts on the marine environment that threaten marine biodiversity. Both stratospheric ozone depletion and global warming can be harmful to plankton growth in ocean surface waters, where most primary production occurs.[21] Global warming is caused by the greenhouse effect. Accumulations of carbon dioxide, methane, and other gases trap solar infrared light in the atmosphere. This leads to warming of the atmosphere.[22] It is important to realize that a rise in atmospheric temperature will eventually lead to a concomitant rise in ocean temperature. An increase of only one or two degrees in ocean temperature can have dramatic repercussions on biological communities. A predictable effect of such a temperature change is a rise in sea level resulting from thermal expansion of the oceans and melting of the polar ice caps. Should these developments occur, a number of potential negative impacts on marine biological diversity are forecasted, including the loss of coral reefs, salt marshes, and mangrove swamps; the loss of species whose temperature tolerance is exceeded; and the intrusion of saltwater into freshwater ecosystems, including lakes, rivers, and freshwater marshes.[23]

IV. INTERNATIONAL LEGAL PRESCRIPTIONS

A. *Integrated Resource Management*

1. The Biodiversity Convention

The preservation of ecosystems is the most effective means to conserve biological diversity. The two notions are so intermeshed that it is apparent that conserving biological diversity is the best means of maintaining healthy, naturally functioning ecosystems.

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21. *Marine Biodiversity Hearings*, *supra* note 3, at 61 (statement of Elliott A. Norse).

22. *See generally* PATRICK J. MICHAELS, SOUND AND FURY: THE SCIENCE AND POLITICS OF GLOBAL WARMING (1992); STEPHEN H. SCHNEIDER, GLOBAL WARMING: ARE WE ENTERING THE GREENHOUSE CENTURY? (1989).

23. THE LIVING OCEAN, *supra* note 5, at 20-21.

An ecosystem approach must be adopted that considers not only ecological aspects of a given ecosystem, but also the political, social, and economic factors associated with it. This approach should foster self-renewal, which permits a particular ecosystem to recover without human assistance or interference.

The need for a global ecosystem approach induced international efforts to produce a comprehensive plan to protect biological diversity. The United Nations Conference on Environment and Development took steps in this direction by opening for signature on June 5, 1992, the Convention on Biological Diversity.[24] The Biodiversity Convention, which entered into force on December 29, 1993, seeks to protect the genetic pool of all species, including those in the marine environment. Its main purpose is to stimulate international efforts to stem the rapid and pervasive loss of plant and animal life that is occurring worldwide. Consequently, the Biodiversity Convention addresses conservation of biological resources and their sustainable uses, access to genetic resources, sharing of benefits derived from genetic materials, and access to technology, including biotechnology. Thus, the Convention furnishes an integrated approach to conservation and sustainability of biological variation, including that in the world marine environment.

The Biodiversity Convention embodies an international effort to create treaty-based obligations that operate together to preserve biological variability. Toward that end, the Biodiversity Convention strives to treat biological diversity in a comprehensive, global manner "for the benefit of present and future generations."[25] The need to sustain biodiversity throughout the world's oceans may be well known and undeniable, but historically it is not well appreciated or thought out. The Biodiversity Convention strives to remedy this slight by highlighting the specific salience of marine biodiversity and the need to implement the Convention "with respect to the marine

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24. United Nations Convention on Biological Diversity, *opened for signature* June 5, 1992, 31 I.L.M. 818 (1992) (entered into force December 29, 1993) [hereinafter Biodiversity Convention or Convention]. For a useful analysis, see David E. Bell, *The 1992 Convention on Biological Diversity: The Continuing Significance of U.S. Objections at the Earth Summit*, 26 GEO. WASH. J. INT'L L. & ECON. 479 (1993) (tracing international efforts to promote biological diversity and outlining the development of the Convention).

25. Biodiversity Convention, *supra* note 24, pmbl.

environment consistently with the rights and obligations of States under the law of the sea."[26]

The preamble of the Biodiversity Convention asserts that states are "responsible for conserving their biological diversity and for using their biological resources in a sustainable manner."[27] States, therefore, have the fundamental duty to conserve the diversity of living resources in their offshore marine environments. These concomitant duties of conservation and sustainable use, however, obtain not only in territorial seas and contiguous zones that are immediately seaward of states. They also apply throughout the 200-mile exclusive economic zones over which coastal states are allocated exclusive national jurisdiction, including exclusive jurisdiction over living and nonliving natural resources.

The Biodiversity Convention sets out to accomplish three main objectives, all of which promote preservation of biodiversity in the oceans. These objectives are the following: (1) to promote the conservation of biological diversity; (2) to foster the sustainable use of biological resources; and (3) to effect the fair and equitable sharing of resulting benefits.[28] To achieve these goals, parties are encouraged to "cooperate . . . through competent international organizations . . . for the conservation and sustainable use of biological diversity."[29] In the case of global marine ecosystems, the International Maritime Organization, the International Whaling Commission, the Commission on the Conservation of Antarctic Marine Living Resources, as well as numerous international and regional fishery management associations, exemplify maritime organizations that might serve as conduits for cooperation aimed at the protection of biodiversity in the world's oceans.

2. Relevance for the Marine Environment

The Biodiversity Convention states that "biological diversity" refers to "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."[30] The global marine environment clearly falls within the purview of this definition.

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26. *Id.* art. 22 (2).
27. *Id.* pmbl., para. 5.
28. *Id.* art. 1.
29. *Id.* art. 5.
30. *Id.* art. 2.

Oceanic ecosystems are marine geographical areas in which populations of various species evolve and adapt to their environment and to each other. Oceanic ecosystems are not simply the organisms themselves. They also include nonliving elements in the marine geographic area. The oceans are, in fact, the earth's greatest reservoir of biological diversity.

All of the world's ocean space clearly falls within the jurisdictional ambit of the Biodiversity Convention. According to its jurisdictional statement, the Biodiversity Convention applies to a contracting party:

> (a) In the case of components of biological diversity, in areas within the limits of its national jurisdiction; and
> (b) In the case of processes and activities, regardless of where their effects occur, carried out under its jurisdiction or control, within the area of its national jurisdiction or beyond the limits of national jurisdiction.[31]

Consequently, waters offshore of a coastal state are brought under the Biodiversity Convention, as are the high seas regions.

The specific components associated with marine biological diversity—species, ecosystems, and genetic material—are set out in the Biodiversity Convention. Each party is obliged to protect those components within the bounds of its national jurisdictions—both over its land territory and its offshore maritime zones, including territorial waters, the exclusive economic zone, and, if applicable, the continental shelf area. Significantly, the Biodiversity Convention imposes no direct management obligations on a party acting individually with regard to the components of biological diversity within another state's national jurisdiction or on the high seas.

Parties' obligations with respect to high seas resources are limited to "cooperation" on relevant issues.[32] Parties are obligated to cooperate with respect to areas beyond national jurisdiction and on other matters of mutual interest for the conservation and sustainable use of biological diversity. Other matters of mutual interest might include migratory species, shared sea resources, or maritime activities causing transboundary pollution.

Each party is also made responsible for "processes and activities" performed under its jurisdiction or control, whether they occur within the area of its jurisdiction or beyond the limits

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31. *Id.* art. 4.
32. *Id.* art. 5.

of its national jurisdiction.[33] With respect to ocean space, therefore, a party is obligated to control the activities of its nationals within its territorial sea and exclusive economic zone. A party is similarly required to control the activities of its nationals and flagged vessels on the high seas.[34] A government, however, is not mandated to control the activities of its nationals in the exclusive economic zone or territorial waters of another state.[35] The obligation to cooperate under the Biodiversity Convention would apply to processes and activities in the territorial seas and to the exclusive economic zones of other states, as well as to regions of the high seas.[36]

There are several guiding principles and legal obligations in the Biodiversity Convention that relate to protection of biological diversity in general. Implicitly, they also relate to protecting the variability of species in the marine environment. Preeminent among these is the duty of states to engage in the development of national strategies to foster sustainable use of biological diversity[37] and to integrate its conservation into the country's relevant sectoral programs.[38] States are also obligated to identify specific components of biological diversity,[39] as well as processes and activities that may produce adverse impacts on biological diversity.[40] To achieve these goals, states are supposed to monitor the components of biodiversity[41] and the effects of potentially adverse activities,[42] as well as organize related data.[43]

Scientific research is obviously a highly important component of marine biodiversity protection. Contracting parties pledge to promote research for the identification, conservation, and sustainable use of biological diversity,[44] including marine biodiversity. Parties are also obliged to promote scientific cooperation in biodiversity matters[45] and are encouraged to heighten public awareness of all matters relating to biological

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33. *Id.* art. 4.
34. *Id.* art. 4(b). *See also infra* note 124.
35. Biodiversity Convention, *supra* note 24, art. 4 ("Subject to the rights of other States, ...").
36. *See id.* art. 5 (stating that the parties shall cooperate "in respect of areas beyond national jurisdiction and on other matters of mutual interest").
37. *Id.* art. 6(a).
38. *Id.* art. 6(b).
39. *Id.* art. 7(a).
40. *Id.* art. 7(c).
41. *Id.* art. 7(b).
42. *Id.* art. 7(c).
43. *Id.* art. 7(d).
44. *Id.* art. 12.
45. *Id.* art. 18(1).

diversity.[46] Certain general transboundary obligations in the Biodiversity Convention hold particular relevance for the marine ecosystem. States are expected to promote arrangements for the consultation, notification, and exchange of information relating to activities that might adversely affect the biological diversity of other states or areas beyond the limits of national jurisdiction.[47] Obviously, should a massive pollution incident occur in an area offshore of a particular state, or on the high seas, this provision would take on particular relevance. In this event, parties would be obligated to notify other states of a threatening activity and to take action to prevent or minimize any "imminent or grave danger or damage" to biodiversity in the marine ecosystems of other states.[48]

Importantly, the Biodiversity Convention asserts that biodiversity is a national resource rather than part of the "common heritage of mankind."[49] Consequently, unlike minerals on the international deep seabed, living marine resources within the national jurisdiction of a state are sovereign biological resources belonging to that state. The biodiversity agreement asserts that states have sovereign rights over their own biological resources.[50] The Convention provides that "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies," provided that those activities do not harm the environments of other states.[51] This stipulation essentially reiterates Principle 21 of the 1972 Stockholm Declaration, which is the modern conceptual foundation for international environmental law.[52] Thus, the Biodiversity Convention clearly brings biodiversity of marine resources within a state's jurisdiction and under national

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46. *Id.* art. 13.

47. *Id.* art. 14(1)(c).

48. *Id.* art. 14(1)(d).

49. *See* Christopher C. Joyner, *Legal Implications of the Concept of the Common Heritage of Mankind,* 35 INT'L & COMP. L.Q. 190 (1986). For a discussion of the political and policy implications of the common heritage of mankind concept as it relates to the marine environment, see generally MARKUS G. SCHMIDT, COMMON HERITAGE OR COMMON BURDEN? THE UNITED STATES POSITION ON THE DEVELOPMENT OF A REGIME FOR DEEP SEA-BED MINING IN THE LAW OF THE SEA CONVENTION (1989).

50. Biodiversity Convention, *supra* note 24, art. 3.

51. *Id.*

52. Declaration of the United Nations Conference on the Human Environment, June 16, 1972, prin. 21, U.N. Doc. A/CONF.48/14 [hereinafter Stockholm Declaration] *reprinted in* 11 I.L.M. 1416 (1972). *See infra* note 85 and accompanying text.

control. It also directs governments to develop and implement strategies for research, training, and protection of their marine resources. The Biodiversity Convention places responsibility for protection of biological variability in offshore areas squarely upon the shoulders of coastal states. That mantle of sovereign jurisdiction over biodiversity attaches just as securely for marine coastal resources as it does for land-based natural resources.

