

# MARINE BIODIVERSITY AND INTERNATIONAL LAW: INSTRUMENTS AND INSTITUTIONS THAT CAN BE USED TO CONSERVE MARINE BIOLOGICAL DIVERSITY INTERNATIONALLY

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## I. INTRODUCTION

The great majority of attention and effort on the issue of biological diversity has been directed toward land-based ecosystems. Even though more than two-thirds of the planet is ocean, and even though there are more types of species in the seas than on land, the legal and institutional framework for governing human activities in the marine environment lags two decades behind that for the terrestrial environment.<sup>1</sup> For most of human history, people have seen the ocean as a limitless and unchangeable resource, with endless physical and biological resilience to respond to the activities of man.<sup>2</sup> We must realize that the oceans are not beyond human influence and that we must act to preserve them.

### A. *What is Marine Biodiversity?*

The most widely used definition of biological diversity looks at three levels of diversity: genetic, species, and ecosystem diversity.<sup>3</sup> The most obvious level is species diversity, or the number of individual species. Most lay people identify this level as the whole of biological diversity. Ecosystem and genetic diversity are less understood by decisionmakers and the general public, but are just as important. Ecosystem diversity encompasses not only the species composing the

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1. GLOBAL MARINE BIOLOGICAL DIVERSITY: A STRATEGY FOR BUILDING CONSERVATION INTO DIVERSITY xviii (Elliot A. Norse ed., 1993).

2. Peter Weber, *Abandoned Seas: Reversing the Decline of the Oceans*, WORLDWATCH PAPER 116, Nov. 1993, at 5.

3. NORSE, *supra* note 1, at 9.

marine communities, but also the physical structures of the ecosystems and the interactions of the species within the community. There are a number of drastically differing types of marine ecosystems, such as salt marshes, coral reefs, and deepsea ecosystems. Ecosystem diversity can also occur within these types of habitats. For example, river estuaries would vary in different areas of the world. The last level of biological diversity is the genetic diversity within a particular species. Populations of the same species, separated by factors such as geography, with limited genetic mixing between the populations, will develop different characteristics. Even within a population, some individuals may have characteristics that others do not. Genetic diversity is very important to biological diversity because populations with higher genetic diversity are more likely to have some individuals that can withstand environmental change.<sup>4</sup>

Another definition is provided by the recent Convention on Biodiversity:<sup>5</sup> “*Biological diversity*” means 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.<sup>6</sup>

This definition reflects the three levels of biodiversity. The specific inclusion of marine and aquatic species reflects the growing global awareness of the value of marine resources.

Marine biodiversity is of vital importance to human-kind. Nearly 71% of the earth’s surface is covered by oceans, which hold 97% of the earth’s water.<sup>7</sup> The oceans perform vital functions, such as regulating the global climate, moderating local temperatures, removing carbon dioxide (the primary greenhouse gas) from the atmosphere, and providing a major source of protein for human consumption. “In some countries more than half of the animal protein that people eat comes from the sea.”<sup>8</sup> In Asia, more than one billion people rely on fish as their primary source of protein, as do many other people in island nations and along the coast of

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4. *Id.* at 10-13.

5. Convention on Biological Diversity, June 5, 1992, art. 2, 31 I.L.M. 822, 823 [hereinafter Convention on Biodiversity].

6. *Id.*

7. Weber, *supra* note 2, at 7.

8. NORSE, *supra* note 1, at xxviii.

Africa.<sup>9</sup> Marine photosynthesis produces one-third to one-half of the global oxygen supply.<sup>10</sup> In addition, the biological diversity of the oceans is an invaluable and scientifically important resource. "The sea is far richer in major groupings (phyla) of animals than the land; nearly one-half of all animal phyla occur only in the sea."<sup>11</sup> Scientific researchers frequently turn to the sea to search for medical cures and unique compounds. Sea sponges have provided anti-leukemia drugs, bone graft material has come from coral, red algae has produced diagnostic chemicals, and anti-infection compounds have come from shark skin.<sup>12</sup> Losses of marine biodiversity threaten these important functions and values.

The full extent of the diversity of life in the ocean is not known. Because marine species are so poorly documented, the true number of ocean species is certain to be far higher than the number presently recorded.<sup>13</sup> Marine habitats can be drastically disparate, ranging from icy plains to deep mountain ranges to shallow tropical coral reefs.<sup>14</sup> The life forms inhabiting this spectrum would also need to be radically diverse. There is a pressing need for further research and study regarding marine biodiversity.

#### *B. The Threats to Marine Biodiversity*

Just as on land, diversity in the ocean is threatened by human exploitation (both directed and incidental catches of fish and other marine organisms), by alterations of the physical environment (such as coastal development), by pollution, by introduction of alien species, and by atmospheric and climatic change. The oceans are vulnerable to the same unsustainable trends that are degrading the terrestrial environment.<sup>15</sup> Extinction of species is occurring at rates that are high by historical standards. Because of this, many more species are threatened.<sup>16</sup>

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9. Weber, *supra* note 2, at 9.

10. *Id.* at 8.

11. NORSE, *supra* note 1, at xxvii-xxviii.

12. Weber, *supra* note 2, at 10-11.

13. *Id.* at 11.

14. *Id.*

15. NORSE, *supra* note 1, at xxviii-xxix.

16. THE WORLD BANK WORLD DEVELOPMENT REPORT 1992: DEVELOPMENT AND THE ENVIRONMENT, 6 (1992) [hereinafter THE WORLD BANK].

## II. OVEREXPLOITATION

While once prosperous fishing communities, the Canadian maritimes have been reduced to welfare, and New England fishermen face the prospect of a shutdown of the entire groundfish industry.<sup>17</sup> At least two species of the once plentiful groundfish they sought off the Grand Banks, cod and haddock, are thought to be commercially extinct.<sup>18</sup> These groundfish may even be approaching biological extinction.<sup>19</sup> The Peruvian anchovy catch was the largest in the world during the 1950s and 1960s. Then it collapsed, took two decades to recover, and is on the downturn once again.<sup>20</sup> In the Bering Sea, the Alaska pollock catch has in the past decade climbed to the largest domestic fish catch by volume and one of the world's largest single species fisheries.<sup>21</sup> However, accompanying the rise in landings has been a decline in seabirds and marine mammals that prey on the same species of fish.<sup>22</sup> Swordfish in the Atlantic have been reduced to 40% of their spawning population, fewer than 20 years ago, and the average size of mature female fish has dropped from more than 100 to less than 70 pounds.<sup>23</sup>

These are but a few examples of the results of the centuries-old notion of *Mare Liberum*, freedom of the seas,<sup>24</sup> the informal principle behind fishery management (or lack of it). Documented catches of fish rose from a mere 5 million tons in 1900, to a peak of 86 million tons in 1989, before being forced downward.<sup>25</sup> For many years fishers kept the catch numbers climbing by abandoning overexploited stocks and concentrating on new species.<sup>26</sup> The unsustainability of this trend is

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17. See generally Bruce N. Shibles, *Implications of an International Standard for Transboundary Management of Gulf of Maine-Georges Bank Fishery Resources*, 1 OCEAN & COASTAL L. J. 1 (1994).

18. Weber, *supra* note 2, at 36.

19. Anthony Vaughan, *Stock Assessment Presentation to New England Fishery Management Council*, NORTHERN FISHERIES SCIENCE CENTER, Aug. 10, 1994.

20. Nat'l Oceanic & Atmospheric Admin., *Our Living Oceans, Report on the Status of U.S. Living Marine Resources, National Oceanic and Atmospheric Administration, NOAA Tech. Memo. NMFS-F/SPO-2*. Dec., 1992, at 82 [hereinafter *Our Living Oceans*].

21. *Id.* at 105.

22. *Id.* at 109, 117.

23. John J. Hoey et al., *The Western North Atlantic Swordfish*, AUDUBON WILDLIFE REP., 468-71 (1989-90).

24. Weber, *supra* note 2, at 39.

25. *Id.* at 32.

26. *Limiting Access to Marine Fisheries: Keeping the Focus on Conservation*, CENTER FOR MARINE CONSERVATION AND WORLD WILDLIFE FUND, at ix (Karyn L. Gimbel ed., 1994) [hereinafter *Limiting Access*].

reflected in the decline in catches that has occurred since 1986.<sup>27</sup> In looking at ways to conserve biological diversity, however, direct catch should not be our only concern. Researchers estimate that in the Dutch region of the North Sea, every square meter of the seabed along with the plants, worms, crustaceans and other marine organisms that inhabit it, is plowed over yearly by bottom trawls.<sup>28</sup> In the shrimp fisheries of the world, catchers throw away up to 10 pounds of immature fish for every pound of shrimp landed.<sup>29</sup> While not the target of nets, longlines, and trawls, marine turtles, mammals, and seabirds (including endangered and threatened species) are hauled up, killed, and thrown overboard in fisheries around the world in staggering quantities.<sup>30</sup> It is conservatively estimated that as many as 11,000 sea turtles are killed annually in offshore shrimp trawls.<sup>31</sup> Bycatch of nontarget fish is estimated in the billions of pounds per year,<sup>32</sup> and is thought to be an even greater threat to diversity among fish species than directed fishing.

Increasing demand for food, proliferation of distant water fleets, and burgeoning technology with which humans can sweep the seas for ever-declining (and less discriminate) catches of fish, make overexploitation of the world's fish populations one of the greatest threats to marine biological diversity. The United Nations Food and Agriculture Organization (FAO) estimates that virtually every commercially exploited species has been either depleted, overexploited or fully exploited.<sup>33</sup> Since 1970, the size of the world's fishing fleet has increased at twice the rate of catches,<sup>34</sup> and for the first time in the history of fishing, catches have declined for three consecutive years, despite the introduction of more, faster, and bigger boats and gear.<sup>35</sup> Although the FAO once estimated that the potential of the world's fisheries was 100

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27. Weber, *supra* note 2, at 32-33.

28. *Id.* at 36. See also NORSE, *supra* note 1, at 110-11.

29. NORSE, *supra* note 1, at 94.

30. *Id.* at 93.

