

MARINE BIODIVERSITY CONSERVATION: THE INTERNATIONAL LEGAL FRAMEWORK AND CHALLENGES

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ABSTRACT

The conservation of marine biological diversity and ecosystems is a major current global issue. Marine biological diversity is threatened by sea pollution, overfishing, deep-sea mining, oil exploratory activities, bottom trawling, and other human activities in marine areas. The protection of marine biological diversity is essential for maintaining balance in the natural food chains and ecosystems of Earth, and this can be achieved through sustainable management of marine resources and by preventing pollution, overfishing, and harmful exploitation of sea resources. In this regard, the law of the sea has provided rules and regulations for preventing harmful effects on marine biological diversity caused by human operations in the marine environment. The U.N. Convention on the Law of the Sea (UNCLOS) and the Fish Stocks Agreement have applied general obligations on coastal states not to cause pollution and other harm to marine life and resources and the marine environment. The UNCLOS and the RFMO/As also provide protective measures for marine areas beyond national jurisdictions. Furthermore, there are several other international, regional, and United Nations conventions for setting out policies, goals, and strategies for the sustainable use and protection of marine biological diversity and ecosystems. The CMS Convention, CITES, the SOLAS Convention, the London Convention, and the Convention on Biological Diversity are prominent international conventions with a core focus on preserving biological diversity and the environment in

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international seas. In addition, there are several other regional agreements and conventions, including the Barcelona Convention, the OSPAR Convention, and the Noumea Convention, that provide regulations for controlling marine pollution and regulating human activities in regional seas for marine environmental and biodiversity protection. In addition, several international organizations including the U.N. General Assembly, the Food and Agriculture Organization, the World Wildlife Fund, the International Maritime Organization, and several others are working to preserve marine biological diversity and ecosystems within their respective regional and global spheres. International humanitarian law, treaty law (comprising different agreements and conventions, e.g., the Geneva Conventions Additional Protocol I and the Hague Convention) and the UNCLOS define protective instruments and principles for the conservation of marine environment during armed conflicts. The United States has also made efforts to extend protection for biological diversity in its marine areas and in the high seas. However, there are still a lot of gaps and challenges in the implementation of such protective measures and principles in marine areas in regional as well as in the high seas.

Keywords: Marine biodiversity, Deep-sea mining, Marine environment, Regional fisheries management organizations and arrangements (RFMO/As).

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I. INTRODUCTION

“Biodiversity,” or “biological diversity,” is defined as the occurrence of variety in species of animals, plants, and microorganisms, as well as in their genes and habitats in the marine, freshwater, and terrestrial ecosystems.¹ Biodiversity enhances the well-being of an ecosystem by maintaining its natural lifecycle, making it essential to an ecosystem’s sustainability and development.² For instance, biodiversity regulates the oxygen and carbon dioxide balance,³ maintains the

1. See P. Becker, S.A. Thomas & R.A. Elston, *Natural Heritage Plan for Biological Diversity in the North American Great Lakes Ecosystem: Lessons and Applications to the Black Sea Region*, in CONSERVATION OF THE BIOLOGICAL DIVERSITY AS A PREREQUISITE FOR SUSTAINABLE DEVELOPMENT IN THE BLACK SEA REGION 376 (V. Kotlyakov, M. Uppenbrink & V. Metreveli eds., 2012).

2. ENCYCLOPEDIA OF SOIL SCIENCE, VOL. 1, 150 (Rattan Lal ed., 2006).

3. LIFE ON EARTH: AN ENCYCLOPEDIA OF BIODIVERSITY, ECOLOGY AND EVOLUTION, VOL. 1 A–G, 35 (Niles Eldredge ed., 2002).

presence of beneficial nutrients and chemicals in soil,⁴ improves the fertility of land through decomposition processes instigated by a variety of microorganisms, and regulates several other natural processes on Earth.⁵

However, natural biodiversity is currently threatened by a number of factors.⁶ In particular, marine biological diversity is facing threats from certain human activities, for instance: the dumping of waste materials and hazardous industrial chemicals into the seas and other aquatic environments, overfishing, oil spills, and deep-sea mining.⁷ The large-scale continuation of these activities is harmful to marine species and their habitats.⁸ Therefore, particular attention must be given globally as well as regionally for the preservation of biological diversity.

The first section of this paper will explain the term “biodiversity” and will go on to explain the potential threats to marine biodiversity. The second section sets out the provisions of the United Nations Convention on the Law of the Sea (UNCLOS) and the Fish Stocks Agreement regarding the conservation of marine biological diversity. The third section will include a discussion of the contributions made by international law in establishing international conventions and agreements for formulating rules and regulations related to the conservation of marine biological diversity and the protection of the marine environment. The functions and roles of the prominent international organizations working toward realizing this goal are also addressed. The fourth section includes an elaboration of the recommendations provided by the UNCLOS and regional fisheries management organizations and arrangements (RFMO/As) for the protection of marine areas beyond national jurisdiction.

4. *Id.* at 36.

5. COMPOSTING FOR SUSTAINABLE AGRICULTURE 245 (DINESH K. MAHESHWARI ED., 2014).

6. PLANT-DERIVED NATURAL PRODUCTS: SYNTHESIS, FUNCTION, AND APPLICATION 127 (Anne E. Osbourn & Virginia Lanzotti eds., 2009).

7. See THE MARINE FLORA AND FAUNA OF HONG KONG AND SOUTHERN CHINA V 5 (Brian Morton ed., 2000); see also SYBILLE VAN DEN HOVE & VINCENT MOREAU, DEEP-SEA BIODIVERSITY AND ECOSYSTEMS 44 (2007).

8. See VAN DEN HOVE & MOREAU, *supra* note 7.

The fifth section of this paper addresses issues with protecting the environment and biological diversity during armed conflicts. In particular, it sets out the principles of international law, including international humanitarian law, treaty law, and the law of the sea, which provides guidelines to belligerents to ensure the environment and biological diversity are protected in areas within and beyond their jurisdiction. The sixth section includes an explanation of the gaps and challenges that are present in the implementation of the suggested guidelines for the protection of the marine environment and biological diversity in the regional as well as in areas beyond national jurisdiction. The seventh section includes a description of the efforts made by the United States in ensuring protection of the marine environment and biological diversity in its seas as well as beyond its national jurisdiction. At the end of this paper, inferences are drawn and presented with fair analysis.

II. WHAT IS BIODIVERSITY?

A. Definition

The Convention on Biological Diversity (CBD) defines “biodiversity” as:

[T]he variability among living organisms from all sources including, inter alia, marine and other aquatic ecosystem and the ecological complexes of which they are part: this includes the diversity within species, between species and of ecosystems.⁹

This variety includes all types of living beings, whether in the animal, microorganism, or plant kingdoms.¹⁰ Variety defines the differences and relationships of species in the natural ecosystem. This variety or biodiversity, has a key position and importance in the sustenance and preservation of natural lifecycles on Earth.¹¹

9. BIODIVERSITY AND THE LAW: INTELLECTUAL PROPERTY, BIOTECHNOLOGY AND TRADITIONAL KNOWLEDGE 116 (CHARLES R. MCMANIS ED., 2012); U.N. Convention on Biological Diversity art. 2 (1992) [hereinafter “UNCBD”].

10. See UNCBD, *supra* note 9, at art. 2.

11. FRED VAN DYKE, CONSERVATION BIOLOGY: FOUNDATIONS, CONCEPTS, APPLICATIONS 85 (SPRINGER 2008).

B. Threats to Biodiversity

Despite endeavors by the international community for the preservation of natural habitats and biodiversity, there are countless threats to marine and land-based biodiversity.¹² Some of the prominent threats to marine biodiversity are set out below as well as measures that international law and the law of the sea suggest to counter those threats.

1. Harmful Fishing Practices

Certain kinds of fishing practice cause harm to the biodiversity of the seas.¹³ For instance, “bottom trawling” is a fishing practice that uses rockhopper trawls with large fishing nets and rubber tires or rollers that capture large numbers of fish.¹⁴ However, while capturing fish, other marine species such as tortoises are also tangled in the nets and harmed by the trawls. If these species come in the way of the rubber tires or rollers, these can crush the animals.¹⁵

The bottom trawling technique has been used widely since the 1980s,¹⁶ and it captures a large number of fish from the seas.¹⁷ Unfortunately, it has caused severe damage to coral, as the trawls can reach depths of two kilometers and destroy the coral reefs they run into.¹⁸ Bottom trawling is responsible for 90 percent of the nearly one million pounds of coral reefs removed

12. See Prabhakar R. Pawar, *Anthropogenic Threats to Coastal and Marine Biodiversity: A Review*, 4 INT. J. MOD. BIOL. RES. 36–37 (2016), <http://www.bluepenjournals.org/ijmbr/pdf/2016/October/Pawar.pdf>; see also *Overfishing: A Threat to Marine Biodiversity*, UNITED NATIONS: 10 STORIES THE WORLD SHOULD HEAR MORE ABOUT (last visited Mar. 9, 2018), <http://www.un.org/events/tenstories/06/story.asp?storyID=800#>.

13. See *Destructive Fishing*, MARINE CONSERVATION INST., <https://marine-conservation.org/what-we-do/program-areas/how-we-fish/destructive-fishing/> (last visited Mar. 6, 2018).

14. DANIEL BECKMAN, *MARINE ENVIRONMENTAL BIOLOGY AND CONSERVATION* 365 (JONES & BARTLETT LEARNING ED., 2012).

15. *Id.*

16. GUIFANG XUE, *CHINA AND INTERNATIONAL FISHERIES LAW AND POLICY* 158 (2005).

17. ANAND M. SAXENA, *THE VEGETARIAN IMPERATIVE* (2011).

18. CALLUM ROBERTS, *THE UNNATURAL HISTORY OF THE SEA* 299 (2007).

each year by commercial fisheries along the coast of Alaska.¹⁹ A large amount of marine life depends on coral;²⁰ as a result of the damage, significant harm has been caused to natural marine biodiversity.