Biodiversity is best preserved in its natural state. Preservation of the natural state is referred to in the Biodiversity Convention as "*in-situ* conditions" or "*in-situ* conservation."[53] The implications for marine resources are especially salient in this regard. The Biodiversity Convention plainly states that each party must pursue *in-situ* conservation so as to:

> (a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
> (b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas . . . [and]
> (d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings . . . .[54]

Contracting states are also required to "[r]ehabilitate and restore degraded ecosystems and promote the recovery of threatened species."[55] The relevance of such efforts to protect biodiversity within a marine ecosystem is apparent. Conservation of diversity in the marine ecosystem can best be accomplished through dedicated management of coastal regions, and implementing select means for the protection of special areas. These means include creation of offshore marine parks, designation of coastal conservation zones, declaration of marine sanctuaries, and

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53. Biodiversity Convention, *supra* note 24, art. 2. *In-situ* conservation is defined as "the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties." *Id.* Obligations of parties for *in-situ* conservation are enumerated in Article 8 of the Convention. *Id.* art. 8. Opposed to *in-situ* conservation are preservation efforts that might be made outside some natural habitat, designated as "*ex-situ* conservation," and defined in the Convention as "the conservation of components of biological diversity outside their natural habitats." *Id.* art. 2. Measures associated with *ex-situ* conservation are set out in Article 9 of the Convention. *Id.* art. 9.

54. *Id.* art. 8.

55. *Id.* art. 8(f).

setting aside certain marine ecosystems as national wildlife preservation areas. Indeed, the Biodiversity Convention requires parties to "[r]egulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use."[56]

The Biodiversity Convention postpones for further consideration the issues of liability and redress for oceanic pollution and other activities causing marine environmental degradation. Such provisions are not included in the Biodiversity Convention. There is no specific language in the Biodiversity Convention's text to obligate parties to bear the costs of avoiding activities that might threaten or damage biodiversity in marine ecosystems. Moreover, the Biodiversity Convention does not obligate a party either to avoid or to minimize threats or damage to biodiversity beyond the limits of its national jurisdiction (i.e., on the high seas). When and where such damage does occur, the Convention does not hold that state liable for the costs of remedial action and compensations. The Convention's failure to include these provisions is especially regrettable because it deprives the instrument of the regulatory means necessary to control parties whose nationals violate norms associated with the preservation of marine biodiversity.

3. Implications for Ocean Law

It is plain that the Biodiversity Convention should apply to the marine environment. Article 22, paragraph 2, of that instrument states: "Contracting Parties shall implement this Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea."[57] This provision imposes upon party states the clear obligation to implement the Biodiversity Convention in accordance with, and subject to, the corpus of customary ocean law, as well as the specific stipulations contained in the 1982 United Nations Convention on the Law of the Sea (1982 LOS Convention).[58]

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56. *Id.* art. 8(c).

57. *Id.* art. 22(2).

58. United Nations Convention on the Law of the Sea, Dec. 10, 1982, U.N. Doc. A/CONF.62/122 (entered into force Nov. 16, 1994) [hereinafter 1982 LOS Convention], *reprinted in* UNITED NATIONS, THE LAW OF THE SEA: OFFICIAL TEXT OF THE CONVENTION ON THE LAW OF THE SEA WITH ANNEXES AND INDEX, U.N. Doc.

The profound reach and ramifications of Article 22, paragraph 2, should not be underestimated. Two chief considerations for the management of marine biodiversity resources stand out: first, the establishment by the ocean law treaty of designated conservation zones, which patently affect the scope of national jurisdiction over marine living resources; and second, the explicit creation of certain rights and duties in the 1982 instrument that are explicitly associated with the protection and conservation of resources in the marine environment.[59]

The 1982 Convention on the Law of the Sea establishes a new offshore zone—the 200-mile exclusive economic zone (EEZ). In the EEZ, the coastal state has exclusive rights not only to maintain fisheries but also to regulate, exploit, and manage all living and nonliving resources therein.[60] Through the EEZ, the coastal state is allocated the principal role in preserving and protecting biological diversity in the marine ecosystem, for at least 200 nautical miles seaward of its coast.

The coastal state has two preeminent responsibilities in the management and conservation of living resources within its EEZ. First, the coastal state is bound to ensure, through proper conservation and management measures, that the living resources of the EEZ are not endangered by over-exploitation.[61] The coastal state is obligated to maintain or restore populations of harvested fisheries at levels that produce a "maximum sustainable yield."[62] The conservation of biological diversity in a marine ecosystem is directly dependent on the efficacy of a coastal state to maintain the maximum sustainable yield of indigenous living resources. This is particularly true of the spillover impacts of harvesting related local stocks, harvesting patterns in the region, and technologies employed for harvesting.

The second chief responsibility of coastal states associated with protecting biodiversity in the EEZ is to promote the objective

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A/CONF. 62/122, U.N. Sales No. E.83.V.5 (1983). As of September 1995, eighty-one ratifications had been deposited.

59. For an insightful analysis of the protection and preservation contributions made by the 1982 LOS Convention, see Jonathan I. Charney, *The Marine Environment and the 1982 United Nations Convention on the Law of the Sea*, 28 INT'L LAW. 879 (1994).

60. 1982 LOS Convention, *supra* note 58, arts. 55-75.

61. *Id.* art. 61(2).

62. *Id.* art. 61(3). The construct of maximum sustainable yield refers to the level of harvesting of a stock of living resources at which the maximum tonnage of that resource can be taken without depleting the stock. For discussion of this notion, see FRANCIS T. CHRISTY, JR. & ANTHONY SCOTT, OCEAN FISHERIES: SOME PROBLEMS OF GROWTH AND ECONOMIC ALLOCATION 215-42 (1965).

of "optimum utilization" of living resources within the zone.[63] The coastal state is charged with determining the permissible catch of the living resources within its EEZ,[64] and its own capacity to harvest that permissible catch.[65] A coastal state may not, in any event, determine the permissible catch level such that it might lead to over-exploitation of harvested species.[66]

Under the contemporary law of the sea, coastal states retain the right to regulate several matters that impinge upon the biological diversity of a coastal region. Among these matters are included the following rights: to license fishermen, fishing vessels, and harvesting equipment; to determine which species might be caught; to fix quotas and catch limits; to regulate seasons and areas of fishing; to set the age and size of fish and other species that may be harvested; and to require the conduct of specified research programs in order to gain new data about fisheries in the EEZ.[67]

No less important for a coastal state are the rights allocated for enforcement of the law. The coastal state has the right to enforce all laws and regulations adopted to conserve and manage living resources within its EEZ.[68] Enforcement of regulations pertaining to anadromous species harvested beyond the EEZ requires agreement between the coastal state and other states concerned.[69] Likewise, enforcement of regulations regarding harvesting of highly migratory species and straddling stocks taken beyond the EEZ requires agreement among all states concerned.[70]

The Biodiversity Convention obligates parties to regulate or manage biological resources important for the conservation of biological diversity.[71] In bringing these obligations into effect for living marine resources, parties under the 1982 Convention on the Law of the Sea are made subject to the rights of other states, especially in the case of highly migratory species,[72] marine

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63. 1982 LOS Convention, *supra* note 58, art. 62(1).
64. *Id.* art. 61(1).
65. *Id.* art. 62(2).
66. *Id.* art. 61(2).
67. *Id.* art. 62(4).
68. *Id.* art. 73.
69. *Id.* art. 66.
70. *Id.* arts. 63, 64.
71. Biodiversity Convention, *supra* note 24, art. 8(b).
72. 1982 LOS Convention, *supra* note 58, art. 64. For an insightful assessment of the problems attendant to protecting biological diversity among these species, see Evelyne Meltzer, *Global Overview of Straddling and Highly*

mammals,[73] anadromous stocks,[74] and catadramous species.[75]

Also critical for the protection of coastal biodiversity resources is the establishment of special areas offshore for marine resource management and ecosystem preservation. The Biodiversity Convention actually calls for the establishment of protected areas or regions where special measures need to be taken in order to conserve biological diversity[76] and to protect ecosystems and natural habitats.[77] Marine parks, wildlife sanctuaries, and offshore natural preserves clearly may be mandated under national law within a coastal state's 12-mile territorial sea. In creating these areas, however, parties are also obligated to respect the rights and duties of innocent passage in the territorial seas of other states.[78] Parties are also expected to follow appropriate procedures of the International Maritime Organization for routing schemes and for special areas designation for the control of vessel source pollution.[79]

The contemporary law of the sea also asserts the cardinal duty for the conservation of living resources in high seas areas. Here, too, significant implications arise for the preservation of biological diversity in the marine environment beyond the limits of national jurisdiction. Conservation and management of high seas resources require preservation of international marine biodiversity. All states have the right to fish on the high seas, subject to their treaty obligations and the rights and duties of coastal states.[80] In addition, all states have the duty to take such measures, in cooperation with other states, as may be necessary for the conservation and management of living resources of the high seas.[81] States are required to ensure that their citizens comply with these measures.[82] Significantly, states whose citizens are engaged in the exploitation of fishery resources in the same area are obliged to enter into negotiations to conserve those

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Migratory Fish Stocks: The Nonsustainable Nature of High Seas Fisheries, 25 OCEAN DEV. & INT'L L. 255 (1994).

73. 1982 LOS Convention, *supra* note 58, art. 65.

74. *Id.* art. 66. On the problems associated with lawful protection of anadromous species, see William T. Burke, *Anadromous Species and the New International Law of the Sea*, 22 OCEAN DEV. & INT'L L. 92 (1991).

75. 1982 LOS Convention, *supra* note 58, art. 67.

76. Biodiversity Convention, *supra* note 24, art. 8(a).

77. *Id.* art. 8(d).

78. *See* 1982 LOS Convention, *supra* note 58, arts. 17-19, 38, 45 and 52.

79. *Id.* arts. 211(1) & 211(6).

80. *Id.* art. 116.

81. *Id.* art. 117.

82. *Id.*

resources.[83] To this end, governments should, as appropriate, cooperate in establishing regional and subregional organizations to facilitate conservation and management of those resources.[84]

Efforts to protect biodiversity through conservation and management of ocean resources will remain limited so long as people continue to think in terms of short-term economic profits and not in terms of long-term management of resources. No economic value can be effectively placed on the ecological aspects of the marine environment. No material sum can be fixed on the benefits of extracting living resources, minerals, and other commodities from the sea. As a result, strategies to preserve marine biodiversity must ensure that the overall natural stability of marine ecosystems will be maintained and that those resources will continue to be available. This approach is "sustainable development," a concept based on the recognition that the earth's resources are finite and that all natural resources should not be depleted. If oceanic biodiversity is to be preserved, an ecosystemic approach to conservation must be taken, dedicated and managed with the objective of sustainable development in mind.

B. *Marine Pollution Abatement*

The conservation of global marine biodiversity depends largely on the efficacy of international efforts to halt pollution of the oceans. In recent years, the international community has made serious and sustained efforts toward constructing an international law for ocean space that does just that. A nexus of international agreements now exists that strives to conserve living resources in the oceans by protecting them from human-made pollution.

1. International Environmental Law

Protection of marine biological diversity falls within the realm of international environmental law. The conceptual cornerstone of modern international environmental law was laid with the 1972 Stockholm Declaration on the Human Environment,[85]

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83. *Id.* art. 118.