31. *Our Living Oceans*, *supra* note 20, at 135.

32. NORSE, *supra* note 1, at 94.

33. Weber, *supra* note 2, at 5.

34. *Limiting Access*, *supra* note 26, at 1. See also John P. Wise, *Federal Conservation and Management of Marine Fisheries in the United States*, CENTER FOR MARINE CONSERVATION, 1991, at 4.

35. Serge M. Garcia & C. Newton, Current Situation, Trends, and Prospects in World Capture Fisheries, Paper delivered at *FAO Conference on Fisheries Management Global Trends*, in Seattle, WA (June 14-16, 1994).

million tons per year,<sup>36</sup> it is now thought that we will not realize that potential unless we drastically change the way we manage our fisheries.<sup>37</sup> It is undeniable that fishing fleets have grown far faster than available fishing stocks.<sup>38</sup> Worldwide expenditures on fishing amount to an estimated \$124 billion, and only \$70 billion in fish are caught.<sup>39</sup> Obviously, government subsidies are keeping more people fishing than the environment can sustainably support.<sup>40</sup> Less clear, but no less disturbing, are the implications of churning the seabed, raking the eelgrass, discarding tons of unwanted carcasses, or grinding them up to be applied on the land as fertilizer.

A limited number of management regimes and frameworks regulate catches of fish on an international basis. Even fewer involve approaches that have conservation of fish as their primary strategy. If conservation of marine diversity, including marine species that are not the target of a market, is the goal, advocates must look to other sources of international law.

#### A. *International Framework for Fisheries Management*

The traditional legal approach for managing the way the fishing fleets of the world went about their business remained unchanged for centuries: the doctrine of freedom of fishing. Within their own waters (for most nations, a 12-mile band adjacent to the coast), states exercised control over who fished, and how much they caught.<sup>41</sup> Beyond the territorial seas, fishing vessels were subject only to such regulations as their flag state wished to impose. In the early nineteenth century, increased exploitation of fisheries led several coastal states to enter explicit bilateral and multilateral agreements to conserve and manage fisheries.<sup>42</sup> However, even where a multilateral institution was created by such agreements, the fishing nations and the coastal states generally

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36. *Our Living Oceans*, *supra* note 20, at 9.

37. Weber, *supra* note 2, at 34.

38. Franz Thomas Litz, *Harnessing Market Forces in Natural Resources Management: Lessons from the Surf Clam Industry*, 21 B.C. ENVTL. AFF. L. REV. 335, 337 (1993-94). *See also*, J.G. Shepherd Ministry of Agriculture, *Key Issues in the Conservation of Fisheries*, LEAFLET NO. 72, 7 (1993).

39. Weber, *supra* note 2, at 47.

40. *Id.* at 45-6.

41. William Burke, Remarks at University of Washington on Fisheries Law, at 3-1 (1992) (transcript available with the author).

42. LOUIS B. SOHN & KRISTEN GUSTAFSON, *THE LAW OF THE SEA* 115 (1984).

were not willing to confer on such institutions the authority needed to enforce the rules. Therefore, few of the world's fisheries were ever subjected to meaningful management.<sup>43</sup>

It was not until after World War II, as world population and food demands increased, and as technology increased the distance to which nations could send their fleets in search of fish, that the idea of extending a state's jurisdiction over fisheries took hold.<sup>44</sup> Nations developed the capacity to send fleets to far-off fishing grounds and harvest fish there in enormous quantities, and coastal nations began to feel protective of "their" fishery resources. According to commentators, the idea of extending jurisdiction was fueled not only by the increased capacity of distant water fleets to take amounts of fish viewed by coastal states as "excessive," but also by their unwillingness to enter into agreements with coastal states to manage and enforce catch and effort limitations.<sup>45</sup>

#### 1. Early Efforts at Fishery Management

The first shoe to drop in the extension of coastal state jurisdiction was the Truman Fisheries Proclamation of 1945, asserting U.S. jurisdiction over fishery conservation zones "in those areas of the high seas contiguous to the coast of the United States . . . ."<sup>46</sup> It recognized the pressing need for conservation and protection of fishery resources, and established fishery "conservation zones," subject to U.S. regulation and control.<sup>47</sup> The proclamation was followed shortly by similar actions in Peru, Chile, and Ecuador.<sup>48</sup> Even with these efforts, however, the principle of freedom of fishing on the high seas was the prevalent doctrine for the next two decades (modified only by such multilateral arrangements as fishing and coastal nations were able to conclude).<sup>49</sup> However, the concept of a fishery zone, where a coastal state could claim exclusive jurisdiction independent of its territorial sea became generally

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43. Burke, *supra* note 41, at 3-1.

44. SOHN & GUSTAFSON, *supra* note 42, at 116-19.

45. Burke, *supra* note 41, at 3-1 to 3-2.

46. Proclamation No. 2668: Policy of the United States with Respect to Coastal Fisheries in Certain Areas of the High Seas, Fed. Reg. 12,304 (1945).

47. Burke, *supra* note 41, at 3-2.

48. *Id.* at 3-3 to 3-6.

49. *Id.* at 3-1.

accepted, although the limits of that extended jurisdiction were disputed.<sup>50</sup>

During this period, a number of agreements were achieved that created international fishery regulatory bodies such as the Northwest Atlantic Fisheries Organization (NAFO),<sup>51</sup> the Inter American Tropical Tuna Commission (IATTC),<sup>52</sup> International Pacific Halibut Commission (IPHC),<sup>53</sup> and the International North Pacific Fishery Commission (INPFC).<sup>54</sup> While these bodies, and the conventions and treaties that established them, had conservation as their objective, commentators have noted these shortcomings: the scope of their authority did not reach to all the places the fish were found; the regulatory measures they recommended were not binding without legislative action on each of their parts; and there was no enforcement mechanism or authority other than the flag state.<sup>55</sup> As a result, very little protection was provided for marine biodiversity.

## 2. The 1982 Convention on the Law of the Sea

Attempts at widespread international agreement on fishery management were unsuccessful until the 1982 United Nations Conference on the Law of the Sea (UNCLOS III). With it came recognition of the extension of coastal State jurisdiction to 200 miles,<sup>56</sup> the freedom of fishing on the high seas was circumscribed, and qualifications were placed on the rights of distant water fishing nations. One commentator stated:

... Convention on Fishing and Conservation of the  
Living Resources of the High Seas ... is the first

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50. *Id.* at 3-21, 3-27.

51. The North Atlantic Fisheries Organization (NAFO) was formed in 1978, after the Northwest Atlantic coastal nations extended their fisheries jurisdictions. The U.S. has not joined NAFO.

52. Convention for the Establishment of an Inter-American Tropical Tuna Commission, May 31, 1949, U.S.-Costa Rica, 1 U.S.T. 230 [hereinafter IATTC].

53. Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea Convention, Mar. 2, 1953, U.S.-Can 5 U.S.T. 5 [hereinafter IPHC].

54. International Convention for the High Seas Fisheries of the North Pacific Ocean, May 9, 1952, 4 U.S.T. 380 [hereinafter INPFC].

55. Burke, *supra* note 41, at 3-6 to 3-7.

56. In 1976, the United States, Canada, and numerous other states moved to a 200 mile "exclusive economic zone" (EEZ). Many other 200-mile zones were adopted in the late 1970s, and nearly all of those currently in force were adopted by the end of the Law of the Sea Conference in 1982. Burke, *supra* note 41, at 3-27.

international legislation dealing comprehensively with conservation problems. [I]t provides a sound basis for international cooperation . . . in the adoption of such conservation measures as are necessary to maximize the productivity of . . . fishery resources . . . .<sup>57</sup>

The United States signed UNCLOS III on July 29, 1994,<sup>58</sup> after resolving long-standing concerns regarding its deep seabed mining provisions,<sup>59</sup> but has not yet ratified the treaty. The precise status of the U.S. in regard to UNCLOS III may be irrelevant, though, because many important fishing countries, the U.S. among them, have incorporated into their domestic laws the principles reflected in the Convention.<sup>60</sup> Many experts have agreed that “UNCLOS is not only a treaty but a codification and articulation of the present state of the rules applicable to the oceans,” and, as such, is binding on both signatories and nonsignatories as customary international law.<sup>61</sup> This is especially true for those provisions related to international navigation and the rights and duties of coastal states.<sup>62</sup>

Article 56 of the Convention gives coastal states sovereign rights out to 200 miles.<sup>63</sup> This includes the authority to conserve and manage living resources.<sup>64</sup> The coastal nation must ensure, using conservation and management measures, that the living resources of the EEZ are not threatened by overexploitation.<sup>65</sup> Access to the zone by foreign fleets is solely within coastal state discretion and subject to its laws and regulations; compliance with conservation and management measures is required.<sup>66</sup> The 1982 conference even imposed new obligations on high seas fishing states. While freedom of fishing on the high seas continues in principle, the Convention can be read as imposing a dual responsibility on fishing nations: conservation and cooperation with coastal states.<sup>67</sup> The Convention also directs fishing nations to establish cooperative

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57. Wise, *supra* note 34, at 17.

58. S. Res. 9975-9976, 10046-10048, 103d Cong., Sess., 140 Cong. Rec. 101 (1994).

59. Wise, *supra* note 34, at 49. *See also* SOHN & GUSTAFSON, *supra* note 42, at xix-xx.

60. Wise, *supra* note 34, at 109.

61. *Id.* at 109-10 (quoting Martin H. Belsky, *The Ecosystem Mandate for a Comprehensive United States Ocean Policy and Law of the Sea*, 26 SAN DIEGO L. REV., 417, 470 (1989)).

62. SOHN & GUSTAFSON, *supra* note 42, at XIX-XX.

63. Third United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 I.L.M. 1245 [hereinafter UNCLOS III]. *See also* SOHN & GUSTAFSON, *supra* note 42, at 120.

64. UNCLOS III, *supra* note 63, art. 61.

65. *Id.* art. 61(2). *See also* SOHN & GUSTAFSON, *supra* note 42, at 123.

66. *Id.* art. 62.