2. Overfishing

Another major threat to marine biodiversity is overfishing,²¹ because marine life is generally slow in its reproduction and growth.²² Therefore, fishing beyond a certain limit in a sea can cause a *shortage* of living beings in that area. Despite this, massive overfishing in several coastal regions is being carried out regularly, threatening existing marine life.²³ Such incidents are more common in the high seas,²⁴ i.e., in the areas of sea that are ratified as international waters. Notably, no particular monitoring is being carried out here by any state to prevent overfishing.²⁵ Such waters are highly vulnerable to overfishing. Marine life in these seas can become extinct if the overfishing is not regulated or controlled.

3. Pollution

Pollution is a major threat to the biodiversity of the seas and fresh watercourses.²⁶ A number of factories dump industrial waste into the seas.²⁷ Industrial waste contains harmful chemicals that make it difficult for marine life to breathe or live comfortably in the water.²⁸ Hazardous chemicals can also kill

19. PER JAHREN & TONGBO SUI, *HOW WATER INFLUENCES OUR LIVES* 70 (2017).

20. *Id.*

21. ROBIN KUNDIS CRAIG, *COMPARATIVE OCEAN GOVERNANCE: PLACE-BASED PROTECTIONS IN AN ERA OF CLIMATE CHANGE* 35 (2012).

22. *See* LIFE AT EXTREMES: ENVIRONMENTS, ORGANISMS, AND STRATEGIES FOR SURVIVAL 307 (Elanor Bell ed., 2012).

23. Don Anton, *Law for the Sea's Biological Diversity*, ANU COLL. OF L., 23 (1997).

24. *Id.*

25. ERIK FRANCKX, *FISHERIES ENFORCEMENT: RELATED LEGAL AND INSTITUTIONAL ISSUES* 3 (FAO 2001).

26. SUNIT GUPTA, *GLOBAL ENVIRONMENT CURRENT STATUS* 197 (SARUP & SONS ed., 2000).

27. *See* OUR COMMON SEAS: COASTS IN CRISIS 140 (Don Hinrichsen ed., 2016); *see also* A COMPANION TO INDIAN FICTION IN ENGLISH 147 (Pier Paolo Piciucco ed., 2004).

28. Nazih K. Shammas, *Characteristics of Hazardous Industrial Wastes*, in HANDBOOK OF ADVANCED INDUSTRIAL AND HAZARDOUS WASTES TREATMENT 501

fish and damage coral, algae, and other sea plants.²⁹ Moreover, it can also damage the health of those who may eat the poisoned fish.³⁰ The pollution of seas is a direct threat to the survival of the diversity of marine life.³¹

Highly pollutive incidents have taken place in recent history when leaks of oil from ships have polluted the sea and caused the deaths of a significant number of fish and marine life.³² In response, substantial measures and regulations must be adopted to prevent the pollution of the seas and reduce the loss of fish and marine biodiversity.

4. Deep-Sea Mining

Deep-sea mining is performed for the exploitation of minerals from the depths of the seas.³³ However, this mining of the seabed threatens marine life due to the destruction of natural habitats.³⁴ The deprivation of a marine animal's habitat often means death, as it is difficult for dislocated marine animals to find a new habitat quickly. Therefore, deep-sea mining can pose a great threat to the life and survival of marine species as well as to the biological diversity of the marine ecosystems.³⁵

The threats listed above present a high risk to marine biological diversity and this risk needs to be tackled effectively by devising and implementing appropriate policy frameworks, legislation, and rules. In this regard, the provisions of the

(Lawrence K. Wang, Yung-Tse Hung, & Nazih K. Shammass eds., CRC Press, 2009).

29. C.H. Sujatha, V.B. Pratheesh & Yung-Tse Hung, *River and Lake Pollution*, in HANDBOOK OF ENVIRONMENT AND WASTE MANAGEMENT: AIR AND WATER POLLUTION CONTROL 908 (Lawrence K. Wang, Yung-Tse Hung, & Nazih K. Shammass eds., WORLD SCI., 2012).

30. *Id.*

31. ANDREW FARMER, *MANAGING ENVIRONMENTAL POLLUTION* 156 (ROUTLEDGE 2013).

32. *See* LING ZHU, *COMPULSORY INSURANCE AND COMPENSATION FOR BUNKER OIL POLLUTION DAMAGE* 7 (Springer 2007).

33. *See* BERNARD TAVERNE, *PETROLEUM, INDUSTRY AND GOVERNMENTS: A STUDY OF THE INVOLVEMENT OF GOVERNMENTS IN THE PRODUCTION AND USE OF PETROLEUM* 313 (Kluwer Law Int'l 2008).

34. KRISTINA M. GJERDE, *ECOSYSTEMS AND BIODIVERSITY IN DEEP WATERS AND HIGH SEAS* 30 (UNEP 2006).

35. *Id.*

international law of the sea can be adopted to prevent the loss of marine biodiversity.

III. THE LAW OF THE SEA AND THE CONSERVATION OF MARINE BIODIVERSITY IN AREAS WITHIN STATES' JURISDICTION

The international law of the sea provides guidelines for regulating activities to preserve marine biodiversity and the marine ecosystem.³⁶ Of particular interest are the provisions of the UNCLOS relating to the conservation of biological diversity in the marine environment.

A. UNCLOS (*U.N. Convention on the Law of the Sea*)

The UNCLOS was ratified in 1994³⁷ and provides certain provisions for the conservation of the marine ecosystem and biological diversity.³⁸ Part XII of the UNCLOS relates to the conservation of the marine ecosystem.³⁹ It imposes a general obligation on all nations to take adequate measures to preserve the marine ecosystem and biodiversity.⁴⁰

1. Pollution in the Marine Environment

Particular focus has been given in Part XII of the UNCLOS on preventing pollution in the seas. According to Article 192, States have the obligation to protect and preserve the marine environment.⁴¹ Article 194(1) applies a general obligation on all states to take substantial measures to prevent the occurrence of pollution in their marine environments.⁴² Such measures must also ensure the protection of endangered marine species and their habitats.⁴³ Without mentioning the term "biodiversity," the UNCLOS makes it obligatory for states to protect and preserve

36. See U.N. Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS 1982].

37. *Id.*

38. See generally *id.* at pt. XII.

39. See generally *id.*

40. *Id.*

41. *Id.* at art. 192.

42. *Id.* at art. 194(1).

43. *Id.* at art. 194(5).

the natural habitats of marine species, which implies the protection of marine biological diversity.

Article 21(1)(f) encourages coastal states to enact legislation to prevent, reduce, and control pollution in seas.⁴⁴ Similarly, Article 39(2)(b) places a duty on ships in transit passage to comply with international legislations and rules related to the prevention and reduction of pollution in the seas.⁴⁵ Articles 42 and 43 relate to states that have coastlines on straits.⁴⁶ Article 42(1)(b) urges such states to adopt laws related to the prevention of pollution in straits' coastal areas,⁴⁷ while Article 43 generally obligates such states to cooperate "for the prevention, reduction and control of pollution from ships."⁴⁸

Article 94(4)(c) applies a duty on flag states to ensure the application of international laws and rules relating to the prevention and control of pollution in marine areas.⁴⁹ Similarly, Article 142(3) ensures coastal states are not prevented from taking action to prevent, mitigate, or eliminate the threats caused by pollution.⁵⁰ Article 145 additionally asks coastal states to enact adequate legislation and rules that take practical measures for preventing, controlling, and reducing pollution and its hazardous effects on the marine environment.⁵¹ It also enumerates certain activities that can spread pollution and pose a danger to the marine environment and its biodiversity, such as, "drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities."⁵²

Article 198 and 199 of the UNCLOS recommends that states communicate and cooperate with other possibly effected states to prevent the spread of pollution in marine areas.⁵³ Article 200

44. *Id.* at art. 21(1)(f).

45. *Id.* at art. 39(2)(b).

46. *Id.* at art. 42–43.

47. *Id.* at art. 42(1)(b).

48. *Id.* at art. 43.

49. *Id.* at art. 94(4)(c).

50. *Id.* at art. 142(3).

51. *Id.* at art. 145.

52. *Id.*

53. *Id.* at art. 198–199.

obligates states to conduct joint studies and scientific research programs to collaborate and exchange data with the ultimate goal of devising new ways to prevent pollution.⁵⁴ In addition, Article 202 also recommends that states assist underdeveloped regions and developing states in launching their own scientific research programs and projects on preventing marine pollution.⁵⁵

Section 4 of Part XII of the UNCLOS also places an obligation on countries to perform assessments of the environmental impact of their activities or developmental projects.⁵⁶ In this regard, they must give particular attention to ensuring their activities or construction projects in marine areas do not result in the spread of pollution in the marine environment.⁵⁷ Pertinently, Article 204 advises states to monitor and properly assess the probable effects of pollution in the marine environment and requires them to take adequate measures to mitigate the effects of the pollution on the marine ecosystem and its biodiversity.⁵⁸

Section 5 of Part XII of the UNCLOS includes further detailed rules for preventing and controlling pollution in the marine environment.⁵⁹ This section contains Articles 207 to 212 and discusses the necessity of preventing pollution caused by land-based resources,⁶⁰ by seabed activities in the national jurisdiction of states,⁶¹ by human activities in the marine regions,⁶² by dumping waste and hazardous materials in the seas,⁶³ by ships,⁶⁴ and by the pollution in the atmosphere.⁶⁵ Section 6 of Part XII, comprising Articles 213 to 222, is related to the enforcement of the general rules for reducing pollution

54. *Id.* at art. 200.

55. *Id.* at art. 202.

56. *Id.* at art 204–206.

57. *Id.* at art. 204.

58. *Id.*

59. *See id.* at art. 207–212.

60. *See id.* at art. 207.

61. *See id.* at art. 208.