84. *Id.*

85. Stockholm Declaration, *supra* note 52. For discussion, see Louis B. Sohn, *The Stockholm Declaration on the Human Environment*, 14 HARV. INT'L L.J. 423 (1973), and Christopher C. Joyner & Nancy D. Joyner, *Global Eco-*

which signaled the first effort to articulate legal principles governing the global environment. Principle 21 of the Stockholm Declaration contains the fundamental international obligation underpinning protection of the environment. This principle, which recognizes the sovereign right of states "to exploit their own resources pursuant to their own environmental policies," asserts the correlative responsibility of states "to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."[86] As numerous international agreements have since affirmed, pollution of the global marine environment clearly falls within the scope of this mandate, which includes damage to marine biodiversity.[87]

The modern evolution of ocean law and the negotiation of various antipollution conventions have established a broad legal framework for protecting and preserving marine biodiversity beyond the limits of national jurisdiction. The 1954 International Convention for the Prevention of Pollution of the Sea by Oil[88] was the first landmark agreement designed to deal with vessel-source ocean pollution. Its emphasis was directed at curtailing discharge by ships of "persistent oils"—primarily crude and heavy fuel oil—within "prohibited zones" that extended 50 nautical miles seaward from coastal states.[89] Amendments in 1962 designated specific standards for tank subdivision and container stability.[90] Additional provisions in 1969 amended the treaty to make these discharge standards applicable beyond the stipulated zones.[91] In effect, all the world's high seas were brought under the regulatory

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Management and International Organizations: The Stockholm Conference and Problems of Cooperation, 14 NAT. RESOURCES J. 533 (1974).

86. Stockholm Declaration, *supra* note 52, prin. 21. The responsibility clause in Principle 21 not only expresses an established norm in contemporary international law; it also highlights the duty to seek peaceful and orderly resolution of international environmental disputes.

87. The international precedent often cited as the genesis for this norm is the *Trail Smelter Arbitration* between the United States and Canada. Trail Smelter Case, 3 R.I.A.A. 1905 (U.S.-Can. 1949), *reprinted in* 35 AM. J. INT'L L. 684 (1941). In this case, the Tribunal held that "under the principles of international law . . . no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein . . . ." *Id.* at 1965.

88. May 12, 1954, 12 U.S.T. 2989, 327 U.N.T.S. 4.

89. *Id.* Annex A(1).

90. *Amended* Apr. 11, 1962, 17 U.S.T. 1523, 600 U.N.T.S. 332.

91. Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, Nov. 29, 1969, 26 U.S.T. 765, 970 U.N.T.S. 211 (entered into force May 6, 1975).

aegis of this instrument, which essentially aimed to preserve biodiversity of the marine ecosystem.

Although the 1958 Geneva Conference on the Law of the Sea did not address the need for a comprehensive regime to prevent pollution or preserve the marine environment, certain relevant obligations for states were adopted. For example, in the 1958 Convention on the High Seas,[92] the general problem of marine pollution was cited in specific provisions. Article 24 of that instrument creates a general duty for states to regulate the discharge of oil from ships and pipelines, or from exploration or exploitation activities on the seabed or its subsoil.[93] Article 25 similarly requires that states take measures to prevent pollution of the seas caused by the dumping of radioactive wastes, and to cooperate with international organizations in taking measures to prevent pollution of the seas resulting from any activities with radioactive materials or other harmful agents.[94] The 1958 Convention on the Continental Shelf also mandates that coastal states undertake all appropriate measures to protect living resources of the sea in safety zones around artificial installations.[95] Taken in the aggregate, these early provisions served to bolster the legal credibility for preventing pollution of the high seas. As a result, they implicitly proffered protection for marine biological diversity under international law.

2. The 1982 Convention on the Law of the Sea

The 1982 United Nations Convention on the Law of the Sea (1982 LOS Convention) furnishes the highest level global directives currently available for protecting and preserving biological diversity in the marine environment. The provisions contained in Part XII of the Convention—"Protection and Preservation of the Marine Environment"[96]—do not merely restate existing conventional law or state practice. These articles are actually constitutional in character. They establish a comprehensive framework for the protection and preservation of the marine environment in the context of international law applicable to ocean space. In this respect, Part XII embodies the first serious effort to construct and codify a public international

92. Apr. 29, 1958, 13 U.S.T. 2312, 450 U.N.T.S. 82.
93. *Id.* art. 24.
94. *Id.* art. 25.
95. Convention on the Continental Shelf, *done* Apr. 29, 1958, art. 5(7), 15 U.S.T. 471, 499 U.N.T.S. 311.
96. 1982 LOS Convention, *supra* note 58, arts. 192-237.

law framework that deals with the degradation of and threat to biodiversity in the world's marine environment. Consequently, these provisions emphasize the need for global response to problems of marine pollution. Part XII also effectively codifies the principles of "soft law" that were set out in the United Nations Conference on the Human Environment, held in Stockholm in 1972.[97]

It is important to realize that Part XII was intentionally designed to function as compass law for regional activities. Although it is generally norm-setting, the 1982 LOS Convention does not depend on national authority or unilateral response. It aims at fostering regional cooperation to deal with pollution threats to marine biodiversity. States are directed to cooperate globally and regionally to formulate rules and standards, giving particular attention to "characteristic regional features."[98] This suggests that regionalism may come to bridge unwieldy global efforts and piecemeal, unpredictable national responses toward protecting marine biodiversity. Part XII does not merely furnish standard-setting principles. Rather, it supplies a blueprint for regionally responsive standards. As such, its provisions embody a general framework for anti-pollution measures designed to protect biodiversity in the world marine ecosystem.

The 1982 LOS Convention defines marine pollution in sweeping terms that hold special relevance for the preservation of marine biodiversity. As set out in Article 1(4), "pollution of the marine environment" entails:

> [T]he introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.[99]

Any activities that involve the injection of harmful or toxic agents into the marine environment that produce disruptive or harmful effects on the biological diversity of living marine resources would qualify as unlawful pollution under this definition. Specific inclusion of the phrase "harm to living resources and marine life" in the definition of "pollution of the marine environment" plainly substantiates this point.[100] Also, the general obligation in the 1982 Law of the Sea Convention for all states "to protect and

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97. *See* Stockholm Declaration, *supra* note 52. *See also supra* note 83.
98. 1982 LOS Convention, *supra* note 58, art. 197.
99. *Id.* art. 1(4).
100. *Id.*

preserve the marine environment"[101] incorporates the express duty that "measures taken . . . shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life."[102] This language supplies a clear, concise statement of the parties' commitment to protect and conserve biological diversity in the marine environment.

The 1982 LOS Convention establishes the chief duty of national governments in conserving biodiversity in the ocean environment. It states that "States have the obligation to protect and preserve the marine environment."[103] The obligatory language here is obvious. States that violate the mandate to preserve and protect the global marine environment consequently violate international law.[104]

Article 194 gives force to the duty not to pollute the oceans. The Law of the Sea Convention is concerned with "all sources of pollution of the marine environment,"[105] and states are required to take, alone or in concert, all measures necessary to "prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their

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101. *Id.* art. 192.

102. *Id.* art. 194(5).

103. *Id.* art. 192.

104. Indeed, Article 235 substantiates this conclusion: "States are responsible for the fulfillment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance with international law." *Id.* art. 235(1). As Professor Jonathan Charney rightly observes, the 1982 Law of the Sea Convention "takes a holistic approach." Charney, *supra* note 59, at 887. To that end, he posits that:

> The obligation to protect and preserve the marine environment must be undertaken in a way that does not pose risks to other environments. Thus, states have a duty "not to transfer . . . damage or hazards from one area to another or transform one type of pollution into another." [1982 LOS Convention, *supra* note 58, art. 195]. Nor may they use technologies that may "introduce alien or new species into the marine environment that may cause significant or harmful changes to that environment." [*Id.* art. 196]. States are obliged to cooperate regionally and globally [*Id.* art. 197], notify other states when they determine that they are in danger of damage from pollution [*Id.* art. 198], establish contingency plans against pollution [*Id.* art. 199], and undertake scientific research and exchange of information regarding the pollution of the marine environment. [*Id.* art. 200]. They are also obliged to monitor the risks and effects of marine pollution [*Id.* art. 204] and to publish the results of these studies [*Id.* art 205].

Charney, *supra* note 59, at 887 (footnotes omitted).

105. 1982 LOS Convention, *supra* note 58, art. 194(3).

disposal and in accordance with their capabilities."[106] Further, as Article 194 designates, measures taken should specifically aim to "minimize to the fullest possible extent" the following activities:

> (a) the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping;
> (b) pollution from vessels, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional discharges, and regulating the design, construction, equipment, operation and manning of vessels;
> (c) pollution from installations and devices used in exploration or exploitation of the natural resources of the sea-bed and subsoil, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices;
> (d) pollution from other installations and devices operating in the marine environment, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices.[107]

Significant for protecting biodiversity in the marine ecosystem, the 1982 Law of the Sea Convention expands the range of pollution sources to activities stemming from the use of technologies or the introduction of "alien or new" species into the marine environment that may cause "significant and harmful changes thereto."[108] No less salient for marine biodiversity is the aim in Article 194 of promoting measures to "protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life."[109]

The keystone for substantiating international efforts to preserve biodiversity in the marine environment is contained in the package of provisions aimed at worldwide cooperation. States

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106. *Id.* art. 194(1).
107. *Id.* art. 193(3).
108. *Id.* art. 196(1).
109. *Id.* art. 194(5).

are directed, without exception or qualification, to "co-operate [sic] on a global basis and, as appropriate, on a regional basis . . . in formulating and elaborating international rules . . . for the protection and preservation of the marine environment, taking into account characteristic regional features."[110]

The 1982 LOS Convention addresses the threat to marine biodiversity from pollution of the high seas from a source-oriented perspective. Six sources of marine pollution are treated: land-based activities, national seabed activities, activities in the international seabed area, dumping, vessel-source, and atmospheric pollution.[111] Pollution from all these sources impacts on the marine ecosystem, albeit to varying degrees. The general thrust of these anti-pollution provisions is preclusive. They are designed to prevent and dissuade the occurrence of pollution activities, rather than to halt or redress present harmful impacts.