67. SOHN & GUSTAFSON, *supra* note 42, at 123.

measures necessary to conserve straddling stocks, which occur within areas beyond and adjacent to the EEZ.<sup>68</sup> For highly migratory species (defined in UNCLOS as tuna, tuna-like species, and certain cetaceans that move considerable distances over vast expanses of the ocean), the convention requires parties to cooperate directly or through appropriate international organizations for conservation.<sup>69</sup>

Despite this direction, populations of highly migratory species continue to decline. For example, Western Atlantic Bluefin Tuna have been overharvested to the point of being severely depleted. Restrictions enacted since 1982 have been unable to increase numbers of adult tuna,<sup>70</sup> and some scientists believe the Gulf of Mexico spawning stock may be close to collapse.<sup>71</sup> Concern for various declining stocks led to the convening of international conferences for the purpose of establishing responsible management regimes: the 1992 Mexico Conference on Responsible Fishing; the UN Conference on Highly Migratory and Straddling Stocks in 1993; and the Rio Earth Summit. While parties could agree that regional organizations provide the best framework for conservation and management of highly migratory species, problems and ambiguities in the UNCLOS regime remain. These problems and ambiguities include the lack of binding dispute resolution, lack of compatibility between domestic and international management, inconsistency in management measures implemented throughout the range of the fish, insufficient monitoring for compliance, enforcement, information collection, and reduction of effort, insertion of political, and scientific concerns into the determination of allowable catches, allowing continued overexploitation,<sup>72</sup> and other concerns. At the August 1994 UN Conference on Straddling Stocks and Highly Migratory Stocks, a coalition of environmental groups called for a variety of similar measures, all emphasizing the application of the precautionary approach and access by nongovernmental organizations to international

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68. *Id.* at 131.

69. Wise, *supra* note 20, at 52-53.

70. *Our Living Oceans*, *supra* note 20, at 52.

71. Telephone Interview with Dr. Carl Safina (Oct. 12, 1994).

72. Burke, *supra* note 41, at 3-48.

deliberations.<sup>73</sup> The UN has authorized two additional sessions on the topic to be held in March and July of 1995.<sup>74</sup>

*B. Regional Fishery Organizations and Agreements*

Institutions such as the International North Pacific Fisheries Commission (INPFC),<sup>75</sup> the Northwest Atlantic Fisheries Organization (NAFO),<sup>76</sup> the International Pacific Halibut Commission (IPHC),<sup>77</sup> International Commission for the Conservation of Atlantic Tunas (ICCAT),<sup>78</sup> and the Inter-American Tropical Tuna Commission (IATTC),<sup>79</sup> were created for the purpose of managing single species. Their principle mechanisms have been through setting and allocating catch quotas among the parties. More recently, a few of these bodies have explored other management measures, such as efforts to reduce bycatch through improved gear technology and fishing operations and practices.<sup>80</sup>

It is important to note that while these are the very regional agreements and organizations envisioned by the UNCLOS directive to fishing nations, and while their stated objectives may be to conserve the

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73. Letter from Lisa Speer, Natural Resources Defense Council, to Larry Snead, Department of State (Aug. 1994) (on file with author).

74. Telephone interview with Lisa Speer, Natural Resources Defense Council (Oct. 17, 1994).

75. See INPFC, *supra* note 54. INPFC is an international organization governing high-seas salmon fisheries. It strictly regulates catches, yet populations continue to decline. See also NORSE, *supra* note 1, at 231.

76. NAFO's attempt to manage fisheries has not been successful, due in most part to a lack of cooperation from nations fishing in the area covered by the agreement. See NORSE, *supra* note 1, at 232.

77. See IPHC, *supra* note 53. IPHC began as a 1923 agreement between Canada and the U.S. to manage Northern Pacific and Bering Sea halibut stocks. This agreement has been relatively successful due to two factors: there are only two members, who are in agreement about the goal of maintaining halibut populations; and the area covered by the agreement includes much of the halibut's range. See also NORSE, *supra* note 1, at 232.

78. International Convention for the Conservation of Atlantic Tuna, Mar. 3, 1969, 20 U.S.T. 2887 [hereinafter ICCAT]. ICCAT's main aim is the conservation of tuna-like fishes and billfishes throughout the Atlantic Ocean and adjacent seas. ICCAT's effectiveness has been hampered by a lack of funding for staff and research. ICCAT members have had difficulty reaching consensus on management measures, despite drastic declines in populations of Northwest Atlantic bluefin tuna and Atlantic swordfish. See also NORSE, *supra* note 1, at 233.

79. See IATTC, *supra* note 52. This Commission monitors dolphin mortality associated with the setting of purse seine nets deliberately around dolphins, and seeks to reduce bycatch of dolphins. See also NORSE, *supra* note 1, at 209.

80. Wise, *supra* note 34, at 93-103.

stocks they target, the operational reality is that they are aimed at maximizing catch of particular species, not conserving diversity. Conservationists have, however, been able to use these fishing agreements to reach beyond the target catch. For example, it was the U.S. implementation of the allocation of salmon to Japan under the INPFC that entrained the series of events leading to *Kokechik Fishermen's Ass'n v. Secretary of Commerce*,<sup>81</sup> a case related to incidental catch of marine mammals in fishing operations *infra*. The same convention provided the legal handle for environmental groups to gather information about the effects of high seas driftnets that led ultimately to the UN moratorium on the use of this nonselective gear.<sup>82</sup>

One agreement which may act as a model for future agreements regarding conservation of marine biodiversity is the Convention of the Conservation of Antarctic Marine Living Resources (CCAMLR).<sup>83</sup> Due to the climatic conditions in the area, nearly all life in Antarctica lives on the coasts or adjacent waters, and derives food directly or indirectly from the sea.<sup>84</sup> The convention "evidences the developing views on conservation," and a "more ecological approach to management."<sup>85</sup> CCAMLR recognizes that the objective of most international fisheries agreements is to achieve the maximum sustainable yield of the stock being fished. However, under article II(3), CCAMLR requires not only that harvesting be regulated so as to prevent populations of target species from decreasing below their level of maximum sustainable yield, but also that equal consideration be given to the likely effects of proposed harvest

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81. *Kokechik Fishermen's Ass'n v. Secretary of Commerce*, 839 F.2d 795 (D.C. Cir. 1988), *cert. denied*, 488 U.S. 1004 (1989). The court, in construing the Marine Mammal Protection Act of 1972, 16 U.S.C. §§ 1361-1407 (1982 & Supp. III 1985), held that the Secretary of Commerce could not grant permission to a group of Japanese fishermen to "take" a quota of Dall's porpoise when the Secretary knew that other protected species (such as fur seals) would also be ensnared, and found it contrary to law to issue a permit as to only one of the protected species with the intention of simply assessing civil penalties on the fishermen for taking the other protected species "without" a permit.

82. Burke, *supra* note 41, at 3-88. See also Convention for the Prohibition of Fishing with Long Driftnets In the South Pacific, May 17, 1991, 29 I.L.M. 1449.

83. Convention on the Conservation of Antarctic Marine Living Resources, Apr. 7, 1982, U.S.-Austl. 33 U.S.T. 3476 [hereinafter CCAMLR]. See also Jennifer Angelini & Andrew Mansfield, *A Call for U.S. Ratification of the Protocol on Antarctic Environmental Protection*, 21 *ECOLOGY L.Q.* 163 (1994).

84. NORSE, *supra* note 1, at 227.

85. U.S. International Trade Commission, International Agreements to Protect the Environment and Wildlife, Report to the Committee on Finance, United States Senate, Investigation No. 332-287, Jan. 1991, at 5-13 [hereinafter U.S. International Trade Commission].

levels on nontarget species and on the marine ecosystem as a whole.<sup>86</sup> These provisions were used to limit the harvest of krill, which is a vital link in the Antarctic food chain.<sup>87</sup>

Article VII of CCAMLR establishes a commission for research, compilation and analysis of data on Antarctic marine living resources and the ecosystem.<sup>88</sup> Article IX provides for implementation of a system of observation and inspection, and formulation of conservation measures on the basis of the best scientific evidence available.<sup>89</sup> Enforcement however, is left to national means.<sup>90</sup> Unfortunately, the many positive aspects of CCAMLR can be frustrated by the requirement that decisions be made by consensus, which gives any single nation the power to block or slow conservation-oriented measures.<sup>91</sup>

C. *Additional International Agreements Protecting Marine Mammals, Birds and Other Wildlife*

Some “non-fish” marine species have received protection under specific conventions, perhaps because of their appeal to the public for aesthetic (e.g. whales) or recreational (e.g. migratory bird hunting) reasons. These agreements can be useful in preserving some individual species, or perhaps increasing species or genetic diversity, but are likely to be of limited value in regard to ecosystem diversity. They have, however, been used as a means to control fishing, where fishing effort could be linked to incidental takes of the specific protected species.

1. Marine Mammal Conventions

Marine mammals are frequently the subject of protective measures. Fur seal populations, devastated by hunting in past centuries,<sup>92</sup> were protected under the Interim Convention on Conservation of North Pacific Fur Seals<sup>93</sup> (which was implemented by the U.S. in the Fur Seal

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86. *Id.* See also NORSE, *supra* note 1, at 229.

87. Weber, *supra* note 2, at 49.

88. CCAMLR, *supra* note 83, art. VII.

89. *Id.* art. IX.

90. U.S. International Trade Commission, *supra* note 85, at 5-13.

91. NORSE, *supra* note 1, at 229.

92. *Id.* at 98.