62. *See id.* at art. 209.

63. *See id.* at art. 210.

64. *See id.* at art. 211.

65. *See id.* at art. 212.

caused by the aforementioned activities in marine areas.⁶⁶ Section 7 of Part XII further elaborates on the safeguarding and protective measures that states can adopt to prevent and reduce the harmful effects of pollution in the seas.⁶⁷ Clearly, the UNCLOS has provided detailed sets of rules for preventing and curbing pollution in the marine environment to protect marine biodiversity and ecosystems.

2. Shipping

Shipping can cause harm to marine biodiversity.⁶⁸ For instance, collisions of whales or other marine animals with the ships⁶⁹ are known as “ship strikes.”⁷⁰ Collisions of ships or leakages of oil from ships can result in the pollution of the marine environment.⁷¹ Shipping also results in pollution when waste from ships is dumped into the sea.⁷² Moreover, shipping can also cause noise pollution, which may disturb the natural habitats of marine species.⁷³ All of these aspects are harmful to the welfare of marine biodiversity. Therefore, the UNCLOS recommends that states follow the rules of an international body, the International Maritime Organization (IMO), which provides regulations on the shipping sector for navigation for the safety of marine species.⁷⁴ The IMO is an international

66. *See id.* at pt. XII, sec. 6.

67. *See id.* at pt. XII, sec. 7.

68. THE HANDBOOK OF GLOBAL CLIMATE AND ENVIRONMENT POLICY 53–54 (Robert Falkner ed., John Wiley & Sons 2013).

69. HERMAN MEDWIN, SOUNDS IN THE SEA: FROM OCEAN ACOUSTICS TO ACOUSTICAL OCEANOGRAPHY 430 (Cambridge Univ. Press, 2005).

70. 2 DEPT OF NAVY, SOUTHERN CALIFORNIA RANGE COMPLEX: DRAFT ENVIRONMENTAL IMPACT STATEMENT/OVERSEAS ENVIRONMENTAL IMPACT STATEMENT F-18 (2008), <https://catalog.hathitrust.org/Record/100984561>.

71. *See* ECONOMICS AND POLITICS OF ENERGY 221 (Arnold Perlmutter et al. eds., Springer 2007).

72. Fadi M. Doumani & James A. Listorti, *Environmental Health: Bridging the Gaps*, 422 WORLD BANK PUBLICATIONS 304 (2001), <https://openknowledge.worldbank.org/handle/10986/13942>.

73. INTERNATIONAL ORGANIZATIONS AND THE LAW OF THE SEA: DOCUMENTARY YEARBOOK 66 (Barbara Kwiatkowska & Harm Dotinga eds., Martinus Nijhoff Publishers 2001).

74. *See* UNCLOS 1982, *supra* note 36, at Annex VIII, art. 2(2); *see also* Study by the Secretariat of the International Maritime Organization, International Maritime Organization On The Law Of The Sea For The International Maritime Organization 7,

organization that promulgates regulations, principles, and guidelines for states to maintain shipping safety at sea.⁷⁵ The UNCLOS makes it obligatory for states to follow the rules made by the IMO.⁷⁶ The IMO's roles and functions are addressed later in this paper.

3. Overfishing

As elucidated in the first section of this paper, overfishing can threaten marine life and biodiversity; therefore, the UNCLOS attempts to address this threat. Part VII(2) of the UNCLOS provides freedom to all states to fish in the high seas, but also applies a limit to this freedom by making it conditional upon the sustainable utilization and conservation of marine species.⁷⁷ Similarly, Articles 116 to 119 of the UNCLOS Convention place a duty on coastal states to adopt special measures and to cooperate with one another for the protection of marine species.⁷⁸ Hence, the UNCLOS imposes a general "duty to cooperate" on coastal states for the conservation of marine biological diversity.⁷⁹

Article 118 also recommends the formation of regional organizations, called RFMOs, for managing the protective measures for marine life and for enhancing cooperation among regional coastal states.⁸⁰ The regulations adopted by the RFMOs are obligatory and binding, but only on its member states,⁸¹ hence they cannot be applied globally and to all states.

4. Dumping at Sea

Articles 210 and 216 of the UNCLOS relate to dumping at sea.⁸² Article 210 of the UNCLOS addresses the issue of

Jan. 30, 2014 [hereinafter Secretariat of the IMO].

75. See UNCLOS 1982, *supra* note 36, at Annex VIII, art. 2(2).

76. See Secretariat of the IMO, *supra* note 74, at 10.

77. JAMES CRAWFORD, BROWNLIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 300 (6th ed. Oxford Univ. Press 2012).

78. See *generally* UNCLOS 1982, *supra* note 36, at art. 116–19.

79. See *id.* at art. 117.

80. See *id.* at art. 118.

81. *Id.*

82. See THE IMLI MANUAL ON INTERNATIONAL MARITIME LAW: VOL. III, 3.2 (David Attard, Malgosia Fitzmaurice, Norman Martinez & Riyaz Hamza eds., Oxford Univ.

pollutive dumping.⁸³ It places an obligation on states to enact new laws and to take measures to prevent and stop the dumping of waste material on the seas.⁸⁴ Such laws must not allow dumping without the prior permission of the states whose marine environment may be affected.⁸⁵ Such laws prevent other states from dumping in exclusive economic zones without the prior approval of the state connected with the zone.⁸⁶

Article 210 also gives importance to national laws and obligations related to the prevention of dumping in the seas in the same manner as it does to international obligations.⁸⁷ It also deems national laws helpful to curb pollution and dumpings at sea; it therefore makes it obligatory for states to implement national laws in addition to the international regulations preventing pollution.⁸⁸

Article 216 of the UNCLOS particularly relates to the implementation of laws by coastal states related to dumping in seas within or beyond their jurisdictions and in exclusive economic zones.⁸⁹ It links the implementation of dumping preventive laws on flag states in relation to their vessels at sea.⁹⁰

5. Deep-Sea Mining

Deep-sea mining can cause significant harmful effects to marine biodiversity.⁹¹ As a result, the UNCLOS has given very particular attention to it by establishing the International Seabed Authority (ISA), which works to regulate human activities including deep-sea mining in international seas.⁹²

Press 2016).

83. See UNCLOS 1982, *supra* note 36, at pt. XII, art. 210.

84. See *id.* at art. 210(1).

85. See *id.* at art. 210(3).

86. See *id.* at art. 210(5).

87. See *id.* at art. 210(4), (6).

88. *Id.*

89. See *id.* at art. 216.

90. *Id.*

91. JOHN C. KUNICH, *KILLING OUR OCEANS: DEALING WITH THE MASS EXTINCTION OF MARINE LIFE* 39 (Greenwood Pub. Group 2006).

92. CATHRIN ZENGERLING, *GREENING INTERNATIONAL JURISPRUDENCE: ENVIRONMENTAL NGOS BEFORE INTERNATIONAL COURTS, TRIBUNALS, AND COMPLIANCE*

Deep-sea mining for the exploitation of minerals is allowed only in marine areas approved by the ISA.⁹³ Furthermore, mining activity can be pursued in these areas only by those parties, organizations, or persons that share the nationality of the controlling regional states or those parties that are controlled or backed by those states.⁹⁴ Consequently, a contract is signed by the party that is interested in mining, and then if any objections or queries are raised over the nature of the interpretation or implementation of the contract, the Seabed Disputes Chamber of the International Tribunal for the Law of the Sea examines it for compliance.⁹⁵ However, under Article 189 of the UNCLOS, the decisions of the Seabed Disputes Chamber cannot be adopted or accepted as a substitute for that of the ISA regarding mining activity.⁹⁶

The ISA gives special attention to environmental safety when it addresses issues related to deep-sea mining because the conservation of the marine environment is necessary for the protection of marine biological diversity.⁹⁷ For instance, in its suggested plan related to the Clarion–Clipperton Zone in the Central Pacific Ocean, the ISA has highlighted certain marine areas as environmentally protected near the deep-sea mining operations in the zone because they possess significant biological diversity.⁹⁸

Moreover, Annex III of the UNCLOS includes a detailed discussion related to mining and its regulation.⁹⁹ Article 17 of Annex III assigns the International Seabed Authority with a duty to make rules and regulations for mining in marine

228 (Martinus Nijhoff Publishers 2013).

93. *Directorate General for Internal Policies Policy A: Economic and Scientific Policy, Towards a Possible International Agreement on Marine Biodiversity in Areas Beyond National Jurisdiction*, 38–39 (2014).

94. *Id.*

95. MICHAEL LODGE, *THE OXFORD HANDBOOK OF THE LAW OF THE SEA* 249 (Alex G. Oude Elferink, Donald R. Rothwell, Karen N. Scott & Tim Stephens eds., Oxford Univ. Press 2015).

96. *Id.*

97. *See supra* note 93, at 38–39.

98. *Id.*

99. *See generally* UNCLOS 1982, *supra* note 36, at Annex III.

areas.¹⁰⁰ In this regard, it particularly mentions the protection and safety of marine life, resources, and environment as an important consideration for the ISA for creation and adoption of mining relevant rules and regulations.¹⁰¹ In addition, Article 18 in Annex III of UNCLOS also levies penalties on mining contractors if they fail to comply with the rules set by the ISA for mining in the marine region.¹⁰²

B. U.N. Fish Stocks Agreement

The Fish Stocks Agreement was ratified by the United Nations in 1995.¹⁰³ It came into force in 2001 and became a part of the international law of the sea.¹⁰⁴ It regulates fisheries management in the high seas.¹⁰⁵ The Fish Stocks Agreement is applicable to migratory fish stocks, which also include high seas fish stocks.¹⁰⁶ The Fish Stocks Agreement is applicable in exclusive economic zones and exclusive fishery zones, but it does not apply to territorial or jurisdictional waters.¹⁰⁷

The provisions of the Fish Stocks Agreement highlight the importance of protecting the marine ecosystem and biological diversity. Article 5(g) applies a general obligation on states to protect marine biodiversity and its environment.¹⁰⁸ Article 5(a) places a general obligation on states to adopt adequate measures

100. *See id.* at art. 17.