The 1982 LOS Convention specifically recognizes the threat that land-based sources of pollution present for the marine environment. States are directed to take legislative action "to prevent, reduce and control pollution of the marine environment from land-based sources, . . . taking into account internationally agreed rules, standards and recommended practices and procedures."[112] To accomplish this, national legislation should be "designed to minimize to the fullest extent possible, the release of toxic, harmful or noxious substances, especially those which are persistent, into the marine environment."[113]

With respect to dumping, states are obligated to adopt laws and take means necessary "to prevent, reduce and control pollution" from dumping.[114] The 1982 LOS Convention insists that dumping into the ocean not be allowed without the permission of "competent authorities of States."[115] States are directed to "endeavour to establish global and regional rules,"[116] and their national antipollution legislation "shall be no less effective . . . than the global rules and standards."[117] It falls upon national governments to insure that dumping from their vessels is formally prohibited not only in waters of national jurisdiction but

110. *Id.* art. 197. *See infra* notes 163-257 and accompanying text.
111. 1982 LOS Convention, *supra* note 58, arts. 207-12.
112. *Id.* art. 207(1).
113. *Id.* art. 207(5).
114. *Id.* art. 210(1).
115. *Id.* art. 210(3).
116. *Id.* art. 210(4).
117. *Id.* art. 210(6).

also on the high seas. Responsibility also is assigned to national governments, in particular coastal states whose waters may be affected or the flag states whose vessel may be dumping, to enforce these prohibitions.[118]

Vessel-source pollution, along with its impacts on marine biodiversity, has been of international concern for many years. The 1982 LOS Convention recognizes this situation and requires states to establish international rules to regulate vessel-source pollution worldwide.[119] National laws adopted by states are to have at least "the same effect as that of generally accepted international rules and standards."[120] Again, enforcement is left in the hands of flag,[121] port,[122] and coastal states.[123] The reasoning here is cogent and clear: National governments make antipollution law; vessels under the jurisdiction of national governments violate the law; therefore, national governments must enforce the law against those vessels—in port, in waters of national jurisdiction, or on the high seas. Not surprisingly, then, flag states have the chief responsibility to "adopt laws and regulations and take other measures necessary" for implementing those national laws and applicable international rules for their vessels sailing in international waters.[124] By implication, flag

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118. *Id.* art. 216.
119. *Id.* art. 211(1).
120. *Id.* art. 211(2).
121. *Id.* art. 217.
122. *Id.* art. 218.
123. *Id.* art. 220.
124. *Id.* art. 217(1). In terms of state responsibility for oversight and enforcement of pollution control regulations, this paragraph is crucial for protecting biodiversity in the marine environment. In full, it provides that:

> States shall ensure compliance by vessels flying their flag or of their registry with applicable international rules and standards, established through the competent international organization or general diplomatic conference, and with their laws and regulations adopted in accordance with this Convention for the prevention, reduction and control of pollution of the marine environment from vessels and shall accordingly adopt laws and regulations and take other measures necessary for their implementation. Flag States shall provide for the effective enforcement of such rules, standards, laws and regulations, *irrespective of where a violation occurs.*

Id. (emphasis added). Flag states are also expected to certify that their vessels are in compliance with international rules and standards. *Id.* art. 217(3). If an alleged violation of international rules or standards by a vessel is reported, the flag state is expected to conduct an "immediate investigation" and "institute proceedings" where appropriate. *Id.* art. 217(4). Significantly, the penalties provided for in the laws and regulations of flag states "shall be adequate in severity to discourage violations wherever they occur." *Id.* art. 217(8).

states are expected to regulate the design, equipment, and operation of vessels, as well as to take measures to prevent accidents that might pollute the marine environment and bring harm to biological diversity in the oceans.

Part XII of the 1982 LOS Convention imposes international obligations for states to protect marine biological diversity in three main ways. First, governments are explicitly required to protect and preserve the marine environment. Simply put, governments have a duty not to pollute ocean space and not to condone the actions of nationals that do.

Second, governments are obligated to cooperate on both a global and regional basis. This involves a basic commitment to make rules, regulations, and standards that undergird the first duty of protecting the marine environment. The critical ingredient here, of course, is international cooperation, which includes information exchange, technological assistance, and implementation assistance.

Third, governments are obligated to adopt, enact, and enforce at the national level internationally agreed-upon standards for protecting the marine ecosystem. This duty becomes the linchpin for protecting biological diversity in the oceans. Only governments of states can make international law work effectively. Nevertheless, the duty of implementing national action still remains difficult to secure. The idea of preordained state sovereignty, the lack of resolute political will, and the diverse perceptions of what seems best for a state's national interest can override the perceptions of official decisionmakers.

Several conclusions can be drawn about marine biodiversity and the international law prohibiting the pollution of ocean space. First, environmental law generally has been developed on an ad hoc basis. International antipollution legislation has evolved largely in reaction to some accident or perceived environmental crisis situation, rather than from prolonged compliance with policies contained in international conventions. Second, the international law for protecting the marine environment and its biological diversity from human-made pollution has similarly evolved piecemeal during the past three decades. The available law has appeared in a patchwork fashion rather than as a carefully premeditated, internationally-coordinated effort aimed at constructing a coherent legal regime for conserving and protecting biological diversity in the world's oceans. Despite the lack of an even legislative keel, an international law for protecting the world's seas from pollution—and hence, for preserving biological diversity in the marine environment—has evolved, is in place, and has assumed direct relevance for ocean space.

Third, the antipollution provisions in the 1982 LOS Convention are intended neither to replace nor to supersede previous legal commitments made by states in other marine pollution agreements. Instead, these provisions reaffirm and underscore the universal legal obligation to preserve and protect the ocean environment from human-made pollution. To this end, Article 235 succinctly announces that "States are responsible for the fulfillment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance with international law."[125] This obligation unquestionably remains a critical norm, calling for preservation of marine biodiversity in the world oceans.

3. The London Dumping Convention

The 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter[126] (London Dumping Convention) supplies another legal framework that supports the evolving norm against marine pollution. This international agreement was designed to promote effective control over all sources of pollution that befoul the marine environment. The Convention obligates contracting parties "to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities, or to interfere with other legitimate uses of the sea."[127] To accomplish this end, the Convention specifically prohibits or restricts certain "black-" or "grey-" listed substances from being dumped into "all marine waters other than the internal waters of States."[128] Contracting parties are accordingly obliged not to dump harmful substances—including toxins, plastics, and petrochemicals—into ocean space.[129] The London Dumping Convention stands out as a salient international agreement now in force for regulating protection of marine biodiversity in high sea areas.[130]

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125. *Id.* art. 235(1).

126. Dec. 29, 1972, 26 U.S.T. 2403, 1046 U.N.T.S. 120 (entered into force Aug. 30, 1975) [hereinafter London Dumping Convention].

127. *Id.* art. I.

128. *Id.* art. III(3).

129. *Id.* art. IV & annex I.

130. In 1995, the London Dumping Convention had at least 70 parties. U.S. DEP'T OF STATE, TREATIES IN FORCE 365 (1994) [hereinafter TREATIES IN FORCE].

The London Dumping Convention provides a list of prohibited materials[131] and sets international standards for evaluating materials not specifically listed.[132] Important for protecting marine biodiversity, among those materials banned from disposal are plastics and other persistent synthetic materials that float or remain suspended in ocean waters, materially interfering with fishing, navigation, and other legitimate uses of the oceans.[133]

As defined in Article III 1(a) of the London Dumping Convention, dumping is "any deliberate disposal at sea."[134] Annex I expressly prohibits the dumping of plastic materials, particularly those that can ensnare or choke marine mammals.[135] Thus, deliberately discarding fishing nets into the high seas is forbidden if they are thrown overboard, intentionally cut to avoid detection for fishing violations, or even purposefully severed to free unlawfully entangled marine mammals.

The London Dumping Convention is not self-implementing. It relies upon appropriate statutes passed by individual contracting parties for its enforcement. Jurisdiction of each state extends to vessels and aircraft registered in its territory, flying its flag, or loading matter to be dumped within that state's territory or its territorial seas; it also applies to vessels and platforms under the jurisdiction of a member party believed to be engaged in acts of dumping at sea.[136]

Although it obviously improves the jurisdictional and substantive ambit of international law for curbing pollution in the world marine ecosystem, and hence protects marine biodiversity, the London Dumping Convention suffers from certain deficiencies. First, the agreement leaves enforcement to the discretion of each state, creating uncertainty as to how each party is to implement the instrument through its domestic law. Second, enforcement of the convention remains difficult. Dumping of garbage and debris most often takes place on the high seas, where there is scant chance that any violations might be seen or detected by a contracting state's enforcement agents.

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131. London Dumping Convention, *supra* note 126, annexes I & II.
132. *Id.* art. IV & annex III.
133. *Id.* annex I(4).
134. *Id.* art. III(1)(a).
135. *Id.* annex I.
136. *Id.* art. VII.

4. The MARPOL Convention and Its Protocol

Since pollution's harmful effects on global marine biodiversity have been recognized only recently, serious efforts to control the problem are relatively new. Attention to marine pollution has mainly focused on oil and the prevention of maritime accidents. Intense media attention to oil tanker disasters at sea has promoted greater international involvement in marine pollution control. One result of this attention was the 1973 execution of an international agreement specifically designed to replace the outdated 1954 International Convention for the Prevention of Pollution of the Sea by Oil.[137]

The jurisdictional reach of this new agreement, the 1973 International Convention for the Prevention of Pollution from Ships, as modified by its Protocol of 1978 (MARPOL 73/78),[138] extends to global marine biodiversity. As articulated in its preamble, the purposes of MARPOL 73/78 are to remedy the "deliberate, negligent or accidental release of . . . harmful substances from ships" as well as "to achieve the complete elimination of intentional pollution of the marine environment . . . by harmful substances. . . ."[139] The agency responsible for promoting MARPOL 73/78 is the International Maritime Organization (IMO). While MARPOL 73/78 deals mainly with pollution of the seas by oil,[140] its regulatory authority also reaches to noxious liquid substances,[141] harmful packaged substances and freight containers,[142] sewage discharge from

137. May 12, 1954, 12 U.S.T. 2989, 327 U.N.T.S. 4.

138. Nov. 2, 1973, 12 I.L.M. 1319 (1973) [hereinafter MARPOL 73], as modified by the Protocol Relating to the International Convention for the Prevention of Pollution from Ships, June 1, 1978, 17 I.L.M. 546 (1978) [hereinafter MARPOL 73/78]. The 1973 MARPOL Convention was not intended to enter into force or be applied on its own. The regime to be used by states party to the 1978 Protocol is contained in the 1973 Convention, as modified by the 1978 Protocol. TREATIES IN FORCE, *supra* note 130, at 366 n.1. The acronym "MARPOL" is taken from the first three letters of the words "marine pollution." For an insightful treatment of the MARPOL Convention and its Annex V, see Bruce Manheim, *Annex V of the MARPOL Convention: Will It Stop Marine Plastic Pollution?*, 1 GEO. INT'L ENVTL. L. REV. 71 (1988).

139. MARPOL 73, *supra* note 138, pmbl.

140. *See id.* annex I: Regulations for the Control of Pollution by Oil, 12 I.L.M. at 1335.

141. *Id.* annex II: Regulations for the Control of Noxious Liquid Substances in Bulk, 12 I.L.M. at 1386.

142. *Id.* annex III: Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Forms, or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons, 12 I.L.M. at 1421.

ships,[143] and disposal of garbage and plastics from vessels at sea.[144] That authority emanates from the special annexes appended to the convention that contain regulations for the enforcement and administration of pollution prevention.

MARPOL 73/78 contains five annexes, each of which pertains to a particular type of pollutant. Annexes I and II are concerned with oil and noxious liquid substances. These two annexes contain strict regulations for ship design, and their acceptance was required as a precondition for MARPOL's entry into force. A state that accepts MARPOL 73/78, however, is not required to accept Annexes III, IV, or V, which are referred to as the Optional Annexes.[145] This arrangement underscores the importance attached to the control of oil pollution in 1973, the year the MARPOL Convention was negotiated. In fact, the preamble of this instrument recognizes the need to control marine pollution "by oil and other harmful substances,"[146] though it stops short of specifying what these other substances might be.

5. Annex V of MARPOL

Annexes III, IV, and V of the MARPOL Convention are concerned with containerized substances, ship sewage discharges, and ship garbage. Annex V of the MARPOL Convention is concerned with the prevention of pollution by garbage from ships, and only addresses the routine disposal of wastes at sea, not the issue of maritime accidents.[147] Hence,

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143. *Id.* annex IV: Regulations for the Prevention of Pollution by Sewage from Ships, 12 I.L.M. at 1424.

144. *Id.* annex V: Regulations for the Prevention of Pollution of Garbage from Ships, 12 I.L.M. at 1434 [hereinafter MARPOL Annex V].

145. MARPOL 73, *supra* note 138, art. 14(1).

146. *Id.* pmbl.