93. Interim Convention on Conservation of North Pacific Fur Seals, Oct. 14, 1957, 8 U.S.T. 2284.

Act of 1966)<sup>94</sup> until the Convention expired in 1984.<sup>95</sup> Nonetheless, the depleted status of the Northern fur seal in the U.S. was used as a handle at first to condition, and subsequently to shut down, the Japanese high seas driftnet fishery for salmon in the North Pacific.<sup>96</sup> The fishery, deploying millions of miles of driftnets in a season, caught not only fur seals but also Dall's porpoise, other marine mammals and birds.<sup>97</sup> Renewed protection for some seals was provided by the Convention for the Conservation of Antarctic Seals (the 1978 Convention),<sup>98</sup> which is still in force. Although this agreement does not ban hunting, it does help to protect seal species from overexploitation,<sup>99</sup> by strictly controlling the killing and capturing of seals within the Convention Area, including completely banning exploitation of some species.<sup>100</sup> The 1978 Convention is notable for its establishment of protective reserves, where seals are not to be captured.<sup>101</sup>

The International Whaling Commission (IWC) was established by the International Convention for the Regulation of Whaling (ICRW).<sup>102</sup> IWC was created by whaling nations alarmed by rapidly decreasing whale stocks. The original goal of IWC was sustainable whaling, but even under management practices whale species continued to decline. In the 1970s, international conservation groups and nonwhaling nations began to get involved in the IWC. Their involvement and the undeniable scientific evidence regarding the decline of whale species prompted a moratorium on commercial whaling in 1982.<sup>103</sup> However, some "research" and subsistence whaling continues, and Iceland, Norway, and Japan have threatened to resume commercial

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94. 16 U.S.C. §§ 631-659 (1988) (repealed).

95. Wise, *supra* note 34, at 107.

96. See *Kokechik Fishermen's Ass'n v. Secretary of Commerce*, 839 F.2d 795, 802 (D.C. Cir. 1988), *cert. denied*, 488 U.S. 1004 (1989).

97. Nina Young et al., *The Incidental Capture of Marine Mammals in U.S. Fisheries*, CENTER FOR MARINE CONSERVATION, 1993 at 318.

98. Convention for the Conservation of Antarctic Seals, June 28, 1978, 29 U.S.T. 441 [hereinafter the 1978 Convention].

99. U.S. International Trade Commission, *supra* note 85 at 5-42.

100. Wise, *supra* note 34, at 99.

101. The 1978 Convention, *supra* note 98, § 5.

102. International Convention for the Regulation of Whaling, Dec. 22, 1946, 62 Stat. 1716 [hereinafter 1946 Convention]. For a discussion of the future of the Commission and its potential for conservation success, see Cynthia Taliaferro Bright, *The Future of the International Whaling Commission: Can We Save the Whales?*, 5 GEO. INT'L ENVTL. L. REV. 815 (1993).

103. NORSE, *supra* note 1, at 243.

whaling.<sup>104</sup> One of the major weaknesses of the IWC is that any member nation can escape the effects of IWC regulation by simply filing an objection.<sup>105</sup> Other weaknesses involve disputes over the extent of IWC's territorial and species jurisdiction.<sup>106</sup> IWC's accomplishments include maintaining an international observer program, establishing a whale sanctuary in the Indian Ocean area, prohibiting the use of cold grenade (nonexploding) harpoons to kill whales for commercial purposes, and the adoption of a management scheme for aboriginal subsistence whaling.<sup>107</sup>

There are two primary international agreements that interact with the ICRW,<sup>108</sup> UNCLOS III (article 65), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).<sup>109</sup> Appendix I of CITES lists gray, blue, humpback, bowhead, and right whales; all other cetacean species are listed in Appendix II. Trade in species listed under CITES is restricted.<sup>110</sup> Article 65 of UNCLOS III directs states to "co-operate with a view to the conservation of marine mammals and in the case of cetaceans shall in particular work through the appropriate international organizations for their conservation, management, and study."<sup>111</sup> This allows stricter regulation by coastal states within the EEZ than would otherwise be allowed under articles 61 and 62 of UNCLOS III.<sup>112</sup> In its most recent action last May, the IWC voted to establish a Southern Ocean Sanctuary for whales, and adopted a nonbinding resolution to explore a revised management regime for regulating whaling.<sup>113</sup>

## 2. Protection of Migratory Birds

The United States is party to a number of individual bilateral conventions designed to protect migratory birds (including those that are

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104. *Id.* at 243-44.

105. Burke, *supra* note 41, at 3-123.

106. *Id.* at 3-124.

107. U.S. International Trade Commission, *supra* note 85, at 5-27.

108. Burke, *supra* note 41, at 3-124.

109. Convention on International Trade in Endangered Species of Wild Fauna and Flora, Mar. 6, 1973, 27 U.S.T. 1087 [hereinafter CITES].

110. Burke, *supra* note 41, at 3-125.

111. CITES, *supra* note 109, art. 65.

112. Burke, *supra* note 41, at 3-124.

113. Nina Young, *Whales Find Sanctuary at IWC Meeting*, MARINE CONSERVATION NEWS, Autumn 1994, at 1.

integral parts of marine ecosystems) through international cooperation. These include the Convention Between the United States and Great Britain (For Dominion of Canada) For the Protection of Migratory Birds in the United States and Canada (the 1916 Convention),<sup>114</sup> the Convention Between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals (the 1936 Convention),<sup>115</sup> and the Convention Between United States and Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment (the 1972 Convention).<sup>116</sup> The conventions restrict the instances in which migratory birds protected under them can be taken, and strictly controls trade in listed species. The 1916 Convention lists broad categories of species, while the other two conventions list individual species. Both the 1916 Convention and the 1936 Convention contain language encouraging the establishment of refuges to enhance conservation efforts.<sup>117</sup> Unfortunately, none of the agreements provide specifically for enforcement mechanisms,<sup>118</sup> reducing their potential effectiveness as tools to preserve marine biodiversity. The lack of a widely accepted global agreement is also a threat to the continued health of migratory bird populations not protected by specific agreements.

In several instances, environmentalists have used the Migratory Bird Treaty Act,<sup>119</sup> the U.S. law implementing the treaty, to modify or condition fishing practices. In 1986-87 parties hammered out an agreement which adopted a zoned approach for deployment of gillnets to avoid incidental takes of common murre in nets. The parties used the threat of the Migratory Bird Act's strict "no take" provisions as

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114. Convention Between the United States and Great Britain (For Dominion of Canada) for the Protection of Migratory Birds in the United States and Canada U.S.-Gr. Brit. 39 Stat. 1702 (1916) [hereinafter 1916 Convention]. Implemented by the United States in the Migratory Bird Treaty Act of 1918, 16 U.S.C. §§ 703-711 (1988) [hereinafter MBTA].

115. Convention Between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals, Feb. 7, 1936, U.S.-Mex. 50 Stat. 1311 [hereinafter 1936 Convention].

116. Convention Between United States and Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment, Mar. 4, 1972, U.S.-Japan 25 U.S.T. 3329 [hereinafter 1972 Convention].

117. U.S. International Trade Commission, *supra* note 85, at 5-38 to 5-39.

118. *Id.* at 5-39.

119. 16 U.S.C. §§ 703-708, 709A-711 (1988).

leverage.<sup>120</sup> That law has again come into play with regard to coastal gillnets off the State of Washington.<sup>121</sup>

### 3. Conservation of Overexploited Wildlife

The Convention on International Trade in Endangered Species was ratified in 1975.<sup>122</sup> It is a multilateral convention regarding the export, import, and transit of certain species of wild animals and plants, trade in which poses a threat to their continued survival. The goal of the convention is to prevent the overexploitation of listed species whose survival is jeopardized. Parties to CITES are not allowed to trade in species listed in the appendices of the Convention, except in accordance with the Convention.<sup>123</sup> "CITES allows the imposition of bans against the export of listed species to any signatory nation in order to diminish the economic incentives for continued taking" of the species.<sup>124</sup> All cetacean species (whale and dolphin) are currently listed in either Appendix I or Appendix II of the Convention.<sup>125</sup> Various other marine mammals, such as seals, sea lions, walrus, marine otters, manatees, and dugong, are also protected. Additional listed marine species include all sea turtle species.<sup>126</sup> Although CITES is somewhat effective as a conservation tool, it kicks in only after the fact of severe depletion, and does not act to protect species before they are threatened with extinction. For this reason, in 1992, and again in 1994, conservation groups attempted to seek a listing of the Western Atlantic bluefin tuna under Appendix II of CITES. This would have required monitoring of trade in bluefin.<sup>127</sup> The argument is that by monitoring trade by nations not party to the tuna treaty, management agencies would get a better picture of the overall mortality of bluefin throughout its range. Although they have

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120. Letter from California Department of Fish and Game, to Roger E. McManus, Center for Environmental Education (Sept. 30, 1986).

121. See, e.g., M. England, *Biologists Gagged as Seabirds Drowned*, LIVING OCEANS NEWS, Fall 1993.

122. Burke, *supra* note 41, at 3-124.

123. *Id.* at 3-125.

124. NORSE, *supra* note 1, at 209.

125. *Id.* at 53.

126. *Id.*

127. Letter from the Center for Marine Conservation to U.S. Fish and Wildlife Service (Jan. 28, 1992); see also Steven Weisman, *Bluefin Tuna and African Elephants Win Some Help at a Global Meeting*, N.Y. TIMES, Mar. 11, 1992, at A8; 59 Federal Register 4096 (1994). See also *Western Atlantic Bluefin Tuna Proposed for Listing under CITES*, LIVING OCEAN NEWS, Winter 1993-94.

been unsuccessful to date, they continue to argue that CITES offers opportunities for conservation tools that are unavailable through existing regional management agreements.<sup>128</sup>

*D. Domestic Strategies for Conserving Marine Biodiversity Globally*

The United States has successfully used domestic legislation to pursue the goal of preservation of marine species internationally, and such measures could be used by other nations to pursue conservation of marine biodiversity. One means for an individual nation to influence behavior of other nations toward marine species around the globe is to invoke the power of a country's markets, by imposing trade sanctions or other economic measures against those nations that engage in environmentally destructive behavior. Other methods are more direct, and are aimed at the harmful behavior itself.

1. Trade and Economic Measures<sup>129</sup>

Laws on trade and taxation are gaining attention as ways to control activities that threaten biodiversity. Regulations of this type can use market forces to encourage environmentally friendly behavior in nations around the world.<sup>130</sup> Use of this type of approach to pursue environmental goals, however, can be constrained under the General Agreement on Tariffs and Trade (GATT),<sup>131</sup> and potentially under UNCLOS III.