101. *See id.* at art. 17(2)(f).

102. *See id.* at art. 18.

103. STEVE CUNNINGHAM & D.F. GREBOVAL, *MANAGING FISHING CAPACITY: A REVIEW OF POLICY AND TECHNICAL ISSUES* 45 (FAO 2001).

104. JUDITH SWAN, *IMPLEMENTATION OF THE INTERNATIONAL PLAN OF ACTION TO PREVENT, DETER AND ELIMINATE ILLEGAL, UNREPORTED AND UNREGULATED FISHING: RELATIONSHIP TO, AND POTENTIAL EFFECTS ON, FISHERIES MANAGEMENT IN THE MEDITERRANEAN* 3 (FAO 2005).

105. *Id.*

106. *Id.*; *see also* MARY ANN PALMA, MARTIN TSAMENYI & WILLIAM R. EDESON, *PROMOTING SUSTAINABLE FISHERIES: INTERNATIONAL LEGAL AND POLICY* 61 (Martinus Nijhoff Publishers 2010).

107. *See* Swan, *supra* note 104, at 2–3.

108. *See* U.N. Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, *Agreement for the Implementation of the Provisions of the U.N. Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, art. 5(g), U.N. Doc. A/CONF.164/37 (Sept. 8, 1995) [hereinafter *Fish Stocks Agreement*].

for the sustainable management of fish stocks.¹⁰⁹ Subsection (f) of Article 5 also makes it mandatory for coastal states to cooperate in reducing pollution and waste discard as well as to minimize the catchment of non-targeted fish species by adopting cost effective fishing techniques.¹¹⁰ Subsection (h) recommends that states take stringent measures to prevent overfishing.¹¹¹

Article 6 advises states to take care of the multiple habitats and ecosystems that exist in the high seas, and not to harm them through fishing activities.¹¹² It also recommends that states perform precautionary measures for protecting fish stocks, particularly the migratory and straddling fish stocks, in order to preserve marine biodiversity.¹¹³ Article 7 advises the parties to assess the compatibility and practicability of the planned measures to be implemented for protecting the marine biodiversity and ecosystem.¹¹⁴

Article 8 urges coastal states to establish cooperation with each other for sustainable fish stocks management and for the protection of marine biodiversity and ecosystems.¹¹⁵ For this purpose, it also suggests the formulation and operation of appropriate organizations.¹¹⁶ Article 9 further elaborates on the steps that coastal states can take for the establishment of regional or subregional organizations.¹¹⁷ Article 10 explains the functions of such organizations.¹¹⁸ These organizations are responsible for sustainably managing fish stocks by establishing cooperation among coastal states, conducting scientific research related to fisheries management, devising joint monitoring and surveillance mechanisms, exchanging and collecting accurate data related to fish stocks, adopting relevant standards, and peacefully resolving any disputes and differences among coastal

109. *Id.* at art. 5(a).

110. *Id.* at art. 5(f).

111. *Id.* at art. 5(h).

112. *Id.* at art. 6.

113. *Id.*

114. *Id.* at art. 7.

115. *Id.* at art. 8.

116. *Id.*

117. *Id.* at art. 9.

118. *Id.* at art. 10.

states related to fish stocks management.¹¹⁹ Article 12 recommends that states maintain transparency in the activities of fish stocks management performed by their respective fisheries management organizations.¹²⁰

Articles 18 and 19 elaborate the responsibilities of flag states related to the fishing activities performed by their vessels.¹²¹ Flag states are required to adopt regulations related to the safety of marine life and biodiversity.¹²² Flag state vessels are prohibited from fishing in those marine areas where fishing is not allowed or where the vessels do not have a license or permit to fish.¹²³ The flag states can also adopt regional and sub-regional measures for vessels for protection of straddling and migratory fish stocks.¹²⁴ Moreover, flag states should also monitor and supervise the vessels.¹²⁵ For monitoring the compliance, they can also implement national or regional inspection schemes for vessels.¹²⁶

Although the Fish Stocks Agreement contains detailed sets of regulations related to sustainable fish stocks management for the conservation of marine biodiversity, the agreement is not universally applicable as only 87 states are parties to this agreement.¹²⁷ Therefore, some states have yet to recognize this agreement.

Both the UNCLOS and the Fish Stocks Agreement have put forward guidelines for regulating human activities related to the marine environment, particularly those activities that threaten the biological diversity of marine areas.¹²⁸ It is necessary that states, particularly coastal states, act upon these guidelines and perform adequate measures to prevent the loss of marine

119. *Id.*

120. *Id.* at art. 12.

121. *Id.* at art. 18–19.

122. *Id.* at art. 18(3)(b).

123. *Id.* at art. 18(3)(b)(ii).

124. *Id.* at 18(3)(g).

125. *Id.* at art. 19(1).

126. *Id.* at art. 18(3)(iii).

127. As per the recent 2017 statistics, the total number of parties to the Fish Stocks Agreement is 87. See *Fish Stocks Agreements*, *supra* note 108.

128. *Id.* at Annex II.

biological diversity in their jurisdictional marine areas. Furthermore, they should collaborate with each other to protect the biodiversity and marine environment of the areas beyond their national jurisdiction. In this way, the guidelines of the UNCLOS and the Fish Stocks Agreement could be adopted effectively and would produce beneficial results for preserving marine biodiversity at the global level.

IV. AUXILIARY SUPPORT IN INTERNATIONAL LAW FOR MARINE BIODIVERSITY CONSERVATION

The protection of natural ecosystems and biodiversity is essential for the sustainability of animals, plants, microorganisms, and also humans.¹²⁹ Natural biological diversity supports several natural processes, phenomena, and links for food chains and helps protect the natural environment.¹³⁰ The conservation of natural biodiversity ensures the protection of natural ecosystems on Earth, on which humans are heavily dependent for food and other necessities.¹³¹ Hence, the survival of humanity is linked to the survival of Earth's entire biodiversity.¹³² The international community has given particular attention to protecting natural biodiversity. For this purpose, a number of international conventions, agreements, and contributions from international law focused on the protection of natural biodiversity and the ecosystem have been presented and ratified at the regional and international levels.¹³³

A. *International Conventions for Protection of Biodiversity*

There are several international conventions focused on the

129. See KAZUO N. WATANABE & EIJA PEHU, PLANT BIOTECHNOLOGY AND PLANT GENETIC RESOURCES FOR SUSTAINABILITY AND PRODUCTIVITY 95 (1997).

130. GERARDO M.E. PERILLO, ERIC WOLANSKI, DONALD R. CAHOON, & MARK M. BRINSON, COASTAL WETLANDS: AN INTEGRATED ECOSYSTEM APPROACH 335–36 (2009); see also RATTAN LAL, ENCYCLOPEDIA OF SOIL SCIENCE 150 (2d ed., 2006).

131. See HAROLD P. COLLINS, G. PHILIP ROBERTSON, & MICHAEL J. KLUG, THE SIGNIFICANCE AND REGULATION OF SOIL BIODIVERSITY 142 (2012).

132. See PAUL M. WOOD, BIODIVERSITY AND DEMOCRACY: RETHINKING SOCIETY AND NATURE 36 (2000).

133. See ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, OECD ENVIRONMENTAL OUTLOOK 134 (OECD Publications Serv. 2001).

protection of biodiversity which include valuable recommendations for adopting special measures for the protection of biodiversity and the sustainable use of marine life.

1. CMS Convention

The Convention on the Conservation of Migratory Species, also called the CMS Convention, is focused on the protection of migratory species worldwide.¹³⁴ It was ratified under the sponsorship of the United Nations Environment Program (UNEP, now U.N. Environment).¹³⁵ The CMS Convention offers a global platform for the sustainable utilization and protection of migratory species of animals and birds and their habitats.¹³⁶ In this regard, the CMS Convention mostly covers those regions that are beyond any national jurisdiction, but also has regional regulations related to the protection of marine biodiversity.¹³⁷ For instance, the ACCOBAMS (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic Area) program of the CMS Convention regulates the marine biodiversity and ecosystem in the Mediterranean and the Black Sea, while the ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic North East Atlantic, Irish and North Seas) program is linked with the North Atlantic and the Baltic Sea.¹³⁸ Similarly, the WATCH (Western African Talks on Cetaceans and their Habitat) program of the CMS Convention works for the conservation of the marine environment and biological diversity in the Pacific and West African islands.¹³⁹

134. SANJA TIŠMA, ANA-MARIA BOROMISA, & ANA PAVICIC KASELJ, ENVIRONMENTAL FINANCE AND DEVELOPMENT 15 (2012).

135. See Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (UNEP/CMS), U.N. Bonn (Feb. 20, 2018), <http://unbonn.org/index.php/CMS>.

136. GABRIELA STEIER & KIRAN PATEL, INTERNATIONAL FARM ANIMAL, WILDLIFE AND FOOD SAFETY LAW 765 (2017) [hereinafter STEIER & PATEL].

137. ERICH HOYT, MARINE PROTECTED AREAS FOR WHALES, DOLPHINS AND PORPOISES 96 (2d ed., ROUTLEDGE 2012).

138. *Id.*

139. *Id.*

2. CITES

The Convention on International Trade in Endangered Species (CITES) endorses strong measures for protecting fauna and flora species.¹⁴⁰ It came into effect in 1975.¹⁴¹ It aims to regulate trade at coasts in such a manner as to cause no harm to marine biodiversity.¹⁴² It also focuses on improving agricultural biodiversity.¹⁴³ For instance, if oil is being shipped from one country to another, then special precautionary measures are mandated to ensure that no leakages of oil take place in the sea, as this can pollute the sea water and cause harm to marine life.