147. Garbage is defined in Annex V as follows: "[A]ll kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically . . . ." MARPOL Annex V, *supra* note 144, reg. 1(1). Implicit in this definition is packaging material, although the annex explicitly addresses other types of plastic pollution as well. *Id.* reg. 3(1)(a). Annex V does not specifically define "plastic," but the IMO draft guidelines for implementation do provide clarification:

> Plastic is any high polymer nonmetallic compound, synthetically produced (usually from organic compounds), and combined with other ingredients, such as curatives, filler, reinforcing agents, colorants, plasticizer, etc.; the mixture can be formed by heat, pressure or injection molding (ejection of a measured amount of material into a mold in liquid). Plastics have material properties ranging from hard and brittle to soft and

unlike Annexes I and II, Annex V omits consideration of vessel design regulations. Annex V contains only seven regulations. Of particular note, though, is that additional regulations applicable to Annex V are cited in the main body of the convention.[148] Moreover, Annex V of the MARPOL Convention has emerged as the principal international legal instrument for prohibiting disposal of synthetic, nonbiodegradable materials by ships at sea. Thus, Annex V embodies the new international norm against ocean pollution by human-made debris, which is a serious concern closely associated with the protection of marine biodiversity.

The MARPOL Convention addresses only vessel-source pollution. Each Annex to the Convention is concerned with a different type of harmful substance or effluent that may be intentionally or accidentally discharged from a ship. Vessel discharge should not be confused with ocean dumping, which concerns the disposal of land-generated wastes. In fact, Article 2, paragraph 3(b) of the Convention states that discharge does not include "dumping within the meaning of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. . . ."[149]

The MARPOL Convention was promulgated to bridge gaps left by the 1972 London Dumping Convention. Article 3, paragraph 1(i) of the Dumping Convention proclaims that dumping excludes "the disposal at sea of wastes or other matter incidental to, or derived from the normal operations of vessels . . . ."[150] In this way, the MARPOL and London Dumping Conventions, both authorized by IMO, are mutually cohesive in banning pollution activities that might contribute to loss of marine biological diversity.

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elastic. Plastics are used for a variety of marine purposes, including, but not limited to, packaging (vapor-proof barriers, structures, siding, piping, insulation, flooring, carpets, fabrics, paints and finishes, adhesives, electrical and electrical components), disposable eating utensils and cups, bags, sheeting, floats, fishing gear, strapping bands, rope and line.

INTERNATIONAL MARITIME ORGAN., DRAFT GUIDELINES FOR THE IMPLEMENTATION OF ANNEX V, REGULATIONS FOR THE PREVENTION OF POLLUTION BY GARBAGE FROM SHIPS, Annex, para. 1.5.4. (Working Paper 10 of the 25th Session of Marine Environment Protection Committee (MEPC)), *reprinted in* U.S. COAST GUARD, ANNEX V OF MARPOL 73/78, A COMPENDIUM OF IMPLEMENTING MATERIALS IN THE UNITED STATES A-5 (L. Berney ed., 1989).

148. *E.g.*, MARPOL 73, *supra* note 138, annex IV, art. 5(3) (disposal of food wastes must be done in accordance with Annex V).

149. *Id.* art. 2(3)(b)(i).

150. London Dumping Convention, *supra* note 126, art. 3(1)(i).

Annex V covers several types of garbage that might be dumped into seas beyond the limits of national jurisdiction. For example, the annex restricts the disposal at sea of floating dunnage and packing materials to areas at least 25 nautical miles from land. In addition, the disposal of food waste and other garbage, such as rags, paper and glass are prohibited closer to land than 12 nautical miles, or 3 nautical miles if the waste is ground up.[151] Significantly, Annex V also specifies that the disposal of all forms of plastic is prohibited anywhere in the ocean. In addition, any mixture of waste items is subsumed under the more stringent requirement. Thus, a combination of garbage that includes plastic items may not be discharged at sea.[152]

MARPOL 73/78 calls for penalties to be established under the laws of each party state in terms "adequate in severity to discourage violations."[153] If a violation occurs, the balance between flag and coastal states is fixed in matters regarding jurisdiction of states. According to the Convention, if the flag state of a vessel sailing in high seas were given sufficient evidence that a violation had occurred on board, that ship would be penalized in accordance with the laws of the flag state.[154]

An important jurisdictional caveat to MARPOL 73/78 concerns its applicability to public vessels. According to the Convention, it "shall not apply to any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service."[155] The treaty suggests, however, that these vessels "act in a manner consistent, so far as is reasonable and practicable, with the present Convention."[156] The MARPOL Convention does not specify what measures a state shall take regarding its public vessels; it only prescribes that they be appropriate and not impair the vessel's operational capabilities.

Annex V of the MARPOL Convention also exempts vessels that discharge garbage "for the purpose of securing the safety of a ship [and those on board] or saving life at sea."[157] Another

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151. MARPOL Annex V, *supra* note 144, reg. 3(1)(b), (c).

152. *Id.* reg. 3(2).

153. MARPOL 73, *supra* note 138, art. 4(4).

154. *Id.* art. 4(1). However, if the violation had occurred within the territorial waters of a state party to the convention, the coastal state would retain jurisdiction. *Id.* art. 4(2).

155. *Id.* art. 3(3).

156. *Id.*

157. MARPOL Annex V, *supra* note 144, reg. 6(a).

stipulated exception that has provoked international concern pertains to discarded fishing gear. The Annex does not apply to plastic fishing nets and other gear lost in the course of making repairs, "provided that all reasonable precautions have been taken to prevent such loss."[158] Nonetheless, the convention omits specifying what precautions shall be taken. Decisions relating to precautions are left to vessel operators.

As often is the case in international legal matters, state compliance remains essential to the success of Annex V. Governments owning more than half of the world's merchant fleet by weight have ratified the treaty.[159] Even so, compliance may not come easily from vessels registered to states that are parties to Annex V. The Annex prohibits the disposal of specified types of garbage in certain areas, and plastic in all areas. This means that ship-generated waste must be separated according to particular classifications. Vessel operators may have neither the time nor the inclination to proceed with such a task. On the open seas the temptation to dump garbage overboard may be simply too great.[160]

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158. *Id.* reg. 6(c).

159. According to provisions of the treaty, this must happen for Annexes to enter into force (i.e. half the fleet must ratify). MARPOL 73, *supra* note 138, art. 15(1), (2).

160. This is particularly true in remote regions of the world's oceans. As a consequence, in November 1990, the Marine Environment Protection Committee of the International Maritime Organization adopted a resolution that designated the Antarctic region—ocean area south of 60° south latitude—as a Special Area under Annexes I and V of MARPOL 73/78. These annexes contain regulations for the prevention of vessel-source pollution by oil in Annex I and garbage in Annex V. *See supra* notes 141 and 145.

This action underscores that the southern oceans are an area of notable importance for marine biodiversity. In this regard, three prominent objectives were set out in the specific amendments to Annexes I and V. First, no oily residues and mixtures, or garbage should be disposed of in the Antarctic, either on shore or at sea. Second, while it was recognized that no reception facility for Annex I or Annex V wastes existed in the Antarctic area, the Committee affirmed that no such facility should be made available there. The existence of such a facility would pose unacceptable problems for the ultimate disposal of wastes in the region. Third, before a ship sails to the Antarctic area, it should be capable of retaining the wastes on board until its departure from the area and arrangements should be made with a reception station outside the region to receive wastes retained on board.

Under MARPOL's so-called "tacit acceptance" procedures, these amendments were deemed to have been accepted on September 15, 1991 because, as of that date, one-third or more of the contracting parties, or those parties whose merchant fleets represent 50 percent or more of the world's merchant fleet, failed to oppose their adoption. Absent that opposition, the MARPOL amendments for the Antarctic entered into force on March 16, 1992.

V. INTERNATIONAL COOPERATION: THE BALANCE SHEET

A. *International Organizations*

Human interference with natural ecosystems inevitably intrudes upon the dynamic homeostasis of those ecosystems. All too often, these intrusions lead to losses in biological diversity. International efforts to protect biological diversity in marine environments have been limited, principally because biovariation in the oceans is not perceived as being notably threatened. The fluid character of the seas produces a common perception that human pollution is constantly being dispersed, and therefore any harm is continually being dissipated. Also, given that the medium of water is fluid, land-based solutions for protecting marine biodiversity are less than appropriate. Similarly, one can not easily erect borders or establish and enforce maritime safe zones. Water does not honor these boundaries, and the marine organisms that swim do not recognize the merits of such legal parameters. Nevertheless, a number of important international and regional fora have been established specifically to deal with human-made disruptions of the global ocean environment. In the process, these fora have dedicated themselves to implementing policies aimed at the protection and preservation of marine biodiversity.

Perhaps preeminent among these is the International Maritime Organization (IMO). Established by the United Nations in 1959 as the Inter-Governmental Maritime Consultative Organization, the IMO provides a forum for cooperation among governments on technical matters affecting international merchant shipping.[161] Membership in the IMO is intended to represent both traditional maritime states and states that rely on the shipping services of other countries.[162] Though the IMO initially placed special emphasis on the safety of life at sea, it has recently focused on the prevention and control of marine pollution from ships. Under Article 211 of the 1982 Law of the Sea Convention, the IMO is presumed to be the organization "competent" to authorize establishment of marine pollution

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161. THE INTERNATIONAL MARITIME ORGANIZATION 1 (Samir Mankabady ed., 1984). *See generally* R. MICHAEL M'GONIGLE & MARK W. ZACHER, POLLUTION, POLITICS, AND INTERNATIONAL LAW 39-77 (1979).

162. VI NEW DIRECTIONS IN THE LAW OF THE SEA 551 (Robin Churchill et al. eds., 1977).

standards.[163] The IMO has the authority to enforce the MARPOL 73/78 agreement on the high seas, as well as to negotiate new international instruments designed legally to dissuade global marine pollution.

Another important forum functioning to preserve marine biodiversity is the International Whaling Commission (IWC). This body, which was established under the International Convention for the Regulation of Whaling,[164] was organized expressly to save whales from extinction by large-scale whaling. At the time, most whaling was conducted principally by Japan, the Soviet Union, and Norway. The IWC sets quotas for commercial catches, which are now gradually declining, and the end objective is a total ban on all commercial whaling. In 1985, the IWC voted to impose a total moratorium on commercial whaling beginning in 1986.[165] No less significant, in May 1994, the IWC established a sanctuary in the Southern Ocean to protect whales.[166] The IWC Whale Sanctuary had two prominent implications. First, it reaffirmed the Antarctic as a special area for the protection and conservation of global marine biodiversity. Second, it marked for the IWC a milestone step toward the universal protection of whales in the world oceans.[167]

Another salient organization operating for the protection of global marine diversity is the Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR). This body, established under the authority of the Convention on the Conservation of Antarctic Marine Living Resources,[168] functions as the primary conservation agency for the whole of the Southern Ocean, encompassing all high seas ocean south of the Antarctic Convergence. The CCAMLR meets annually and, through consensus, formulates specific obligations restricting resource harvesting, as well as conservation policies for contracting parties

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163. 1982 LOS convention, *supra* note 58, art. 211. Article 211 provides that rules and standards for the prevention, reduction and control of pollution of the marine environment should be established through the "competent international organization," which is widely presumed to be the IMO.

164. Dec. 2, 1946, 62 Stat. 1716, 161 U.N.T.S. 72 [hereinafter IWC].

165. June 19, 1985 as an amendment to the Schedule of the IWC. *Id.*

166. *See* Andrew Darby, *Sanctuary for Whales Stops Japanese Kill*, SYDNEY MORNING HERALD, May 28, 1994, at 2, *available in* LEXIS, World Library, Allnws File. The sanctuary notion was originally proposed by France at the IWC Meeting in 1992 and would extend south of 40° south latitude. *See* THE ANTARCTICA PROJECT, A WHALE SANCTUARY FOR ANTARCTICA (1993). The decision by the IWC actually made the Southern Ocean Sanctuary an existing Indian Ocean Whales Sanctuary, which in effect made three-fourths of the southern hemisphere a protected area for whales.