For more than twenty years, the threat of trade sanctions has been a fundamental instrument of U.S. international fisheries and marine conservation policy.<sup>132</sup> Domestic statutes such as the Marine Mammal Protection Act,<sup>133</sup> the Endangered Species Act of 1973,<sup>134</sup> the Lacey Act

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128. Letter from Roger McManus, Center for Marine Conservation, to Dr. Charles Dane, Chief, Office of Scientific Authority, Fish and Wildlife Service (Mar. 14, 1994) (on file with author).

129. A more detailed presentation of the arguments involving UNCLOS and unilateral trade sanctions may be found in an article by Richard J. McLaughlin, *UNCLOS and the Demise of the United State's Use of Trade Sanctions to Protect Dolphins, Sea Turtles, Whales and Other International Marine Living Resources*, ECOLOGY L.Q. (1994).

130. NORSE, *supra* note 1, at 211.

131. General Agreement on Tariffs and Trade, Oct. 30, 1947, 61 Stat. A3 [hereinafter GATT].

132. McLaughlin, *supra* note 129, at 7.

133. 16 U.S.C. §§ 1361-1407 (1988), *amended by* 16 U.S.C. §§ 1361-1407 (Supp. V 1993).

134. 16 U.S.C. §§ 1531-1544 (1988 & Supp IV 1992).

Amendments of 1981,<sup>135</sup> and the 1989 Sea Turtle Conservation Amendments to the Endangered Species Act<sup>136</sup> all contain provisions restricting the importation of fisheries products from nations refusing to comply with U.S. environmental standards for protecting marine living resources. One particularly important measure is the Pelly Amendment to the Fishermen's Protective Act.<sup>137</sup> A variety of other acts invoke the Pelly Amendment in their embargo provisions.<sup>138</sup> Under the Pelly Amendment, the Secretaries of Commerce and Interior are authorized to determine whether foreign nations are acting so as to threaten the effectiveness of an international fishery conservation agreement or international program for endangered or threatened species, and if so, to make an official certification.<sup>139</sup> Once a certification is made regarding a foreign nation, the President may prohibit imports from that country.<sup>140</sup>

Unilateral trade sanctions have been increasingly used by the U.S. over the last five years.<sup>141</sup> This method of achieving compliance with environmental standards has the advantage of allowing timely action, and of being less expensive than international negotiations.<sup>142</sup> A broad spectrum of U.S. political constituent groups, including environmental organizations, commercial and recreational fishermen, labor unions, consumer protection advocates, and others, perceive such sanctions as the most effective, and perhaps in some cases the only feasible method to get foreign nations to alter their behavior.<sup>143</sup> The use of unilateral trade sanctions also has broad support in Congress.<sup>144</sup>

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135. 16 U.S.C. §§ 3371-3378 (1988).

136. 16 U.S.C. § 1537. Other statutes include the International Dolphin Conservation Act of 1992, 16 U.S.C. §§ 1411-1418; the Packwood-Magnuson Amendment 16 U.S.C. § 1821(e)(2)(1988); the Driftnet Impact Monitoring Assessment and Control Act of 1987, 16 U.S.C. § 1822 (1988); the Driftnet Act Amendments of 1990, 16 U.S.C. § 1826 (1988); the 1990 Driftnet Amendments to the Marine Mammal Protection Act, 16 U.S.C. § 1371(a)(2)(E) (1988); the Magnuson Fishery Conservation and Management Act of 1976, 16 U.S.C. § 1825 (1988); the Fishery Conservation Amendments of 1990, 16 U.S.C. § 1822 (1988); the Atlantic Tuna Convention Act of 1975, 16 U.S.C. § 971 (1988); and the Tuna Conventions Act of 1950, 16 U.S.C. §§ 951-961 (1988).

137. 22 U.S.C. § 1978 (1988).

138. McLaughlin, *supra* note 129, at 16.

139. 22 U.S.C. § 1978(a)(1),(a)(2) (1988).

140. *Id.* 1978(a)(4).

141. McLaughlin, *supra* note 129, at 8.

142. *Id.* at 25.

143. *Id.* at 14-15, 25.

144. *Id.* at 75.

Unfortunately, the U.S. may have to relinquish use of this valuable tool. Recent actions taken under GATT have been distinctly hostile to the use of trade sanctions to achieve environmental goals.<sup>145</sup> An additional problem may arise if we become a state party to UNCLOS III, and the Convention enters into force. The international community has long expressed hostility and dissatisfaction with the use of unilateral trade sanctions by the U.S., and could be expected to use all available methods to challenge such practices.<sup>146</sup> U.S. unilateral trade sanctions to protect marine living resources potentially violate a number of substantive rights provided under UNCLOS III.<sup>147</sup> As a consequence, if the U.S. becomes a state party, other state parties may rely on the Convention's compulsory dispute settlement provisions to prevent the U.S. from imposing unilateral sanctions against them, absent some other specific international agreement to the contrary.<sup>148</sup> Customary international law does not explicitly prohibit the use of unilateral economically coercive measures for political purposes,<sup>149</sup> but there is a consensus among international legal scholars that unilateral measures are impermissible when a state is a party to an agreement with an effective dispute settlement mechanism.<sup>150</sup> The resolution of these issues may have a significant impact on the ability of nations to use unilateral trade sanctions to conserve marine biodiversity internationally.

## 2. Direct Regulation

Other means of targeting international behavior that threatens marine biodiversity are more direct than trade sanctions, and may involve measures such as bans on fishing threatened stocks, or bans on the use of certain types of fishing methods. One example of this is the campaign against the use of large scale driftnets on the high seas. Driftnets kill staggering numbers of nontarget species, including whales, dolphins,

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145. NORSE, *supra* note 1, at 211. See also U.S. International Trade Commission, *supra* note 85, at 2-3. For a discussion of the use of the GATT response to trade restrictions in the import of tuna caught with purse seines that encircle dolphins, see Stephen Fleischer, *The Mexico-U.S. Tuna/Dolphin Dispute in GATT: Exploring the Use of Trade Restrictions to Enforce Environmental Standards*, 3 *TRANSNAT'L L. & CONTEMP. PROBS.* 515 (1993).

146. McLaughlin, *supra* note 129, at 20.

147. *Id.* at 76.

148. *Id.* at 29, 42.

149. *Id.* at 65.

150. *Id.* at 76-77.

turtles, and birds.<sup>151</sup> Activism by grassroots environmental organizations created an upsurge of public opinion against driftnet fishing,<sup>152</sup> and led to domestic legislation such as the Driftnet Impact Monitoring, Assessment and Control Act of 1987.<sup>153</sup> Such demonstrations of concern over the impacts of driftnets, from the U.S. and internationally, “prompted the U.N. General Assembly to declare a moratorium on large-scale pelagic driftnet fisheries starting December, 31, 1992.”<sup>154</sup> This campaign and others like it have the potential to positively affect marine biodiversity.<sup>155</sup>

### III. ALTERATION OF THE PHYSICAL ENVIRONMENT

Physical alteration of ecosystems ranks with overexploitation and pollution as the greatest near-term threats to life in the sea. Logging of mangrove forests, construction of marinas, dredging, mining, dams, and ship traffic are all activities that can drastically affect the marine environment.<sup>156</sup> Ecosystems can be totally destroyed, or fragmented to the point where they can no longer function. “Because organisms have adapted to some physical conditions but not to others, physical conditions are very important in determining the community of species that live in an ecosystem.”<sup>157</sup> If a factor, such as the structure of a seabed, is altered, the biological community will change accordingly.<sup>158</sup> The physical alteration of ecosystems threatens all three levels of biological diversity.

#### A. Coastal Development

The areas where the ocean touches the land are among the most valuable of marine habitats. River estuaries, mangrove swamps, and salt marshes are thought to produce more organic material per square meter than any other habitat on earth.<sup>159</sup> Coastal areas provide valuable “nurseries” for young fish and crustaceans (such as shrimp).<sup>160</sup> It is

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151. NORSE, *supra* note 1, at 93-94.

152. Weber, *supra* note 2, at 54.

153. 16 U.S.C. § 1822 (1988).

154. See *supra* note 82 and accompanying text; see also NORSE, *supra* note 1, at 94.

155. For a discussion of the passage of the moratorium on high seas driftnet fishing, see Jane K. Jenkins, *International Regulation of Driftnet Fishing: The Role of Environmental Activism and Leverage Diplomacy*, 4 *IND. INT'L & COMP. L. REV.* 197 (1993).

156. NORSE, *supra* note 1, at 107.

157. *Id.* at 106.

158. *Id.*

159. Weber, *supra* note 2, at 11.

160. *Our Living Oceans*, *supra* note 20, at 73.

estimated that two-thirds of the commercially valuable fish species spend at least part of their life cycle in near-shore waters.<sup>161</sup> “Ninety percent of the marine fish catch comes from the third of the oceans nearest the coasts.”<sup>162</sup>

Coastal wetlands, coral reefs, and other ecosystems are being converted or degraded at rates that are high by historical standards.<sup>163</sup> About half of all the salt marshes and mangrove swamps in the world have been cleared, drained, or filled.<sup>164</sup> The 48 states of the continental U.S. have lost 54% of their historical wetlands.<sup>165</sup> Five to ten percent of the world’s coral reefs have been destroyed by pollution or development, and another sixty percent are threatened with such eradication within the next twenty to forty years.<sup>166</sup> Many marine species are threatened with extinction, in great part due to habitat loss. Models that link species extinction to habitat loss suggest that rapid rises in the rate of extinction to levels approaching those of prehistoric mass extinctions may be difficult to avoid in the next century unless current rates of habitat loss are sharply reduced.<sup>167</sup> Minimal, if any, efforts have been made internationally to deal with this crisis and its effects on marine biodiversity. The one exception may be a recent initiative by the International Union for the Conservation of Nature (IUCN—The World Conservation Union) to undertake efforts to conserve coral reefs.<sup>168</sup>

### B. *Introduction of Alien Species*

Alien species, also known as exotic species or biological pollution, among other terms, are organisms that have been transported by human activity, either intentionally or unintentionally, into regions where they have not historically occurred.<sup>169</sup> Commercial fisheries, mariculture, the aquarium trade, scientific research, manmade canals, and

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161. Weber, *supra* note 2, at 14.