3. Convention on Biological Diversity

The CBD has the main purpose of protecting the natural biodiversity of all (marine and noncoastal) animals, microorganisms, and plants.¹⁴⁴ It was adopted in Rio de Janeiro in 1992, during the Earth Summit¹⁴⁵ and has around 42 articles¹⁴⁶ and 196 states as parties to this convention.¹⁴⁷ In addition, the convention also focuses on the sustainable use of biodiversity as well as the equitable utilization of it by states around the globe.¹⁴⁸

The convention also offers protocols for the protection of biodiversity,¹⁴⁹ including the Cartagena Protocol and the Nagoya

140. See STEIER & PATEL, *supra* note 136, at 765.

141. B. ANJAN KUMAR PRUSTY, RACHNA CHANDRA, & P.A. AZEEZ, WETLAND SCIENCE: PERSPECTIVES FROM SOUTH ASIA 522 (SPRINGER 2017).

142. *Id.*

143. See STEIER & PATEL, *supra* note 136, at 765.

144. EDWARD GOODWIN, MICHAEL BOWMAN, & PETER DAVIES, RESEARCH HANDBOOK ON BIODIVERSITY AND LAW 60 (EDWARD ELGAR PUB. 2016).

145. THOMAS DUX, SPECIALLY PROTECTED MARINE AREAS IN THE EXCLUSIVE ECONOMIC ZONE (EEZ): THE REGIME FOR THE PROTECTION OF SPECIFIC AREAS OF THE EEZ FOR ENVIRONMENTAL REASONS UNDER INTERNATIONAL LAW 26 (LIT VERLAG DR. W. HOPF BERLIN 2011).

146. NAVIN K. AMBASHT & R.S. AMBASHT, MODERN TRENDS IN APPLIED TERRESTRIAL ECOLOGY 129 (Kluwer Academic/Plenum Publishers 2002).

147. See a list of states that are parties to the CBD, as mentioned in the official website of CBD at Convention on Biological Diversity: List of Parties, <https://www.cbd.int/information/parties.shtml>.

148. JOHN I. SPICER, BIODIVERSITY 148 (THE ROSEN PUB. GROUP 2009).

149. UNEP & UNESCO, YOUTHXCHANGE: BIODIVERSITY & LIFESTYLES GUIDEBOOK 48 (UNESCO PUB. 2015).

Protocol.¹⁵⁰ These protocols and the articles of the convention recommend policies for conserving biodiversity.¹⁵¹ In this regard, the convention has also formulated mechanisms for the implementation of policies and rules related to the protection of biodiversity.¹⁵² For instance, it has devised national biodiversity strategies and action plans, partnerships, cooperation mechanisms, and a 10-year strategic plan for the protection of biodiversity.¹⁵³ The Conference of the Parties (COP), an institutional framework, is also working under the CBD to implement policies for biodiversity conservation.¹⁵⁴ The COP reviews the progress of the implementation of CBD policies under the support of the UNEP.¹⁵⁵

Article 22 of this convention relates its policies for protecting marine biodiversity to other international instruments.¹⁵⁶ It considers that the rights of the contracting states provided by other international conventions and agreements remain unaffected by the implementation of CBD policies, except those rights that pose a threat cause damage to the biological diversity.¹⁵⁷ The rules and principles of this convention are applicable to all contracting states in their jurisdictional marine regions,¹⁵⁸ but the applicability becomes complex for marine areas that are beyond the national jurisdictions of these states and is dependent upon the activities performed by the

150. THOMAS GREIBER, AN EXPLANATORY GUIDE TO THE NAGOYA PROTOCOL ON ACCESS AND BENEFIT-SHARING 256 (IUCN 2012).

151. See EVANSON CHEGE KAMAU, GERD WINTER, PETER-TOBIAS STOLL, RESEARCH AND DEVELOPMENT ON GENETIC RESEARCH 27 (ROUTLEDGE 2015).

152. IUCN ACADEMY OF ENVIRONMENTAL LAW, BIODIVERSITY CONSERVATION, LAW AND LIVELIHOODS: BRIDGING THE NORTH-SOUTH DIVIDE 172 (CAMBRIDGE UNIV. PRESS 2008).

153. See ÁKOS MÁTHÉ, MEDICINAL AND AROMATIC PLANTS OF THE WORLD: SCIENTIFIC, PRODUCTION, COMMERCIAL AND UTILIZATION ASPECTS 138 (SPRINGER 2015).

154. HANS-JOACHIM SCHELLNHUBER, WORLD IN TRANSITION: CONSERVATION AND SUSTAINABLE USE OF THE BIOSPHERE 335 (EARTHSCAN 2001).

155. KRZYSZYNA SWIDERSKA, STAKEHOLDER PARTICIPATION IN POLICY ON ACCESS TO GENETIC RESOURCES TRADITIONAL KNOWLEDGE AND BENEFIT-SHARING: CASE STUDIES AND RECOMMENDATIONS 15 (IIED 2001).

156. See Convention on Biological Diversity art. 22, June 5, 1992, 1760 U.N.T.S. 79.

157. *Id.*

158. Convention on Biological Diversity, *supra* note 156, at art. 4(a).

contracting states in the ABNJ.¹⁵⁹ Most of the CBD's rules are not applicable in such areas, although some general rules are applicable in these areas.¹⁶⁰ For example, every state is deemed responsible for the ships that bear its flag.¹⁶¹

Similarly, Article 5 of this convention also encourages states to cooperate with each other to maintain sustainability and the protection of biodiversity in the areas that are beyond their national jurisdictions.¹⁶² The COP also plays an essential role in establishing cooperation among states, particularly for evading the harmful effects on biodiversity of an adverse change in the marine environment.¹⁶³

The COP is also responsible for formulating strategies at the national level for its member states for the protection and sustainable use of their marine biological diversity.¹⁶⁴ Consequently, the parties to the convention can implement the policies and strategies suggested by the COP for the protection and sustainable use of marine biological diversity in their relevant sectors.¹⁶⁵ Article 14 of the convention makes it obligatory for the contracting parties to perform evaluations of their developmental or other projects that could adversely affect the natural biodiversity.¹⁶⁶ A proper assessment is essential to minimize and mitigate the adverse effects on the marine life, the ecosystem, and the natural habitat of the marine species.¹⁶⁷

159. Convention on Biological Diversity, *supra* note 156, at art. 4(b).

160. STEPHEN HODGSON ET AL., DIRECTORATE GENERAL FOR INTERNAL POLICIES, POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY, TOWARDS A POSSIBLE INTERNATIONAL AGREEMENT ON MARINE BIODIVERSITY IN AREAS BEYOND NATIONAL JURISDICTION 21 (2014), <https://publications.europa.eu/en/publication-detail/-/publication/9423bfa8-fda6-46ed-9ee6-a6ae873002bd>.

161. *Id.*

162. Convention on Biological Diversity, *supra* note 156, at art. 5.

163. Convention on Biological Diversity, *Report on the Second Meeting of the Conference of the Parties to the Convention on Biological Diversity*, 59, 61, UNEP/CBD/COP/2/19 (Nov. 30, 1995); *Conference of the Parties*, CONVENTION ON INT'L TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES), <http://www.cites.org/eng/cop/index.php> (last visited Feb. 26, 2018).

164. Convention on Biological Diversity, *supra* note 156, at art. 6.

165. *Id.*

166. Convention on Biological Diversity, *supra* note 156, at art.14.

167. *Id.*

4. London Convention

The London Convention, also called the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, provides regulations related to dumping at sea.¹⁶⁸ It was drafted in 1972¹⁶⁹ and has 87 states as contracting parties.¹⁷⁰ These regulations define three categories of dumping at sea and recommend the relevant responses to these three types of dumping.¹⁷¹ The first category of dumping includes the dumping of harmful chemicals and compounds that are mentioned in Annex I of the convention.¹⁷² This is generally prohibited.¹⁷³ The second category of dumping includes the dumping of certain chemical elements such as arsenic, lead, nickel, and other elements listed in Annex II.¹⁷⁴ The dumping of Annex II elements requires a special permit from state authorities.¹⁷⁵ Each contracting party can issue such a special permit after applying the Regulations for the Control of Incineration of Wastes and Other Matter at Sea.¹⁷⁶ The third category of dumping involves less-harmful chemicals and solid compounds listed in Annex III.¹⁷⁷ Dumping of such chemicals is permitted, but it also requires a general permit be obtained.¹⁷⁸

168. PORTER HOAGLAND, *MARINE POLICY AND ECONOMICS: A DERIVATIVE OF ENCYCLOPEDIA OF OCEAN SCIENCES* 25 (JOHN H. STEELE ET AL. EDs., 2D ED. 2010).

169. Rodney N. Duncan, *The 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes at Sea*, 5 J. MAR. L. & COM. 299, 299 (1974).

170. THE IMLI MANUAL ON INTERNATIONAL MARITIME LAW: VOLUME III: MARINE ENVIRONMENTAL LAW AND MARITIME SECURITY LAW 80 (David Joseph Attard et al. eds., 2016) [hereinafter THE IMLI MANUAL].

171. *Id.*

172. *Id.* at 80–81; London Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter annex I, Dec. 29, 1972, 1046 U.N.T.S. 120 [hereinafter London Convention].