167. Darby, *supra* note 166, at 23.

168. May 20, 1980, 33 U.S.T. 3476, 19 I.L.M. 841.

in the region. Since 1982, the CCAMLR has adopted, with expert scientific advice, at least seventy-five conservation measures in accordance with an ecosystemic approach aimed at sustaining biological diversity. Among these policies have been a precautionary cap on harvesting krill, closure of certain fisheries for cod and mackerel around island groups in the region, prohibition of certain pelagic and bottom nets based on mesh size, and a fishing vessel inspection and reporting system.[169]

Still another instrument expressly designed to conserve living resources in the southern seas is the Convention on the Conservation of Antarctic Seals (Seals Convention).[170] This agreement has operated effectively since 1978 to preclude unregulated commercial harvesting of six species of seals south of 60° south latitude. The Seals Convention employs an "optimum sustainable yield" standard to attain its conservation objectives.[171] Determination of this standard has necessitated use of expert scientific research, which has been coordinated by an independent body, the Scientific Committee on Antarctic Research (SCAR).

B. *Regional Protection Programs*

Several multilateral regional agreements, negotiated independently or as part of the United Nations Regional Seas Programme,[172] aim to preserve and protect the marine environment from pollution activities. These agreements generally oblige states to take measures that prevent, reduce, or control pollution from both land-based and ocean-based sources. While these instruments may be only regional in scope, they nonetheless constructively contribute to enhancing the norm of protecting biological diversity in the marine environment.

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169. For further discussion of CCAMLR and its special role in protecting biological diversity in the Southern Ocean, see CHRISTOPHER C. JOYNER, ANTARCTICA AND THE LAW OF THE SEA 221-62 (1992).

170. June 1, 1972, 29 U.S.T. 441, 11 I.L.M. 251.

171. *Id.* pmbl., para. 4.

172. For a detailed discussion of the United Nations Regional Seas Programme, including texts of the relevant regional agreements, see PETER H. SAND, MARINE ENVIRONMENTAL LAW IN THE UNITED NATIONS ENVIRONMENT PROGRAMME (1988). Under the U.N. Regional Seas Programme, 11 regions, containing 120 of the 130 coastal states, have been created. Working with the United Nations Environmental Programme, states in each region have formulated specific "action plans" that identify areas of cooperation, which are then negotiated into special conventions. Standards adopted in each of these plans directly serve to protect and preserve marine biodiversity.

The flagship agreement of the U.N. Regional Seas Programme is the 1976 Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention).[173] Indeed, all the other U.N. Regional Seas agreements are framed in the Barcelona Convention model.

The Barcelona Convention supplies an integrated approach to the regulation of marine environmental law. The preamble asserts that the parties to the Barcelona Convention are aware of "their responsibility to preserve the common heritage for the benefits and enjoyment of present and future generations." Article 2 defines "pollution" as "the introduction by man, directly or indirectly, of substances or energy into the marine environment resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to marine activities including fishing, impairment of quality for use of sea-water and reduction of amenities . . . ."[174] The Barcelona Convention thus mandates that contracting parties must take "all appropriate measures to prevent and abate pollution of the Mediterranean Sea Area caused by dumping from ships and aircraft."[175] There is no question that littoral states of the Mediterranean Sea Area have declared deliberate discharge of noxious substances and discard of debris into that marine environment to be unlawful, and

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173. Feb. 16, 1976, 15 I.L.M. 290 [hereinafter Barcelona Convention]. The following states or groups of states are currently parties to the Barcelona Convention: Algeria, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Spain, Syria, Tunisia, Turkey, Yugoslavia, and the European Economic Community. In addition to the Barcelona Convention, the following four related instruments are also in force for curbing pollution in the Mediterranean region: Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, Feb. 16, 1976, 15 I.L.M. 300, *reprinted in* SAND, *supra* note 172, at 15; Protocol Concerning Cooperation in Combatting Pollution from Ships and Aircraft of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency, Feb. 16, 1976, 15 I.L.M. 306, *reprinted in* SAND, *supra* note 172, at 22; Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources, May 17, 1980, 19 I.L.M. 869, *reprinted in* SAND, *supra* note 172, at 27; and Protocol Concerning Mediterranean Specially Protected Areas, Apr. 3, 1982, *reprinted in* SAND, *supra* note 172, at 37.

174. Barcelona Convention, *supra* note 173, art. 2.

175. *Id.* art. 5. The crux of the Barcelona Convention's purpose is articulated in Article 6, which provides that:

> The Contracting Parties shall take all measures in conformity with international law to prevent, abate and combat pollution of the Mediterranean Sea Area caused by discharges from ships and to ensure the effective implementation in that Area of the rules which are generally recognized at the international level relating to the control of this type of pollution.

Id. art. 6.

therefore banned within that region. This prohibition contributes directly to the protection of biodiversity in the Mediterranean Sea.

The 1978 Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (Kuwait Convention)[176] was designed to develop an integrated management approach to the marine environment of the Persian/Arabian Gulf region.[177] The Kuwait Convention specifically exhorts contracting parties to take "all appropriate measures" to "prevent, abate, and combat pollution in the Sea Area"[178] caused by "intentional or accidental discharges from ships."[179] With respect to protecting marine biodiversity in the region, the Kuwait Convention obligates contracting states to "take all appropriate measures to prevent, abate, and combat pollution in the Sea Area caused by dumping of wastes and other matter from ships and aircraft, and [they] shall ensure effective compliance in the Sea Area with applicable international rules relating to the control of this type of pollution as provided for in relevant international conventions."[180] Given the heavy oil tanker traffic sailing through the Persian Gulf, the Kuwait Convention emphasizes curbing pollution of the sea by oil. Highlighting this point is a special protocol for combatting pollution by oil and other harmful substances in cases of emergency.[181]

In 1981, a special regional seas agreement was negotiated to govern the Gulf of Guinea, located off the western coast of Africa. The Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central Africa Region (Abidjan Convention)[182] aims "to

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176. Apr. 24, 1978, 1140 U.N.T.S 133, *reprinted in* 17 I.L.M. 511 (1978) [hereinafter Kuwait Convention]. The following states are parties to the Kuwait Convention: Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. SAND, *supra* note 172, at 256.

177. The Kuwait Convention applies to the sea in the region "bounded in the south by the following rhumb lines: from Ras Dharbat Ali (16o 39' N, 53o 3'30' E) to a position 16o 00' N, 53o 25' E; thence through the following positions: 17o 00' N, 56o 30' E and 20o 30' N, 60o 00' E to Ras Al-Fasteh (25o 04' N, 60o 25' E) . . . ." Kuwait Convention, *supra* note 176, art. II(a).

178. *Id.* art. III(a).

179. *Id.* art. IV.

180. *Id.* art. V.

181. Protocol Concerning Regional Cooperation in Combatting Pollution by Oil and Other Harmful Substances in Cases of Emergency, Apr. 24, 1978, *reprinted in* SAND, *supra* note 172, at 58.

182. Mar. 23, 1981, 20 I.L.M. 746 [hereinafter Abidjan Convention]. Signatories to this convention for the Gulf of Guinea include Benin, Cameroon, Congo, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mauritania, Nigeria, Senegal, and Togo. SAND, *supra* note 172, at 257.

prevent, reduce, combat and control pollution of the Convention area and to ensure sound environmental management of natural resources, using for this purpose the best practicable means at their disposal, and in accordance with their capabilities."[183] The Abidjan Convention seeks to strengthen legal constraints on pollution from ships in that all discharges from vessels are rendered unlawful, regardless of intent or accidental circumstance in the normal course of vessel operations.[184] Like other maritime antipollution regional agreements, this instrument explicitly strives to eliminate pollution in the convention area caused by dumping of wastes from ships or aircraft. Toward this end, it aspires to apply "internationally recognized rules and standards relating to the control of this type of pollution."[185]

The 1981 Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific (Lima Convention)[186] generally obligates parties to "adopt appropriate measures . . . to prevent, reduce and control pollution of the marine environment and coastal area of the South Pacific and to ensure appropriate environmental management of natural resources."[187] Primarily, the agreement aims at the prevention, reduction and control of marine environmental pollution so as to minimize any possibility that "toxic, harmful or noxious substances" might be released into the marine environment.[188] Of special concern are those substances and materials that are

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183. Abidjan Convention, *supra* note 182, art. 4(1).

184. Article 5, the provision dealing with "Pollution from Ships," provides the following:

> The Contracting Parties shall take all appropriate measures in conformity with international law to prevent, reduce, combat and control pollution in the Convention area caused by normal or accidental discharges from ships, and shall ensure the effective application in the Convention area of the internationally recognized rules and standards relating to the control of this type of pollution.

Id. art. 5.

185. *Id.* art. 6.

186. Nov. 12, 1981, U.N. Doc. UNEP/GC/INF.11 at 185 [hereinafter Lima Convention], *reprinted in* SAND, *supra* note 172, at 151 (not yet in force). Regarding geographical coverage, the "sphere of application of this Convention shall be the sea area and the coastal zone of the South-East Pacific within the 200-mile maritime area of sovereignty and jurisdiction of the High Contracting Parties and, beyond that area, the high seas up to a distance within which pollution of the high seas may affect that area." Lima Convention, *supra*, art. 1. Signatories to the Lima Convention include Chile, Colombia, Ecuador, Panama, and Peru. SAND, *supra* note 172, at 257.

187. Lima Convention, *supra* note 186, art. 3(1).

188. *Id.* art. 4.

persistent and come from land-based, atmospheric, or ocean-dumping sources.[189]

Though much of the Lima Convention is devoted to emergency pollution situations affecting the region, a special related instrument, the 1983 Quito Protocol for the Protection of the South-East Pacific Against Pollution from Land-based Sources,[190] lists in an annex those substances of particular pollution concern. Included among those substances are "[p]ersistent synthetic materials which may float, sink, or remain in suspension and which may interfere with any legitimate use of the sea." This clear reference to plastic materials contributes to the legal norms aimed at suppression of marine plastic pollution on the high seas, and hence the protection of the biological diversity of living resources in the southeast Pacific.

In 1982, the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention)[191] was promulgated. This instrument commits the parties to "take all appropriate measures . . . for the conservation of the Red Sea and Gulf of Aden environment including the prevention, abatement and combating of marine pollution."[192] The Jeddah Convention mandates that parties "take all appropriate measures" that conform with generally recognized international rules "to prevent, abate and combat pollution in the Sea Area caused by intentional or accidental discharge."[193] Moreover, parties are directed "to prevent, abate, and combat" pollution in the convention area that is caused by the dumping of wastes and other matter from ships and aircraft.[194]

The 1983 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention)[195] was negotiated to provide a cooperative

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189. *Id.* art 4(a).

190. July 22, 1983, Annex I, *reprinted in* SAND, *supra* note 172, at 103, 110.

191. Feb. 14, 1982, U.N. Doc. UNEP/GC/INF.11 at 191 [hereinafter Jeddah Convention], *reprinted in* SAND, *supra* note 172, at 114. In 1990, parties to the Jeddah Convention included: Democratic Yemen, Jordan, Saudi Arabia, Somalia, Sudan, Yemen Arab Republic, and the Palestine Liberation Organization. SAND, *supra* note 172, at 258.

192. Jeddah Convention, *supra* note 191, art. III(1).

193. *Id.* art. IV.