162. *Id.*

163. THE WORLD BANK, *supra* note 16, at 6.

164. Weber, *supra* note 2, at 24.

165. National Fish and Wildlife Foundation, *FY 1994 Fisheries and Wildlife Assessment*, NATIONAL MARINE FISHERIES SERVICE, Apr. 1993, at 33.

166. Weber, *supra* note 2, at 24.

167. *Id.*

168. *Reefs at Risk: Coral Reefs, Human Use, and Global Climate Change*, UNITED NATIONS ENV'TL PROGRAMME, Oct. 1993.

169. NORSE, *supra* note 1, at 130.

shipping can all be sources of alien species introduction.<sup>170</sup> There is no natural precedent for such invasions, and they can cause clear and sometimes devastating effects at the new locations.<sup>171</sup> Alien species can possess competitive, predatory, parasitic, and defensive strategies against which native biota can neither defend nor compete.<sup>172</sup>

Alien species frequently travel within the ballast water of cargo ships.<sup>173</sup> The millions of gallons of water carried by a ship can contain huge numbers of living plankton.<sup>174</sup> One example of the type of disastrous result that this can cause is the invasion of the Great Lakes by the zebra mussel, which is choking out native mollusks and interfering with the operation of ships and power plants.<sup>175</sup> However, the most significant impact of alien species “invasions are toxic marine phytoplankton blooms, which seem to have increased dramatically in the world’s coastal waters in recent years.”<sup>176</sup> Such events “often have severe economic and social impacts, including the closure of shellfishery operations and serious human health repercussions.”<sup>177</sup>

These invasions will continue to occur until effective national and international measures are in place. Some preliminary steps have been taken. In 1990, the U.S. Congress passed the Non-Indigenous Species Act, calling for a study of U.S. shipping practices to increase knowledge about and prevent the introduction of alien species.<sup>178</sup> Various states are also considering regulations requiring ships to dump ballast water at safe distances offshore, rather than in bays or estuaries.<sup>179</sup>

### C. *Global Warming and Climate Change*

#### 1. Potential Effects

“In many ways, the ocean and atmosphere are two parts of one system.”<sup>180</sup> Whatever affects the ocean will also affect the atmosphere,

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170. *Id.* at 130.

171. *Id.*

172. *Id.* at 130-131.

173. *Id.* at 131.

174. *Id.* at 131-32.

175. *Id.* at 134.

176. *Id.* at 135.

177. *Id.*

178. *Id.* at 209.

179. *Id.* at 209.

180. *Id.* at 136.

and what affects the atmosphere will spread to the ocean.<sup>181</sup> Depletion of the ozone in the stratosphere and the buildup of atmospheric greenhouse gasses have profound potential effects on both the atmosphere and ocean.<sup>182</sup>

a. Ozone Depletion

The stratospheric ozone layer is the earth's primary protection from the sun's dangerous ultraviolet radiation.<sup>183</sup> A number of substances manufactured by humans, such as chlorofluorocarbons (CFC's), migrate upward in the atmosphere and destroy this natural shield.<sup>184</sup> Decreases in the ozone over the Southern Hemisphere and the mid-latitude Northern Hemisphere have been observed by scientists.<sup>185</sup> Such decreased concentrations of stratospheric ozone allow an increase in the amount of biologically damaging solar UV-B radiation that reaches the earth.<sup>186</sup> This radiation can penetrate to ecologically significant depths in marine waters, changing the proteins and nucleic acids in living things.<sup>187</sup> Population reductions in marine phytoplankton, zooplankton, and juvenile stages of some fishes are known to result from current levels of UV-B radiation.<sup>188</sup> "Increased . . . radiation would likely reduce productivity and affect the abundance of species throughout the entire marine food web, which would affect world food production."<sup>189</sup> Extinction of some species and a reduction in biodiversity could also result.<sup>190</sup> Fishery resources would be reduced at a time when demand is increasing.<sup>191</sup>

b. Global Warming

"Greenhouse gasses," such as carbon dioxide (CO<sub>2</sub>) and methane, substantially alter the earth's distribution of heat.<sup>192</sup> They act

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181. *Id.*

182. *Id.*

183. *Id.*

184. *Id.*

185. *Id.*

186. *Id.* at 137.

187. *Id.*, at 136.

188. *Id.* at 137.

189. *Id.*

190. *Id.*

191. *Id.*

192. *Id.*

as a blanket, retaining the heat radiated from the Earth's surface within the lower atmosphere, creating a "greenhouse effect."<sup>193</sup> Human activities, such as burning fossil fuels and destruction of forests, are increasing the concentrations of greenhouse gasses and are warming the earth's surface and oceans.<sup>194</sup> The potential effects of this warming could include alteration of ocean circulation patterns, rising sea levels, and changes in biotic production.<sup>195</sup> The more quickly the warming occurs, the more drastic the effects are likely to be.<sup>196</sup>

Because seawater has a much greater heat capacity than air, temperatures change more slowly in the sea than on land. As a result, marine organisms accustomed to more gradual temperature changes may prove especially sensitive to climate change. Additionally, many tropical marine organisms live very close to their upper thermal limits, increasing their susceptibility to climatic change.<sup>197</sup> An innocuous sounding change in temperature of only a few degrees could kill some marine species outright.<sup>198</sup> Coral "bleaching" can occur at temperatures only 1 to 2 degrees Celsius above normal summer temperatures.<sup>199</sup> The sea-ice ecosystems of the Arctic and southern oceans would also be especially vulnerable.<sup>200</sup>

Temperature increases can also cause changes in physiology, behavior, and reproduction in marine species.<sup>201</sup> Higher temperatures increase an organism's metabolic rate, and thus its food and oxygen needs.<sup>202</sup> "In sea turtles, [a hatchling's] sex is determined by the egg's temperature during embryonic development."<sup>203</sup> Already, studies are noting high percentages of female hatchlings on Florida beaches.<sup>204</sup> Further increases in temperatures could potentially eliminate male hatchlings altogether, leading to the extinction of the species.<sup>205</sup>

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193. *Id.*

194. *Id.* at 137-38.

195. *Id.* at 138.

196. *Id.*

197. *Id.* at 142.

198. *Id.* at 141.

199. *Id.*

200. *Id.*

201. *Id.* at 142.

202. *Id.*

203. *Id.*

204. *Id.*

205. *Id.*

Rising sea levels are another potentially devastating consequence of global warming for marine species. Rapid rises in water levels would overtake the coastal ecosystems, eliminating the vital coastal wetlands that act as nurseries for crustaceans, fish, and waterfowl.<sup>206</sup> In the U.S., approximately 80 species threatened with extinction are found only in the narrow (10 foot) band directly above sea level.<sup>207</sup> These and many other species worldwide could disappear if their opportunities for landward migration are blocked by time or coastal development.<sup>208</sup>

## 2. International Responses

Prompt and effective action regarding these threats is necessary to conserve biodiversity. Responses to these threats must be pursued internationally. Individual nations cannot make an impact on problems of this scope with unilateral action.

The global community reacted with unusual speed to the threat posed by the depletion of the ozone layer. The Vienna Convention for the Protection of the Ozone Layer was adopted on March 22, 1985, and entered into force on September 22, 1988.<sup>209</sup> The Convention provides for research in and monitoring of the depletion of the ozone layer, exchange of information, transfer of technology, and promotion of public awareness to facilitate protection of the ozone layer.<sup>210</sup> It also allowed for flexibility by specifically providing for the adoption of protocols and annexes. The Vienna Convention also introduced the use of international trade sanctions as a tool to enforce the goals of the Convention.<sup>211</sup>

The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in September of 1987. It is considered one of the most significant achievements of the international community toward protecting the environment from adverse effects caused by humans. This protocol called for a freeze in the production of the controlled chlorofluorocarbons at their 1986 levels within 1 year of the date of its entry into force (January 1, 1989). It also required a 50% reduction in production and consumption of CFC's by mid-1998. Further provisions

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206. *Id.* at 146.

207. *Id.*

208. *Id.* at 146-47.

209. 26 I.L.M. 1529 (1987).

210. Iwonna Rummel-Bulska, *Environmental Law in UNEP*, UNITED NATIONS ENV'TL PROGRAMME, 1, 9 (1991).

211. U.S. International Trade Commission, *supra* note 85, at 5-69.

required consumption of halons frozen at 1986 levels, although limited production increases were allowed to meet the needs of developing countries.<sup>212</sup>

New information and increased scientific concern led to the Helsinki Declaration on the Protection of the Ozone Layer, issued May 2, 1989. The Helsinki Declaration recommended the timetable be tightened to phase out CFC's and halons and to control and reduce other ozone depleting substances as soon as feasible, while accelerating development of environmentally acceptable substitutes.<sup>213</sup> It also led to the London Adjustments to the Montreal Protocol, which tightened restrictions even further.<sup>214</sup> These adjustments entered into force March 7, 1991.<sup>215</sup>

#### D. *Marine Biosphere Reserves*

Marine protected areas are emerging as an important tool in saving, studying, and sustainably using marine biodiversity.<sup>216</sup> Unfortunately, their development lags far behind their terrestrial counterparts.<sup>217</sup> It has only been 20 years since marine protected areas began to be set aside.<sup>218</sup> Public understanding, involvement, and support are crucial to the success of such reserves. Successful experiences in New Zealand and the Philippines have demonstrated the potential effectiveness of reserves in achieving conservation objectives.<sup>219</sup> Further development of marine reserves could be an integral step in preserving marine biodiversity.

### IV. POLLUTION OF THE MARINE ENVIRONMENT

#### A. *The Effects*

Pollution is one of the major threats to marine biodiversity, and is another problem that requires international cooperation, because pollution does not respect political boundaries.<sup>220</sup> The sources and effects of

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212. Rummel-Bulska, *supra* note 210, at 9.

213. *Id.* at 10.

214. *Id.* at 11.

215. *Id.* at 12.