173. London Convention, *supra* note 172, at annex I, IV.

174. THE IMLI MANUAL, *supra* note 170, at 80–81; London Convention, *supra* note 172, at annex II.

175. THE IMLI MANUAL, *supra* note 170, at 81; London Convention, *supra* note 172, at art. IV–V.

176. London Convention, *supra* note 172, at annex II.

177. THE IMLI MANUAL, *supra* note 170, at 81; London Convention, *supra* note 172, at annex III.

178. THE IMLI MANUAL, *supra* note 170, at 81; London Convention, *supra* note 172, at annex IV.

These guidelines were added to the London Convention in 1972.¹⁷⁹ In 1996, the new Protocol to the London Convention was introduced, replacing the previous regulations.¹⁸⁰ The new protocol came into force in March 2006.¹⁸¹ It particularly prohibited dumping of all kinds of radioactive materials at sea.¹⁸²

5. SOLAS Convention

The SOLAS (Safety of Life at Sea) Convention is related to the safety of ships.¹⁸³ It provides legal regulations for the standardization of safety measures for ships.¹⁸⁴ It also covers some technical guidelines related to the safety of ships.¹⁸⁵ The text of the convention is divided into 14 chapters.¹⁸⁶ The first chapter includes details about general provisions of the convention.¹⁸⁷ The second chapter is related to the construction of ships.¹⁸⁸ It recommends that ships must be built in such a way that if they get damaged, they remain afloat and do not submerge.¹⁸⁹ Fire extinguishing and protective standards must also be installed in the ships.¹⁹⁰ The third chapter requires that the ships contain life-saving appliances. For this purpose, the International Life-Saving Appliance Code is ratified as mandatory by the SOLAS Convention to be applied on ships.¹⁹¹

179. MARIE-LOUISE LARSSON, *THE LAW OF ENVIRONMENTAL DAMAGE: LIABILITY AND REPARATION* 135 (1999).

180. CENTER FOR OCEAN LAW AND POLICY, *THE REGULATION OF CONTINENTAL SHELF DEVELOPMENT: RETHINKING INTERNATIONAL STANDARDS* 270 (MYRON H. NORDQUIST ET AL. EDS., 2013).

181. *Id.*

182. YUKARI TAKAMURA, *THE INTERNATIONAL LAW OF DISASTER RELIEF* 97–98 (Anastasia Telesetsky et al. eds., 2014).

183. International Convention for the Safety of Life at Sea (SOLAS), 1974, Nov. 1, 1974, 1184 U.N.T.S. 2 [hereinafter SOLAS Convention].

184. *Id.*

185. *FREEDOM FOR THE SEAS IN THE 21ST CENTURY: OCEAN GOVERNANCE AND ENVIRONMENTAL HARMONY* 201 (Durwood Zaelke et al. eds., 1993).

186. SOLAS Convention, *supra* note 183.

187. *Id.* at chapter I.

188. *Id.* at chapter II.

189. *Id.* at chapter II-1.

190. *Id.* at chapter II-2.

191. *Id.* at chapter III.

Chapters 4 to 7 are related to the safe installation of radio communications, navigation, cargo, and carriage of dangerous goods, respectively.¹⁹²

Chapter 8 is particularly important in this convention as it relates to adopting safety measures in ships that are carrying nuclear materials by sea.¹⁹³ Nuclear material is highly radioactive and its radiation can be deeply harmful to marine life.¹⁹⁴ Any leakage of the material can result in the damage of biological diversity and marine ecosystems.¹⁹⁵ To adopt adequate safety measures, the SOLAS Convention refers to the Code of Safety for Nuclear Merchant Ships, approved by the IMO in 1981.¹⁹⁶ Chapter 9 of the convention makes it obligatory for states to adopt the International Safety Management Code for maintaining safety management systems on ships.¹⁹⁷ Chapter 10 makes it obligatory for states or shipping merchants to adopt the International Code of Safety for High-Speed Craft, also known as the High-Speed Craft Code.¹⁹⁸

Chapters 11, 12, and 13 of the convention recommend that states or shipping merchants adopt special measures for ensuring maritime security and safety.¹⁹⁹ For this purpose, Chapter 11 recommends the adoption of the International Ship and Port Facilities Security Code.²⁰⁰ Part A of this code applies a general obligation on states, while the second part includes guidelines for complying with the obligations imposed by the code.²⁰¹ Chapter 11 also recommends that governments of

192. *Id.* at chapter IV–VII.

193. *Id.* at chapter VIII.

194. TAKAMURA, *supra* note 182, at 93.

195. Elizabeth Grossman, *Radioactivity in the Ocean: Diluted, But Far from Harmless*, *YALE ENV'T* 360 (Apr. 7, 2011), https://e360.yale.edu/features/radioactivity_in_the_ocean_diluted_but_far_from_harmless.

196. SOLAS Convention, *supra* note 183, chapter VIII; EDMUND JAN OZMANCZYK, *ENCYCLOPEDIA OF THE UNITED NATIONS AND INTERNATIONAL AGREEMENTS: VOLUME 3: N-S 1985* (Anthony Mango ed., 3d ed. 2003).

197. SOLAS Convention, *supra* note 183, at chapter IX.

198. *Id.* at chapter X.

199. *Id.* at chapter XI–XIII.

200. *Id.* at chapter XI-2.

201. *Id.*

coastal states adopt security and safety standards at ports for the safety of the ships.²⁰² Ship safety is essential to avoid damage to ships at sea because pollution from a damaged ship can cause irreparable harm to marine life, natural habitats, and biological diversity.

B. Regional Conventions and Agreements for Marine Biodiversity Conservation

There are several agreements that have been signed at the regional level by states to preserve biodiversity in their local marine environments. For instance, there are 13 Regional Seas Programs established under the patronage of the UNEP for regulating the marine environment and around 140 countries are the participants of these programs.²⁰³ These programs are established in different regional seas including the Mediterranean Sea, the Red Sea, the Pacific Ocean, the North-East Atlantic Ocean, the Black Sea, the Gulf of Aden, and other marine regions.²⁰⁴ In addition, there are bilateral agreements ratified by certain states independently of the UNEP in the coastal areas of the Atlantic and Arctic Oceans.²⁰⁵ Some agreements are applicable in seas in the national jurisdictions of the states that are party to these agreements, while some are also applicable in the marine areas beyond their national jurisdictions.²⁰⁶

1. Barcelona Convention

The Barcelona Convention for the Protection of the Mediterranean Sea against Pollution was held in 1976 by the UNEP under its Regional Seas Program, which intends to

202. *Id.*

203. BARBARA BEAN, LAW OF THE SEA 16 (2015), https://www.asil.org/sites/default/files/ERG_LOS.pdf.

204. *Id.*

205. *Id.*; The 18th Global Meeting of the Regional Seas Convention and Action Plans, *Regional Ocean Governance: Making Regional Sea Programmes, Regional Fishery Bodies and Large Marine Ecosystem Mechanisms Work Better Together*, 24, UNEP/WBRS.18/INF12 (Aug. 12, 2016) [hereinafter Global Meeting of the Regional Seas Convention].

206. BEAN, *supra* note 203, at 18–19; Global Meeting of the Regional Seas Convention, *supra* note 205, at xi–xiii, 28.

enhance regional cooperation among states for the conservation and welfare of the marine ecosystem.²⁰⁷ European and Mediterranean coastal states are the parties to this convention.²⁰⁸ Amendments were made into this convention in 1995 and it also resulted in changing the name of this convention into the Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean.²⁰⁹ There are a total of 35 articles in this convention, which include a general obligation to take adequate measures to prevent pollution and to protect the marine environment as well as to enhance cooperation with other states for marine ecosystem conservation.²¹⁰ Article 5 relates to the dumping of waste into the seas and obliges the parties to take appropriate actions to prevent the dumping of waste at sea.²¹¹ Articles 6, 7, and 8 are related to the spread of pollution in the seas caused by shipping, the overexploitation of the continental shelf and seabed, and pollution caused by land-based sources.²¹² Article 9 places stress on initiating cooperation among regional states to make joint efforts for dealing with situations of pollution emergencies.²¹³ Article 10 explicitly mentions the importance of conserving biological diversity.²¹⁴ It recommends that parties to the convention protect biological diversity either by launching individual efforts or by collaborating with other states in the region.²¹⁵ Article 11 explains the hazardous effects of the transboundary movements of industrial or other waste

207. EDMUND JAN OZMANCZYK, *ENCYCLOPEDIA OF THE UNITED NATIONS AND INTERNATIONAL AGREEMENTS: VOLUME 2: G-M 1404* (Anthony Mango ed., 3d ed. 2003).

208. REMOTE SENSING '96: INTEGRATED APPLICATIONS FOR RISK ASSESSMENT AND DISASTER PREVENTION FOR THE MEDITERRANEAN 69–70 (Anna Spiteri ed., 1997).

209. MARINE SPECIALLY PROTECTED AREA: THE GENERAL ASPECTS AND THE MEDITERRANEAN REGIONAL SYSTEM 82 (Tullio Scovazzi ed., 1999).

210. Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean 1, art. 3–4, UNEP [hereinafter *Barcelona Convention*], http://wedocs.unep.org/bitstream/handle/20.500.11822/7096/Consolidated_BC95_Eng.pdf?sequence=1&isAllowed=y (last visited Feb. 14, 2018).

211. *See id.* at art. 5.

212. *Id.* at art. 5.

213. *Id.* at 12.

214. *Id.*

215. *Id.*

materials and urges the parties to take steps to prevent pollution from such transboundary movements.²¹⁶ Article 11 explains the hazardous effects of the transboundary movements of industrial or other waste materials and urges the parties to take steps to prevent pollution from such transboundary movements.²¹⁷

Additional protocols to the Barcelona Convention have also been adopted in light of Article 21.²¹⁸ Article 21 invites the contracting parties to adopt new protocols and measures to prevent marine pollution.²¹⁹ Therefore, the 1995 protocol designated specially protected marine areas and defined them in Article 3(1)(a) as “Specially Protected Areas of Mediterranean Interest,” that need the implementation of special environmental protective measures by states in the region.²²⁰ The protocol also required that the parties to the Barcelona Convention enact special regulations related to their shipping, mining, exploratory activities, and other operations that could affect the environment of these areas.²²¹ The regulations must protect as well as sustainably manage the marine environment.²²² To be binding, all parties must agree that a particular area deserves such protection.²²³ At present, the protocol applies to all marine waters in the Mediterranean region.²²⁴

2. OSPAR Convention

The OSPAR Convention was signed in 1992.²²⁵ The

216. *Id.*

217. *Id.* at 12–13.