194. *Id.*

195. Mar. 24, 1983, T.I.A.S. No. 11,085, 22 I.L.M. 227 [hereinafter Cartagena Convention]. The Caribbean is the only region in the U.N. Regional Seas Programme that encompasses territorial waters of the United States, and the Cartagena Convention is the only regional seas convention that the United States has signed and ratified. Other parties to the Cartagena Convention include: Antigua and Barbuda, Barbados, Colombia, Cuba, Dominica, France, Grenada,

regional mechanism for reducing and controlling marine pollution of all kinds within the Caribbean area.[196] The Cartagena Convention commits contracting parties "to endeavor to conclude bilateral or multilateral agreements, . . . for the protection of the marine environment."[197] To that end, parties are obligated to take "all appropriate measures" to (a) prevent, reduce, and control pollution from ships; (b) prevent, reduce, and control pollution caused by dumping; and (c) prevent, reduce, and control pollution caused by coastal disposal or by discharge emanating from internal waters.[198]

The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention)[199] was promulgated in 1985 to preserve the marine and coastal environment of the Indian Ocean offshore of Eastern Africa.[200] The Nairobi Convention imposes upon the parties the overriding obligation to "take all appropriate measures in conformity with international law" to prevent, reduce, and combat marine pollution of the Nairobi Convention area and to ensure sound environmental management of natural resources.[201] To this end, the agreement mandates that parties take all appropriate measures to prevent, reduce, and combat pollution of the convention area caused by discharges from ships[202] and by dumping of wastes and other matter at sea from ships, aircraft, or man-made structures at sea.[203] Pollution emanating from coastal disposal or discharges from land-based sources is also singled out for concern.[204]

The widest ranging regional seas agreement, in terms of geographical scope, relates to the South-West Pacific. Negotiated in 1982, the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (Noumea

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Jamaica, Mexico, the Netherlands, Panama, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, United Kingdom, United States, and Venezuela. TREATIES IN FORCE, *supra* note 130, at 366.

196. Cartagena Convention, *supra* note 195, art. 4(1). Jurisdiction extends out to 200 miles in the convention area, which includes the Gulf of Mexico, Caribbean Sea, and areas of the Atlantic Ocean adjacent thereto, south of 30 degrees north latitude. *Id.* art. 2(1).

197. *Id.* art. 3(1).

198. *Id.* arts. 5-7.

199. June 21, 1985 [hereinafter Nairobi Convention], *reprinted in* SAND, *supra* note 172, at 156. In late 1994, France, Madagascar, Seychelles, Somalia, and the European Economic Community were signatories to this agreement.

200. Nairobi Convention, *supra* note 199, art. 2(a).

201. *Id.* art. 4(a).

202. *Id.* art. 5.

203. *Id.* art. 6.

204. *Id.* art. 7.

Convention)[205] obligates parties "to prevent, reduce and control pollution of the Convention Area from any source, and to ensure sound environmental management and development of natural resources . . . ."[206] The convention enjoins parties to prevent, reduce, and control pollution caused by discharges from vessels in the region,[207] as well as from land-based sources.[208]

The injunction against dumping in the Pacific is couched in an attached Protocol, specifically negotiated for that purpose.[209] The Protocol tersely asserts that the parties "shall take all appropriate measures to prevent, reduce, and control pollution in the Protocol Area by dumping."[210] To clarify and reaffirm this edict, the Protocol includes a special annex that lists wastes and

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205. Nov. 25, 1986, 26 I.L.M. 41 (1987) [hereinafter Noumea Convention]. The geographical coverage of this regional seas agreement is vast. As provided for in Article 1, "the Convention area" is comprised of the following:

> (i) the 200 nautical mile zones established in accordance with international law of:
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> American Samoa, Australia (East Coast and Islands to eastward including Macquarie Island), Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia and Dependencies Wallis and Futuna, New Zeland, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcarin Islands, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, [and] Western Samoa
>
> (ii) those areas of high seas which are enclosed from all sides by the 200-nautical-mile zones referred to in sub-paragraph (i);
>
> (iii) areas of the Pacific Ocean which have been included in the Convention Area pursuant to article 3;

Id. art. 2(a).

Article 3 enlarges the convention area such that "[a]ny party may add areas under its jurisdiction within the Pacific Ocean between the Tropic of Cancer and 60 degrees South latitude and between 130 degrees East longitude and 120 degrees West longitude to the Convention Area." *Id.* art. 3. This agreement counts the following as parties: Australia, Cook Islands, Fiji, France, Marshall Islands, Micronesia, New Zealand, Papua New Guinea, Solomon Islands, United Kingdom, United States, and Western Samoa. TREATIES IN FORCE, *supra* note 130, at 312.

206. Noumea Convention, *supra* note 205, art. 5(1).

207. *Id.* art. 6.

208. *Id.* art. 7.

209. Protocol for the Prevention of Pollution of the South Pacific Region by Dumping, Nov. 25, 1986, 26 I.L.M. 65 (1987) [hereinafter Noumea Protocol]. Parties to the dumping protocol include: Australia, Cook Islands, Federated States of Micronesia, France, Marshall Islands, Nauru, New Zealand, Palau, Papua New Guinea, Tuvalu, United Kingdom, United States, and Western Samoa. TREATIES IN FORCE, *supra* note 130, at 311.

210. Noumea Protocol, *supra* note 209, art. 3(1).

other matter the dumping of which is expressly prohibited.[211] Particularly important for protecting marine biological diversity in the Pacific, the annex of blacklisted substances and materials includes "[p]ersistent plastics and other . . . synthetic materials, for example, netting and ropes, which may remain in suspension in the sea in such a manner as to interfere materially with fishing, navigation or other legitimate uses of the sea."[212]

Beyond the family of United Nations Regional Seas Agreements, three other prominent regional antipollution instruments hold relevance for protecting marine biodiversity. The 1972 Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (Oslo Convention)[213] was the earliest regional agreement to address the problem of marine pollution. The purpose of this legal instrument is to prevent pollution of the sea by substances that are likely to create hazards to human health, harm living resources and marine life, or interfere with the legitimate uses of the sea. The authority to enforce provisions is lodged in individual contracting parties, who are assigned responsibility for promulgating regulations and issuing licenses for permissible dumping activities.

The 1974 Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention)[214] also addresses marine pollution in broad scope, including pollution produced from ship-generated wastes, dumping, land-based sources, and seabed exploration and exploitation. Discharge of plastics from ships is prohibited, although accidental losses of synthetic fishing gear are excepted.[215]

There is concern that the ban on disposal of ship-generated garbage within the Baltic Sea area may actually contribute to the disposal of garbage just prior to entry or upon leaving the region.[216] For vessels registered in states that are parties to international antipollution agreements banning the discharge or dumping of materials, acts of disposal beyond the Baltic would be unlawful in any case. Therefore, the real concern is willful violation of the international legal norm that stipulates

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211. *Id.* art. 4 & Annex I.

212. *Id.* Annex I(A)(4).

213. Feb. 15, 1972, 932 U.N.T.S. 3, *reprinted in* 11 I.L.M. 262 (1972).

214. Mar. 22, 1974, U.N. Doc. A/CONF.62/C.3/L.1, *reprinted in* 13 I.L.M. 546 (1974).

215. *Id.* Annex III, reg. 8 (b)(1)(a)(1).

216. *See* CENTER FOR ENVIRONMENTAL EDUCATION, PERSISTENT MARINE DEBRIS IN THE NORTH SEA, NORTHWEST ATLANTIC OCEAN, WIDER CARIBBEAN AREA, AND THE WEST COAST OF BAJA CALIFORNIA, at III-8, VII-11 (1988).

nonpollution of ocean space by the discard of substances and materials harmful to marine biodiversity.

The third regional environmental agreement is the Protocol on Environmental Protection to the Antarctic Treaty (Environmental Protection Protocol),[217] which was adopted by the Antarctic Treaty consultative parties in October 1991.[218] This agreement provides a comprehensive framework for regulating the protection of biological diversity in the Antarctic region, inclusive of the ocean space south of 60° south latitude. The fundamental premise undergirding the protocol is stated in its Article 3:

> The protection of the Antarctic environment and dependent and associated ecosystems and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research, in particular research essential to understanding the global environment, shall be fundamental considerations in the planning and conduct of all activities in the Antarctic Treaty area.[219]

The Protocol also bans mining and drilling in the Antarctic, inclusive of offshore areas.[220] Furthermore, it creates a Committee on Environmental Protection to give advice and make policy recommendations to the Antarctic Treaty states.[221]

Five annexes are attached to the Environmental Protocol, dealing with environmental impact assessment,[222] conservation of fauna and flora,[223] waste disposal and waste management,[224] marine pollution,[225] and protected areas that are to be implemented in furtherance of the environmental protection of

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217. Oct. 4, 1991, 30 I.L.M. 1461 [hereinafter Antarctic Environmental Protocol], *reprinted in* JOHN HEAP, HANDBOOK OF THE ANTARCTIC TREATY SYSTEM 2018 (1994).

218. Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794, 402 U.N.T.S. 71. The states party to the Antarctic Treaty that negotiated the Environmental Protection Protocol include: Argentina, Australia, Belgium, Brazil, Chile, China, Ecuador, Finland, France, Germany, India, Italy, Japan, the Netherlands, New Zealand, Norway, Peru, Poland, Russia, South Africa, South Korea, Spain, Sweden, United Kingdom, United States, and Uruguay.

219. Antarctic Environmental Protocol, *supra* note 217, art. 3(1).

220. *Id.* art. 7.

221. *Id.* art. 11.

222. *Id.* Annex I: Environmental Impact Assessment, 30 I.L.M. at 1473.

223. *Id.* Annex II: Conservation of Antarctic Fauna and Flora, 30 I.L.M. at 1476.

224. *Id.* Annex III: Waste Disposal and Waste Management, 30 I.L.M. at 1479.

225. *Id.* Annex IV: Prevention of Marine Pollution, 30 I.L.M. at 1483.

Antarctica.[226] It is Annex IV, however, that expressly concerns protection of marine biological diversity in the circumpolar seas.

Annex IV, "Prevention of Marine Pollution,"[227] is directly linked to the International Convention for the Prevention of Pollution from Ships, as amended by its 1978 Protocol (MARPOL 73/78).[228] Annex IV deals with discharges from ships—oil, noxious liquids, garbage, and sewage—that can adversely impact biological diversity in the Antarctic ocean environment. To this end, additional provisions stipulate the need for vessel retention capacity,[229] and emergency response and preparedness.[230]

Article 3 of Annex IV prohibits "any discharge of oil or oily mixture," except in circumstances permitted under Annex I of MARPOL 73/78.[231] The marine pollution annex forbids "[t]he discharge . . . of any noxious liquid substance, and any other chemical or other substances, in quantities or concentrations that are harmful to the marine environment. . . ."[232] Article 5 goes on to expressly prohibit disposal into the sea of two other categories of substances: (1) plastics, "including but not limited to synthetic ropes, synthetic fishing nets, and plastic garbage bags . . ."[233] and (2) all forms of garbage, "including paper products, rags, glass, metal, bottles, crockery, incineration ash, dunnage, lining and packing materials . . . ."[234] Parties are also obligated in Article 6 to "eliminate all discharge . . . of untreated sewage . . . within 12 nautical miles of land or ice shelves. . . ."[235] Beyond that distance, any sewage discharge is to be made "at a moderate rate and, where practicable, while the ship is en route at a speed of no less than 4 knots."[236] Such practices, it is believed, will not disrupt biological diversity in the Antarctic ecosystem.