216. NORSE, *supra* note 1, at 218.

217. *Id.*

218. *Id.*

219. *Id.* at 219.

220. Baur & Iudicello, *Stemming the Tide of Marine Debris Pollution: Putting Domestic and International Control Authorities to Work*, 17 *ECOLOGY L.Q.* 71, 75 (1991).

pollution on the marine environment vary. Nutrient and sediment pollution from land based sources have contributed to the decline of estuaries, coastal wetlands, coral reefs, seagrass beds and other marine ecosystems. They also have contributed to the increase in the so-called “red tides” of toxic algae blooms.<sup>221</sup> Land based activity, rather than vessel or maritime activity, has been recognized as the major source of marine pollution.<sup>222</sup>

Debris is another area of concern. Plastic discarded in the marine environment causes a variety of harmful effects.<sup>223</sup> “Marine mammals, seabirds, sea turtles, fishes, and crabs often become entangled in the loops and openings of plastic fishing gear, strapping bands, six-pack rings from beverage containers, and other items.”<sup>224</sup> “Once ensnared, these animals might be unable to swim or feed, or might develop open wounds that become infected.”<sup>225</sup> “Marine animals are also known to ingest everything from large pieces of plastic sheeting to tiny plastic resin pellets.”<sup>226</sup> Floating tar balls and plastics, if eaten, can harm or kill species such as sea turtles.<sup>227</sup>

Petroleum products are a major marine pollutant, with approximately 3.25 million metric tons of them entering the marine environment every year.<sup>228</sup> Oil pollution comes from the extraction and transportation of gas and oil, and from discharges of waste products from vessels. Oil spills are most common in the areas near the coasts that are so important to marine species.<sup>229</sup> Chronic oil pollution from land-based sources and from shipping is an even larger threat, contaminating the marine environment with even greater amounts of oil than is deposited by spills.<sup>230</sup> Marine species and ecosystems are threatened with being poisoned or smothered by oil and having habitat degraded, fragmented, or destroyed by oil spills, pipelines, or exploration.<sup>231</sup> Control of these

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221. Weber, *supra* note 2, at 19.

222. Moira L. McConnell, *The Modern Law of the Sea: Framework for the Protection and Preservation of the Marine Environment?*, 23 CASE W. RES. J. INT’L L. 83, 87 (1991).

223. Baur & Iudicello, *supra* note 220, at 75.

224. NORSE, *supra* note 1, at 127-28.

225. *Id.*

226. *Id.* at 129.

227. *Our Living Oceans*, *supra* note 20, at 136.

228. NORSE, *supra* note 1, at 119.

229. *Id.* at 86.

230. *Id.* 118.

231. *Id.* 110.

different types of pollution is a vital step in preserving marine biodiversity.

*B. The Legal Regime*

1. Land Based Pollution Responses

Reducing the flow of pollution from land is one of the major priorities of oceans management.<sup>232</sup> Thirty-three percent of the pollutants entering the marine environment arrive via air emissions from land-based sources. Another 44% comes through rivers and streams.<sup>233</sup> Types of pollution can include sewage (nutrient), chemicals, toxins, and sediments. Domestic clean-water legislation in countries such as Japan, Germany, and the U.S., although not specifically directed at ocean degradation, is helpful in controlling it.<sup>234</sup>

In order to achieve widespread effectiveness, however, these efforts need broader coordination. Between 1983 and 1985, the "Working Group of Experts for the Protection of the Marine Environment" collaborated to develop the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-based Sources. The agreement was finalized in 1985. In its decision 13/18 of May 24, 1985, the United Nations Environmental Programme (UNEP) adopted these guidelines, encouraging states and international organizations to use the Guidelines in their development of bilateral, regional, and global agreements on the subject. The Guidelines were based on UNCLOS III (part XII), the Paris Convention for the Prevention of Marine Pollution from Land-based Sources, the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area, and the Athens Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources.<sup>235</sup>

The Montreal Guidelines include discussion of co-operation in establishing rules, criteria, standards, and recommended practices and procedures to prevent, reduce, and control pollution; scientific and technical assistance and co-operation; establishment of programs for monitoring and data management; establishment of special protected areas; and development of control strategies. The Guidelines have been

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232. Weber, *supra* note 2, at 51.

233. *Id.*

234. *Id.*

235. Rummel-Bulska, *supra* note 210, at 34.

utilized internationally within the South-East Pacific Action Plan, and by the World Bank in developing its policies on marine and coastal pollution. They have also been used by individual nations in formulating domestic policies.<sup>236</sup>

UNEP's Regional Seas Programs focus on "conservation efforts, public debate, and scientific research on the problems of land-based sources of marine pollution, as well as on species and habitat protection, and emergency spill and pollution plans."<sup>237</sup> Although there have been some substantive successes, the Programs are chronically underfunded, and need increased support if they are ever to meet their goals.<sup>238</sup>

Principal 7 of the Stockholm Declaration obliges states to take "all possible steps to prevent pollution of the seas by substances that are 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."<sup>239</sup> This was reflected in UNCLOS III. UNCLOS III, article 207, requires all countries, both coastal and land-locked, to take measures (such as the adoption of laws and regulations) to prevent the pollution of the marine environment from land-based sources.<sup>240</sup> There is a recognized need for a global convention on the topic.<sup>241</sup>

## 2. Responses to Marine Debris Pollution

The 1982 United Nations Convention on the Law of the Sea "is widely accepted as a codification of customary international maritime law and carries considerable moral force."<sup>242</sup> UNCLOS III requires that parties take all measures necessary to prevent pollution of the sea from any source.<sup>243</sup> Each coastal state has the right to determine appropriate measures to maintain its marine resources<sup>244</sup> and to protect and preserve

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236. *Id.* at 35.

237. Weber, *supra* note 2, at 53.

238. *Id.* at 54.

239. SOHN & GUSTAFSON, *supra* note 42, at 3-4.

240. UNCLOS III, *supra* note 63, art. 200.

241. Rummel-Bulska, *supra* note 210, at 35.

242. Baur & Iudicello, *supra* note 220, at 93.

243. UNCLOS III, *supra* note 63, art. 194(1). The Convention also directs contracting parties to prevent or control all pollution, which is defined as "the introduction by man, directly or indirectly, of substances . . . into the marine environment . . . which results or is likely to result in such deleterious effects as harm to living resources and marine life." *Id.* art. 1.1(4).

244. *Id.* art. 61.

the marine environment within its EEZ.<sup>245</sup> Coastal states must, however, continue to respect the navigation rights of vessels and not impair the “right of innocent passage.”<sup>246</sup> The Convention recognizes that individual states have an affirmative duty to protect the global marine environment from pollution.<sup>247</sup>

Additional international authorities concerned with ocean dumping and marine debris include the London Dumping Convention (LDC),<sup>248</sup> MARPOL,<sup>249</sup> agreements concluded under the United Nations Regional Seas Programme, other regional agreements, and the Law of the Sea Convention.<sup>250</sup> Of these, MARPOL is the most significant.<sup>251</sup>

In 1978, the parties to the International Convention for the Prevention of Pollution from Ships ratified Annex V of the Convention’s 1978 Protocol (MARPOL).<sup>252</sup> Annex V of MARPOL prohibits the disposal of any plastics, including synthetic ropes, fishing nets, and plastic garbage bags, into the sea.<sup>253</sup> Annex V also prohibits disposal of all plastics, paper products, rags, glass, metal, bottles, crockery, dunnage, lining, and packing materials in “special areas” of environmental sensitivity.<sup>254</sup> Food wastes are also restricted.<sup>255</sup> Portside facilities are required to provide facilities for receiving trash from incoming ships.<sup>256</sup>

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245. *Id.* art. 56, § 1(b)(iii).

246. *Id.* art. 15.

247. Baur & Iudicello, *supra* note 220, at 93-94.

248. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403 [hereinafter London Dumping Convention].

249. International Convention for the Prevention of Pollution from Ships of 1973, Nov. 2, 1973, 12 I.L.M. 1319 (1973) [hereinafter MARPOL]; Protocol to Amend the International Convention for the prevention of Pollution from Ships of 1963, June 1, 1978, 17 I.L.M. 546 [hereinafter MARPOL Protocol]; Annex V: Regulations for the Prevention of Pollution by Garbage from Ships, 12 I.L.M. 1434 [hereinafter Annex V]. The requirements of Annex V entered into force on December 31, 1988.

250. UNCLOS III, *supra* note 63.

251. Baur & Iudicello, *supra* note 220, at 84.

252. MARPOL, *supra* note 249.

253. Annex V, *supra* note 249.

254. *Id.* reg. 5(2)(a). A special area is defined as “a sea where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of pollution by garbage is required.” *Id.* reg. 1(3).

255. Baur & Iudicello, *supra* note 220, at 86.

256. Michael Weisskopf, *Plastic Reaps a Grim Harvest in the Oceans of the World*, SMITHSONIAN, Mar. 1988, at 64.

The United States implemented Annex V by enacting the Marine Plastic Pollution Research and Control Act (MPPRCA),<sup>257</sup> governing the disposal of plastics and other debris from ships and the collection of such wastes for disposal at ports and terminals. In certain respects, MPPRCA provides a model for going beyond Annex V by directing national agencies to study the marine debris pollution problem and to seek technological solutions.<sup>258</sup>

The Caribbean Convention is a typical regional seas agreement.<sup>259</sup> It provides a cooperative mechanism through which coastal states may formulate regional strategies to reduce and control pollution in the convention area.<sup>260</sup> The parties also agreed to take all appropriate measures to prevent, reduce, and control pollution from ships,<sup>261</sup> dumping,<sup>262</sup> and coastal disposal or discharges from internal waters.<sup>263</sup> “The draft Protected Areas and Wildlife Protocol contains several provisions pertinent to marine debris.”<sup>264</sup> For example, it would obligate each party to “regulate and, where necessary, prohibit activities having adverse effects on [designated] areas and species.”<sup>265</sup> “Similar measures are directed to protect listed species.”<sup>266</sup> “The Protocol . . . also obligates parties to draft management plans and guidelines to ensure the quality of protected areas, to develop public awareness programs, and to participate in cooperative scientific, technical, and management measures to achieve the Protocol’s objectives.”<sup>267</sup> “The Specially Protected Areas and Wildlife Protocol to the Caribbean Convention could and should serve as a prototype for using regional agreements to establish the type of obligations and action-forcing mechanisms needed to address marine debris pollution.”<sup>268</sup>

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257. Pub. L. No. 100-220, 101 Stat. 1460 (codified in scattered sections of 33 U.S.C.) [hereinafter MPPRCA]. MPPRCA amends the Act to Prevent Pollution from Ships, 33 U.S.C. §§ 1901-1912 (1982), which implemented other requirements of MARPOL.