218. See RENÉ JEAN DUPUY & DANIEL VIGNES, A HANDBOOK ON THE NEW LAW OF THE SEA 1211 (1991); see also Barcelona Convention, *supra* note 210, at 15.

219. Barcelona Convention, *supra* note 210, at 15.

220. Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, art. 3(1)(1) and 8(1), June 10, 1995, 2102 U.N.T.S. 181 (entered into force Dec. 12, 1999).

221. *Id.* at art. 6.

222. Towards a Possible International Agreement on Marine Biodiversity in Areas Beyond National Jurisdiction, Eur. Parl. Doc. (PE 536.292) 39–40 (2014).

223. Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, *supra* note 220, at 208.

224. *Id.* at 203–04.

225. SIMON MARR, THE PRECAUTIONARY PRINCIPLE IN THE LAW OF THE SEA:

European Union, the United Kingdom, Ireland, Luxembourg, Iceland, Belgium, France, Finland, Denmark, Switzerland, Germany, Norway, the Netherlands, Spain, Sweden, and Portugal are the contracting parties to this convention.²²⁶ The OSPAR Convention has a similar purpose to the Barcelona Convention, as it urges its contracting parties to take appropriate measures to protect sea life and the ecosystem from the harmful effects of activities or projects taking place in coastal regions.²²⁷ The restoration and development of the affected marine regions is also one of the primary objectives of this convention.²²⁸

The OSPAR Convention created the OSPAR Commission, which is responsible for implementing the OSPAR strategies.²²⁹ The OSPAR Commission also applies binding and nonbinding regulations on the contracting parties as per the OSPAR constitution.²³⁰ The Convention has 34 articles, five annexes, and three appendices.²³¹ Annex V of the OSPAR Convention relates to the protection of marine biological diversity and ecosystems.²³² Appendix 3 relates to the impacts of human activities on marine biological diversity and ecosystems.²³³

The OSPAR Convention includes five strategies, which also include the OSPAR Biological Diversity and Ecosystems Strategy.²³⁴ The main intention of this strategy is to prevent any

MODERN DECISION MAKING IN INTERNATIONAL LAW 39 (Vaughan Lowe ed., 2003).

226. GOVERNING EUROPE'S MARINE ENVIRONMENT: EUROPEANIZATION OF REGIONAL SEAS OR REGIONALIZATION OF EU POLICIES? 187 n.2 (Michael Gilek & Kristine Kern eds., ASHGATE PUB. 2015).

227. *Id.* at 187.

228. Convention for the Protection of the Marine Environment of the North-East Atlantic, Sept. 22, 1992 [hereinafter OSPAR Convention] https://www.ospar.org/site/assets/files/1290/ospar_convention_e_updated_text_in_2007_no_revs.pdf (last visited Feb. 5, 2018).

229. *Id.*

230. NULIFER ORAL, REGIONAL CO-OPERATION AND PROTECTION OF THE MARINE ENVIRONMENT UNDER INTERNATIONAL LAW 123 (2013).

231. *See generally* OSPAR Convention, *supra* note 228.

232. *Id.*

233. *Id.*

234. *See* North-East Atlantic Environment Strategy, Sept. 24, 2010, Part II, 7–11, https://www.ospar.org/site/assets/files/1200/ospar_strategy.pdf.

further loss of biological diversity in the marine regions that come within the jurisdiction of the OSPAR Convention.²³⁵ The protection and restoration of marine regions adversely affected by human activities are also core objectives of this strategy.²³⁶ The strategy also includes improving the environs of the endangered species and their habitats.²³⁷ Furthermore, the strategy works to establish marine protected areas (MPAs). Hence, the main purpose of this strategy is to preserve marine biological diversity and ecosystems in the OSPAR marine regions.²³⁸

To implement the OSPAR Biological Diversity and Ecosystems Strategy, it suggests continued monitoring and assessment of the marine areas.²³⁹ The OSPAR Commission and the contracting parties are responsible for collaborating with one another to monitor and assess the marine areas within a proper timescale.²⁴⁰ The collection of accurate data related to the endangered species and the effects of human activities in coastal regions is also essential to assess the safety of biodiversity in marine regions.²⁴¹ Data can be acquired from the fisheries management authorities and departments working in the jurisdictions of the contracting states.

The Commission and the contracting parties are also required to make an assessment of the gaps between their planned measures and their implementation for preserving biological diversity and for making the MPAs.²⁴² Consequently, it is also necessary for the contracting parties, to control effects of those human activities that are harming biological diversity.²⁴³ Furthermore, it is also essential for the contracting parties to implement the safety and regulatory standards

235. *Id.* ¶ 1.1.

236. *Id.* ¶ 1.2(c).

237. *Id.* ¶ 1.2(a).

238. *Id.* ¶ 1.2(b)(i).

239. *Id.* ¶ 4.2(a)–(c).

240. *Id.* ¶ 4.1.

241. *See id.* ¶ 4.2(c).

242. *Id.* ¶ 4.2(f)(iv).

243. *Id.* ¶ 4.2(g)(i).

suggested by the IMO.²⁴⁴

Like the Barcelona Convention, the OSPAR Convention applies general obligations on its contracting states to take adequate measures and adopt special policies and programs to prevent pollution and to protect the marine environment.²⁴⁵ Article 2 of this convention applies this obligation.²⁴⁶ Article 3 places stress on preventing the pollution caused by land-based sources.²⁴⁷ Article 4 imposes a duty on the contracting states to prevent pollution caused by dumping at sea.²⁴⁸ Similarly, Article 5 advises states to prevent pollution that results from offshore sources of pollution.²⁴⁹ Article 6 obligates contracting states to make a proper assessment of the marine environment quality and to prevent any activity or action that degrades the quality.²⁵⁰ Article 7 suggests that contracting parties also prevent pollution caused by any source not otherwise mentioned so far.²⁵¹ Hence, the OSPAR Convention is a detailed set of recommendations and obligations for coastal contracting states on the North Atlantic Ocean.

3. Noumea Convention

The Noumea Convention was drafted in 1986 with the core purpose of maintaining environmental quality and sustainable resource development in the Pacific Ocean region.²⁵² The Republic of the Marshall Islands, Fiji, Nauru, the Federated States of Micronesia, Papua New Guinea, Samoa, the Cook Islands, and the Solomon Islands are the parties to this convention.²⁵³ The Noumea Convention is also called the SPREP Convention, or the Convention for the Protection of the Natural

244. *Id.* ¶ 4.2(i).

245. *See* OSPAR Convention, *supra* note 228.

246. *Id.*

247. *Id.*

248. *Id.*

249. *Id.*

250. *Id.*

251. *Id.*

252. RESEARCH HANDBOOK ON INTERNATIONAL MARINE ENVIRONMENTAL LAW 212 (Rosemary Rayfuse ed., EDWARD ELGAR PUB. 2015) [hereinafter Rayfuse].

253. *Id.* at 212 n. 32.

Resources and Environment of the South Pacific Region.²⁵⁴

The Noumea Convention has two protocols.²⁵⁵ One is related to dealing with pollution emergencies, while the second is related to the dumping of waste materials in the sea.²⁵⁶ The convention is applicable to the exclusive economic zones that are within and beyond the national jurisdictions of the contracting states.²⁵⁷

The Noumea Convention urges its contracting states to prevent the spread of pollution in their marine areas.²⁵⁸ It also calls on them to adopt the environmental impact assessment strategy to perform recurrent assessments and monitoring of marine areas to evaluate the levels of safety and protection of marine biodiversity there.²⁵⁹ Moreover, it also recommends that contracting states implement best practices for the management and conservation of natural resources and the environment.²⁶⁰ Article 14 of the Convention addresses the need to make specially protected areas and suggests such areas can be the source of biodiversity conservation.²⁶¹

C. *Global Organizations Working for Marine Biodiversity Conservation*

There are some prominent international bodies that are working for the protection of biological diversity on Earth.

1. United Nations General Assembly

The General Assembly of the United Nations has played an

254. *Noumea Convention*, Secretariat of the Pacific Regional Environment Programme, <https://www.sprep.org/legal/noumea-convention> (last visited Feb. 5, 2018).

255. NIELS WEST, *MARINE AFFAIRS DICTIONARY: TERMS, CONCEPTS, LAWS, COURT CASES, AND INTERNATIONAL CONVENTIONS AND AGREEMENTS* 488 (GREENWOOD PUB. GROUP 2004).

256. *Id.*

257. Rayfuse, *supra* note 252, at 59.

258. DAVID KENNETH LEARY, *INTERNATIONAL LAW AND THE GENETIC RESOURCES OF THE DEEP SEA* 68 (MARTINUS NIJHOFF PUBLISHERS 2007) [hereinafter LEARY].

259. *Id.* at 69.

260. NICO SCHRIJVER, *SOVEREIGNTY OVER NATURAL RESOURCES: BALANCING RIGHTS AND DUTIES* 329 (2008).

261. LEARY, *supra* note 258, at 69; *see also Noumea Convention*, *supra* note 253, art. 14.

important role in promoting international efforts for the conservation of biological diversity and for the protection of the marine environment.²⁶² The eighth COP to the Convention of Biological Diversity was arranged by the U.N. General Assembly with the core purpose of sustainable utilization and conservation of marine biodiversity.²⁶³ The conference of parties to the CBD also highlighted the key role of the U.N. General Assembly for the conservation of biodiversity in areas beyond national jurisdiction.²⁶⁴ In the eighth conference of the CBD, the U.N. General Assembly urged its member states to adopt appropriate policies and programs to decrease the rate of loss of biological diversity and to use the existing biological diversity sustainably.²⁶⁵

Furthermore, the General Assembly also held special meetings for international biodiversity conservation during the tenth COP to the CBD.²⁶⁶ It also declared 2010 to be an “International Year of Biodiversity.”²⁶⁷ The General Assembly has also passed several resolutions that underscore the importance of conservation and the sustainable use of marine biodiversity.²⁶⁸ Moreover, the General Assembly also convened the conference that formulated and approved the Law of the Sea Convention, which is an international legal regulatory framework for the conservation of marine biodiversity and for several other issues related to the international seas.²⁶⁹

2. International Maritime Organization

The IMO is an international body under the umbrella of the United Nations with the core duty of assuring the safety of

262. Rayfuse, *supra* note 252, at 58–59.

263. G.A. Res. 60/202, at 271 (Dec. 22, 2005) [hereinafter UNGA].

264. DANIEL DIZ PEREIRA PINTO, FISHERIES MANAGEMENT IN AREAS BEYOND NATIONAL JURISDICTION: THE IMPACT OF ECOSYSTEM BASED LAW-MAKING 177 (2013).