Enforcement is left to each contracting party. Each party is expected to exercise enforcement powers over their flag ships and over ships supporting that government's Antarctic operations.[237] Annex IV also obligates flag states to ensure that all their ships are fitted with retention tanks of sufficient capacity to retain "all

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226. Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, Oct. 18, 1991, *reprinted in* HEAP, *supra* note 217, at 2125.
227. Antarctic Environmental Protocol, *supra* note 217, Annex IV.
228. MARPOL 73/78, *supra* note 138.
229. Antarctic Environmental Protocol, *supra* note 217, Annex IV, art. 9.
230. *Id.* art. 12.
231. *Id.* art. 3(1).
232. *Id.* art. 4.
233. *Id.* art. 5(1).
234. *Id.* art. 5(2).
235. *Id.* art. 6(1)(a).
236. *Id.* art. 6(1)(b).
237. *Id.* art. 2.

sludge, dirty ballast, tank washing water and other oily residues and mixtures" while operating in the region.[238] Contracting governments are made responsible for ensuring that all ships flying their flags have "sufficient capacity" on board for the retention of garbage while within the Antarctic Treaty area,[239] as well as providing "adequate facilities" for the reception of all sludge, dirty ballast, tank washing water, oily residues, and garbage from all ships.[240]

Compliance with the Protocol and its annexes is left to governments party to the Protocol. Indeed, parties are obligated to take "appropriate measures" to ensure compliance.[241] The Protocol also provides that inspections of stations, installations, equipment, ships, and aircraft within the Antarctic Treaty area should be carried out "to promote the protection of the Antarctic environment . . . and associated ecosystems, and to ensure compliance with this Protocol. . . ."[242]

C. *Resource-Specific Protection Measures*

Several treaty agreements are specially designed to coordinate the international protection and preservation of select biological resources in the global marine environment. Among these are the International Convention for the Conservation of Atlantic Tunas,[243] the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean,[244] the Convention for the Establishment of an Inter-American Tropical Tuna Commission,[245] the Convention for the Conservation of Salmon in the North Atlantic Ocean,[246] the Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America,[247] and the International Convention for the Regulation of Whaling.[248] In addition, two other agreements concerning fishing on the high seas have been negotiated recently but are not yet in force. These agreements

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238. *Id.* art. 9(1).
239. *Id.*
240. *Id.* Annex IV, art. 9(2).
241. *Id.* art. 13(1).
242. *Id.* art. 14(1).
243. May 14, 1966, 20 U.S.T. 2887, 673 U.N.T.S 63.
244. Feb. 11, 1992, S. TREATY DOC. NO. 30, 102d Cong., lst Sess. (1992).
245. Mar. 3, 1950, 1 U.S.T. 230, 80 U.N.T.S. 3.
246. Mar. 2, 1982, T.I.A.S. No. 10,789.
247. Apr. 2, 1987, T.I.A.S. No. 11,100, 26 I.L.M. 1048.
248. Nov. 19, 1956, 10 U.S.T. 952, 338 U.N.T.S. 366.

concern regulation of pollack resources in the Bering Sea,[249] and promotion of fishing vessel compliance with international conservation and management practices.[250] Conservation of biological diversity among these marine resources is the overarching *raison d'etre* for each of these international agreements.

Within the last decade, there has been an international effort to ban the use of extremely long pelagic driftnets on the high seas. This effort represents a highly significant step toward the protection of marine biological diversity. These monofilament nets, which can measure nine meters in depth and forty-five kilometers in length, are visually and acoustically undetectable. Consequently, they are highly effective in capturing large quantities of living marine resources, albeit indiscriminately. In the process, such driftnets literally strip mine the oceans. They entangle everything in their path and harvest not only target species, but also snare vast incidental catches, including other fish, marine mammals, sea turtles, and sea birds.[251] As a result, stocks of living resources are depleted to unsustainable levels and biological diversity in the oceans is considerably diminished.

In 1990, the United Nations General Assembly set an international moratorium on the use of large scale driftnets on the high seas.[252] More important to international law, however,

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249. *See* Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, June 16, 1994, S. TREATY DOC. NO. 27, 103d Cong., 2d Sess. (1994).

250. *See* Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, Nov. 24, 1993, S. TREATY DOC. NO. 24, 103d Cong., 2d Sess. (1994), 33 I.L.M. 969.

251. *See* U.S. DEP'T OF COMMERCE, REPORT OF THE SECRETARY OF COMMERCE TO THE CONGRESS OF THE UNITED STATES ON THE NATURE, EXTENT, AND EFFECTS OF DRIFTNET FISHING IN WATERS OF THE NORTH PACIFIC OCEAN (1989). For an insightful analysis of the problems and legal issues involved, see D.M. Johnston, *The Driftnetting Problem in the Pacific Ocean: Legal Considerations and Diplomatic Options*, 21 OCEAN DEV. & INT'L L. 5 (1990).

252. *Large-Scale Pelagic Driftnet Fishing and Its Impacts on the Living Resources of the World's Oceans and Seas*, G.A. Res. 225, U.N. GAOR, 44th Sess., U.N. Doc. A/225 (1990), *reprinted in* 29 I.L.M. 1555 (1990). Although not legally binding, this General Assembly resolution calls for a global ban on high seas driftnet fishing by June 30, 1992, and recommends immediate cessation of any further expansion of this industry and all driftnetting in the South Pacific by July 1, 1991. *Id.* para. 4. Significantly, the resolution also calls for international cooperation for the monitoring, conservation, and management of marine resources along the lines endorsed by the 1982 LOS Convention and the Wellington Convention for the Prohibition of Driftnet Fishing. *Id.* pmbl. *See also United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks*, G.A. Res. 192, para. 1, U.N. GAOR, 47th Sess., U.N. Doc. A/192, *reprinted in* 23 LAW OF THE SEA BULLETIN 14 (1993). For a highly critical assessment of the

was the promulgation of a special Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific (Driftnet Convention) in 1990, which has since entered into force.[253] This agreement requires parties to prohibit driftnet fishing in areas subject to their fisheries jurisdiction that are also within the Convention Area; parties' own nationals and vessels are prohibited from driftnet fishing anywhere in the Convention Area.[254] The Driftnet Convention provides that parties may take additional actions, including the prohibition of imports of fish caught with driftnets within the Convention Area.[255]

The critical consideration regarding all of these instruments is clear. Each agreement articulates international conservation standards and legal prescriptions for harvesting a particular fishery. Consequently, each agreement implements measures for its contracting states to preserve and protect the biological diversity of that particular resource in its respective marine environment. These contributions are important. They highlight the need for special attention to the protection and conservation of certain targeted living resources. They also provide binding legal remedies for policy action by states toward those ends.

There also are a number of international fishery conservation associations that are noteworthy. For example, the Northwest Atlantic Fisheries Organization (1978) and the North East Atlantic Fisheries Commission (1980) are subregional fishery commissions designed to manage the conservation of special living resources in high sea fisheries. To achieve that purpose, they contribute to protecting biological diversity within the regional scope of their

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United Nations role in regulating driftnet fishing, see William T. Burke et al., *United Nations Resolutions on Driftnet Fishing: An Unsustainable Precedent for High Seas and Coastal Fisheries Management*, 25 OCEAN DEV. & INT'L L. 127 (1994).

253. Nov. 24, 1989, 29 I.L.M. 1454 (1990) [hereinafter Wellington Convention]. *See Ban Endorsed on Drift Nets*, N.Y. TIMES, Nov. 27, 1989, at D6. Representatives of twenty South Pacific states adopted the Final Act of the Meeting on a Convention to Prohibit Driftnet Fishing in the South Pacific, in Wellington, New Zealand. The Convention was prompted by the severe impact that foreign driftnetting vessels were having on the South Pacific tuna fishery. The Convention resorts to indirect means to restrict high seas driftnetting, including restricting port access to driftnet vessels, prohibiting possession of driftnets on board fishing vessels within the Convention's jurisdictional ambit, and prohibiting possession or importation of fish products caught by driftnets. Wellington Convention, *supra*, art. 3(2).

254. Wellington Convention, *supra* note 253, art. 2. The Convention encompasses the area "lying within 10 degrees North latitude and 50 degrees south latitude and 130 degrees East longitude and 120 degrees West longitude. . . ." *Id.* art. 1(a)(i).

255. *Id.* art. 3(2)(c).

jurisdiction. Nonetheless, while the aims of these organizations are significant, certain problems are presented by nonparty distant-water fishing nations. Fleets from Japan, South Korea, Poland, and China continue to fish in these high seas areas and often overharvest local stocks. Only if these governments are willing to participate in serious negotiations can regulations be produced that will be enforceable against their nationals. If their participation can be obtained, greater progress might be made toward the preservation of the biodiversity of fishery resources in the Atlantic Ocean.[256]

A principal lesson to be derived from the experience of international conservation agreements and regional fishery associations is that international law is executed through specific regulations on selected parties. If those regulations are less than sufficiently restrictive or encompassing, then the law will be less than sufficiently effective. For example, if international environmental laws designed to halt pollution and over-fishing are implemented with imperfect enforcement mechanisms and means of prosecution, then degradation and over-harvesting will continue to encroach upon living marine communities. Even if international regulations are clear, appropriate, and applicable, the inconsistent and inadequate enforcement will remain a weak link in achieving protection of marine biodiversity.

It is true that international agreements and national law guide and propel solutions for the protection and preservation of marine biological diversity. Still, the preeminent critical factor remains implementation and enforcement of those laws at the local level. Economic incentives must be made a vital component of any effort to protect, preserve, or conserve marine biological diversity.[257]

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256. A new treaty holds out of the promise of resolving such disputes by regulating fisheries, allocating increasingly scarce living marine resources and thus protecting marine biodiversity. *See* 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, *done* Aug. 4, 1995, U.N. Doc. A/CONF./64/33 (1995). For discussion, see David A. Balton, *Strenthening the Law of the Sea: A New Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks*, ___ OCEAN DEV. & INT'L L. ___ (forthcoming 1996).

257. *See* William M. Flevares, *Ecosystems, Economics, and Ethics: Protecting Biodiversity at Home and Abroad*, 65 S. CAL. L. REV. 2039 (1992).

VI. CONCLUSION

Humans destroy marine ecosystems. In the process, they cause species extinction. Modern technology and market demands encourage humans to exploit living marine resources, especially fisheries, to alter the physical habitat of coastal areas, especially wetlands and estuaries, and to pollute coastal waters with chemicals, garbage, and nonbiodegradable debris.

Humans often place short-term gains ahead of long-term stability. That can be a tragic miscalculation. Such myopic vision often obstructs the fact that conservation ultimately benefits all society—economically, politically, socially, and aesthetically. The upshot of this situation is that a general crisis threatens the survival of living marine resources. There is a critical need for prudent international planning and coordinated management that will insure the continued vitality and survival of these valuable marine ecosystems.

To safeguard the biological diversity of marine environments, the economic development in the coastal zones of states must be effectively regulated. To effectively protect marine biological diversity, coastal states must practice integrated coastal management on a regional scale, coordinated and enforced by national authorities. Regulation of ocean uses must also be made consistent on a global level.

There also is a need for tighter pollution controls and greater economic costs to be placed on polluters. The only effective solution is to eliminate pollution of the marine environment at its sources. This critical precondition requires more than stronger regulations. It requires a revolutionary new attitude toward industrial development, agricultural production, and recreational activities.

States must adopt a precautionary approach to ocean pollution policy. Directly antithetical to this remedy is the widespread perception that the world's oceans should be a global toilet into which the wastes of the world can be flushed, dissolved, and dissipated. Obviously, this approach is short-sighted. Such overt selfishness places short-term economic gains above long-term economic costs, and extols the goal of expediency above the virtue of prudence.

Implementing a comprehensive legal system for global marine ecosystem management will neither be easy nor possible to accomplish perfectly. Still, the efficacy of international policies to

conserve marine biodiversity rests on the genuine commitment by national governments. Governments make international laws prohibiting pollution and over-fishing of the seas, and governments must enforce those laws against nationals who violate them. In the final analysis, the fault for activities degrading marine biodiversity will not lie in frail law. The fault will lie with the governments that fail to uphold their international obligations.