258. MPPRCA, *supra* note 257, §§ 2201-2203.

259. Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, Mar. 24, 1983 art. 4, § 1, 22 I.L.M. 22.

260. *Id.*

261. *Id.* art. 5.

262. *Id.* art. 6.

263. *Id.* art. 7.

264. Baur & Iudicello, *supra* note 220, at 89.

265. *Id.*

266. *Id.* at 90.

267. *Id.*

268. *Id.* at 92.

This and other regional agreements reflect the fundamental importance of cooperative international efforts and focus on regional responses to address marine pollution. They show some promise of success in preserving biodiversity and the marine environment. However, standing alone they are insufficient to reduce marine debris contamination significantly.<sup>269</sup>

The London Dumping Convention (LDC)<sup>270</sup> was one of the earliest noteworthy international agreements to address refuse disposal in the marine environment.<sup>271</sup> LDC prohibits the dumping of wastes at sea, unless a permit is issued.<sup>272</sup> Certain wastes can not be dumped at all, including “persistent plastics.”<sup>273</sup> As a result, the LDC prohibits the disposal of many items that are the principal causes of entanglement and other adverse environmental effects.<sup>274</sup>

The instruments described in this section represent only a fraction of the agreements that attempt to control marine debris pollution. However, despite this plethora of legal standards, lack of international cooperation and enforcement has limited their effectiveness, and marine biodiversity continues to be threatened.

### 3. Oil Pollution

There are two categories of international measures which address oil pollution. The first category attempts to control the pollution directly. The second establishes civil liability and compensation schemes for damages caused by oil pollution.

An example of the former is Annex I to MARPOL, which in order to control oil pollution from vessels, “requires segregated ballast and crude oil washing systems, oil/water separators, and oil discharge monitoring, and it prohibits all discharges from ships in specially

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269. *Id.* at 91.

270. The purpose of the London Dumping Convention is to promote the “effective control of all sources of pollution of the marine environment . . . by [prohibiting] 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.” London Dumping Convention, *supra* note 248, art. I.

271. The Marine Protection, Research, and Sanctuaries Act, 33 U.S.C. §§ 1401-1445 (1982) [hereinafter MPRSA], implements the London Dumping Convention in the U.S., and regulates the dumping of all types of materials in the oceans within the jurisdiction of the United States.

272. London Dumping Convention, *supra* note 248, art. IV, § 1.

273. *Id.* annex I, § 4.

274. Baur & Iudicello, *supra* note 220, at 92.

designated areas.”<sup>275</sup> An example of the latter is the Protocol to the International Convention on Civil Liability for Oil Pollution Damage, London, 1976.<sup>276</sup>

However, there is still a great deal more that needs to be done in order to adequately protect marine biodiversity from oil pollution. Even coastal state efforts to protect marine ecosystems from the hazards of oil spills are insufficient. For example, creation of a National Marine Sanctuary along most of the coast of central California could not include restrictions on tanker traffic, since regulation of vessel lanes takes place under international law.<sup>277</sup> Some measures that have been suggested include improved training and certification for people who produce and transport oil, improved vessel traffic management, imposing higher penalties on perpetrators of oil pollution, stricter and enforceable international vessel construction standards, stronger incentives for motor oil recycling, and perhaps most importantly, improved energy efficiency and use of alternative fuels.<sup>278</sup>

## V. CONCLUSIONS AND RECOMMENDATIONS

“There are alternatives to degrading the sea, but they require changes in the ways that we think and act. Focusing solely on species . . . has proven to be insufficient in the sea, as it is on land. Ecosystem protection and management are essential complements to species protection and management . . . the goal should be to ensure that living things do not become endangered . . . to *maintain the integrity of life* . . . Saving our planet is not a luxury that can be left to someone else. It is an imperative that requires us to make a fundamental change in our course by building conservation into the decision-making process . . . .”<sup>279</sup>

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275. NORSE, *supra* note 1, at 120.

276. Protocol to the International Convention on Civil Liability for Oil Pollution Damage, Nov. 29, 1969, 16 I.L.M. 617 (1977).

277. For a description of the measures that would be necessary to protect the Monterey Bay National Marine Sanctuary, see Richard Townsend & M. Glazer, *Safe Passage: Preventing Oil Spills in Our Marine Sanctuaries*, CENTER FOR MARINE CONSERVATION 77-97 (1994).

278. NORSE, *supra* note 1, at 120.

279. *Id.* at xxx.

*A. Conclusions*

It is not surprising that the existing international legal regime protects marine biological diversity about as well as current science understands it; that is, not very well at all. To the extent that current marine science examines the world beneath the sea coral by coral, fish by fish, pollutant by pollutant, the law has followed the science—with single species, single medium, or single subject regimes—piece by piece.

But diversity is more than the sum of the pieces—it is the balance of the relationships of species to each other, among themselves, and through the systems that support them. Scientists have begun to employ the idea of conservation biology—an integration of individual disciplinary approaches, with conservation as the informing principle. Using such an approach in the marine environment is in its infancy, but could bring together marine ecologists, biogeographers, oceanographers, toxicologists, and specialists in organisms from fish and mammals to algae and mollusks.

If the law is to meet the challenge of conserving the sea's diversity and abundance, it, too, must broaden traditional approaches. Although environmental advocates have had some success reaching across legal regimes, for example, applying laws protecting marine mammals in order to condition fishing operations, the approach is risky and insufficient at best. The Bering Sea situation mentioned at the beginning of this article is one example: despite actions to reduce direct and incidental mortality of Stellers sea lions, the species is not recovering from its status as threatened. Many believe that what is at issue is not direct or indirect kills of the sea lions, but a decline in their food source—fish that are also the target of the largest single species fishery in the world. Attempts to change the management regime for the fishery in order to provide enough pollock for sea lions, birds, fur seals, and other animals in the Bering Sea ecosystem has proven unsuccessful. Even less successful have been ventures into the question of assessing, reducing or minimizing the catch and discard of hundreds of millions of tons of other sea life in the annual course of the fishery—creatures that served a function in a diverse and abundant ocean system. Why? Because the fishery is managed under a single-species fishery management plan informed by the principle of optimum yield to the catchers. It can perhaps be conditioned, moved a bit one way or another, by laws and treaties that protect marine mammals or birds. But there is no law

protecting the sculpins, starfish, jellyfish or hundreds of other “non-desirable,” nonmarket species. There is nothing yet in the law of fishery management that directs managers to conserve the whole—only to maximize the catch of specific parts.

Even where one legal regime has been applied to conserve an entire system or area, other laws can frustrate the purpose of conserving marine diversity. The U.S. National Marine Sanctuary Program is an example. It was designed to identify and designate as national marine sanctuaries areas of the marine environment which are of special national significance, to provide authority for comprehensive and coordinated management of these areas and activities affecting them in a manner which accomplishes the purpose by using both its own and existing regulatory authority.<sup>280</sup> Yet every sanctuary, from the Florida Keys to central California and the Olympic Coast of Washington is exposed to every conceivable pollution source: oil tanker traffic, sewage outfalls, toxic runoff, and hazardous dump sites. The laws governing these activities, more often than not, supersede the purposes for which the sanctuaries were created. Again, advocates are forced to go to sources of law outside what would at first seem to be the governing regime.

In conclusion, there are tools among international and regional authorities to conserve marine biological diversity. But the tools were not designed for that purpose. Advocates on behalf of the marine environment as a whole are faced with the challenge that was often posed in popular “fix it” magazines of the 50’s and 60’s: you have a screw driver and a wrench, but what you really need is a pair of pliers and an awl—can you modify the tools to do the job? In some cases, perhaps but only with limited success.

There is another answer: get a new tool box.

#### *B. Recommendations*

As the scientific and marine resource management community wrestle with new concepts such as conservation biology and ecosystem management, the legal community, too, must begin integrating cross-disciplinary, multifaceted concepts into legal regimes. UNCLOS III holds promise as one potential framework for such an approach, as do the Biological Diversity Treaty and CCAMLR.

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280. National Marine Sanctuaries Act, 16 U.S.C. §§ 1431-39 (1988).

Other opportunities, particularly in the fisheries realm, may emerge with the move toward more regional management agreements as high seas and distant water fleets move farther from the jurisdiction of coastal state fishery management authorities. In the development of these regimes, conservation advocates must strive first for transparency: the capacity for nongovernmental organizations to participate, influence, and observe decision making at the international level. If this can be accomplished, objectives to seek include:

1. Inclusion of the precautionary principle—to manage conservatively in the face of uncertainty;
2. Use of best available scientific information, including data from disciplines other than fisheries management, and recognition that basic research is a “provident investment;”<sup>281</sup>
3. Adopting sustainability, not optimum yield, as the informing principle;
4. Consideration of nonfishery environmental factors, such as development activities;
5. Examination and conservation of ecosystems as well as individual species, with particular regard to reducing the catch and discard of nontarget organisms;
6. Protection of marine habitats—not only from land-based activities, but also protection from fishery-caused habitat degradation;
7. Extension of databases and information exchanges, with emphasis on the transfer of sustainable technology; and finally,
8. Adoption of marine protected areas, places where entire systems can be safeguarded from the damaging effects of human activity.

“To conserve something as broad and deep as the sea requires a broadening of our vision, a deepening of our understanding, and, most important of all, a commitment to concerted action for as long as necessary to do the job.”<sup>282</sup>

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281. Wise, *supra* note 34, at 123.

282. NORSE, *supra* note 1, at 283.