265. See UNGA, *supra* note 263, ¶ 3.

266. UNESCO, ADAPTING TO CHANGE: THE STATE OF CONSERVATION OF WORLD HERITAGE FORESTS IN 2011 60 (UNESCO 2011).

267. DAVE POWELL & DOLORES SANCHEZ BENGOA, TOP BIODIVERSITY CYPRUS 2010 CONFERENCE PROCEEDINGS 7 (LULU.COM 2010).

268. See LEARY, *supra* note 258, at 62.

269. NORMAN J. VIG & REGINA S. AXELROD, THE GLOBAL ENVIRONMENT: INSTITUTIONS, LAW AND POLICY 36 (EARTHSCAN 1999).

shipping and preventing the spread of pollution by ships on the seas.²⁷⁰ The IMO is a regulatory body and it uses special instruments and guidelines to prevent marine pollution and ensure shipping safety.²⁷¹ Most of these instruments are nonbinding; for instance, the International Convention for Prevention of Pollution from Ships, also called MARPOL, is a nonbinding instrument of the IMO to prevent pollution caused by shipping in the sea.²⁷² On the other hand, some instruments are binding in nature.²⁷³ For instance, the Ballast Water Management Convention is a binding instrument with a core focus similar to that of MARPOL.²⁷⁴

Other binding instruments include the International Convention for the Safety of Life at Sea (SOLAS Convention); the International Regulation for Preventing Collisions at Sea (COLREG Convention); the OPRC-HNS Protocol, which aims to offer a global framework to mitigate the threats of marine pollution; the Bunker Oil Convention, which provides an instrumental framework for compensating those affected by the spills of oil from ships in marine areas; the Fund Convention, which establishes compensatory benefits to those affected by maritime shipping activities; and the General Provisions on Ships' Routes.²⁷⁵ All of these are related to the safety of ships, maritime routes, and the protection of living maritime resources from pollution and other issues caused by ships.²⁷⁶

In addition, the Particularly Sensitive Sea Area (PSSA)

270. THOMAS M. LEONARD, *ENCYCLOPEDIA OF THE DEVELOPING WORLD* 845 (ROUTLEDGE 2013).

271. AMRIK SOHAL, B.S. SAHAY, ROGER R. STOUGH, & SONU GOYAL, *GREEN BUSINESS 6* (ALLIED PUBLISHERS 2006).

272. NIGEL BANKES & SELINE TREVISANUT, *ENERGY FROM THE SEA: AN INTERNATIONAL LAW PERSPECTIVE ON OCEAN ENERGY* 71 (Brill 2015).

273. INTERNATIONAL MARITIME ORGANIZATION, *IMO GUIDELINES ON SHIP RECYCLING* iv (IMO PUB. 2006).

274. CLARE SHINE, LOTHAR GÜNDLING, & NATTLEY WILLIAMS, *A GUIDE TO DESIGNING LEGAL AND INSTITUTIONAL FRAMEWORKS ON ALIEN INVASIVE SPECIES* 28 (IUCN 2000) (quoting *Ballast Water News, Issue 1*, 2000; *IMO News*, No. 4, 1999).

275. Secretariat of the International Maritime Organization, *Implications of the U.N. Convention on the Law of the Sea for the International Maritime Organization*, 13 *IMO Conventions 2014* [hereinafter 13 *IMO Conventions 2014*]. <http://www.imo.org/en/OurWork/Legal/Documents/LEG%20MISC%208.pdf>.

276. *Id.*

Guidelines are a set of legal regulations designed by the IMO for protecting the marine areas that are environmentally sensitive in nature.²⁷⁷ These marine areas require particular attention for their conservation, because they can be affected significantly by shipping activities owing to their natural environmental vulnerability.²⁷⁸ Furthermore, these environmentally vulnerable marine areas have the highest biological diversity, which is highly reliant on the safety of the marine environment.²⁷⁹ The Maritime Environment Protection Committee of the IMO is responsible for the implementation of the PSSA Guidelines and for designating particularly sensitive marine areas.²⁸⁰ The Maritime Safety Committee of the IMO is also another authority within the IMO that reviews and approves the marine regions as particularly sensitive areas.²⁸¹

In addition to the PSSA Guidelines, the Arctic Shipping Guidelines and a Polar Code focus on maintaining shipping safety.²⁸² These guidelines are not legal obligations, but are only suggestive policy frameworks for the implementation of the aforementioned instruments and standards of the IMO, with a core focus on the protection of biological diversity from shipping activities in the seas within and beyond national jurisdiction.²⁸³

These IMO instruments and guidelines regulate design, navigation, standardization, insurance, and other aspects related to ships.²⁸⁴ Every state-owned vessel must comply with

277. MARKUS J. KACHEL, *PARTICULARLY SENSITIVE SEA AREAS: THE IMO'S ROLE IN PROTECTING VULNERABLE MARINE AREAS* 198–99 (SPRINGER 2008).

278. IUCN ACADEMY OF ENVIRONMENTAL LAW, *BIODIVERSITY CONSERVATION, LAW AND LIVELIHOODS: BRIDGING THE NORTH–SOUTH DIVIDE* 78 (CAMBRIDGE UNIV. PRESS 2008).

279. *Id.*

280. BARBARA KWIATKOWSKA & HARM DOTINGA, *INTERNATIONAL ORGANIZATIONS AND THE LAW OF THE SEA: DOCUMENTARY YEARBOOK 987* (MARTINUS NIJHOFF PUBLISHERS 2001).

281. MARKUS J. KACHEL, *PARTICULARLY SENSITIVE SEA AREAS: THE IMO'S ROLE IN PROTECTING VULNERABLE MARINE AREAS* 317 (SPRINGER 2008).

282. ALEXANDER N. VYLEGZHANIN & PAUL ARTHUR BERKMAN, *ENVIRONMENTAL SECURITY IN THE ARCTIC OCEAN* 166 (Springer 2012).

283. *TOWARDS A POSSIBLE INTERNATIONAL AGREEMENT ON MARINE BIODIVERSITY IN AREAS BEYOND NATIONAL JURISDICTION* 39 (EUROPEAN PARLIAMENT – DIRECTORATE GENERAL FOR INTERNAL POLICIES 2014).

284. *Id.*; *see also* ELIZABETH TEDSEN, SANDRA CAVALIERI, & R. ANDREAS KRAEMER,

the binding IMO standards, guidelines, and instruments.²⁸⁵

3. WWF

The World Wildlife Fund (WWF) is the largest international organization working for conservation and the sustainable use of the biodiversity of oceans as well as of freshwater resources, forests, and wildlife.²⁸⁶ It is operational in 100 countries and has around five million members globally.²⁸⁷ The core mission of the WWF is to mitigate the threats to the biological diversity of all living resources on Earth.²⁸⁸ The WWF has noted that the oceans have the greatest diversity of plants and animals on Earth.²⁸⁹ As a result, it pays particular attention to the conservation of marine biological diversity by taking concrete steps such as the transformation of sea fish markets to sustainable markets, coordinating with traders to use the sea waters sustainably for the protection of marine life, and mitigating the harmful environmental effects of the activities of trade performed in the oceans.²⁹⁰

Furthermore, the WWF also works to improve the governance mechanisms of states for the conservation of natural habitats in the oceans to protect vulnerable marine species.²⁹¹ For this purpose, it has also endorsed the formulation and implementation of international legal agreements for states, which could protect marine habitats and oceanic biological diversity.²⁹² Moreover, it also provides funding to protect

ARCTIC MARINE GOVERNANCE: OPPORTUNITIES FOR TRANSATLANTIC COOPERATION 141 (SPRINGER 2013).

285. HENRIK RINGBOM, *COMPETING NORMS IN THE LAW OF MARINE ENVIRONMENTAL PROTECTION* 57 (KLUWER LAW INT'L 1997).

286. HELMUT K. ANHEIER & STEFAN TOEPLER, *INTERNATIONAL ENCYCLOPEDIA OF CIVIL SOCIETY* 1666 (SPRINGER 2009) [hereinafter ANHEIER & TOEPLER].

287. *Id.*

288. For details about the mission of the WWF, visit its official website at <https://www.worldwildlife.org/threats>; see also TRACKING KEY TRENDS IN BIODIVERSITY SCIENCE AND POLICY 82 (UNESCO 2013).

289. GOODWIN, BOWMAN, & DAVIES, *supra* note 144, at 147.

290. See ANHEIER & TOEPLER, *supra* note 286.

291. *Id.*

292. See Oceans – Overview, WWF, 2017, (providing details about legal agreements of WWF on marine biological diversity) <https://www.worldwildlife.org/initiatives/oceans>.

biological diversity in the states' jurisdictions.²⁹³ The reduction of pollution in the oceans and the protection of marine life from oil exploration and trading activities are also among the central goals of the WWF.²⁹⁴

4. FAO

The Food and Agriculture Organization (FAO) is working toward realizing a sustainable use of natural resources, agriculture, and fish that can result in the conservation of the natural biodiversity of agricultural and oceanic regions.²⁹⁵ Article I of the FAO's constitution explains that the organization's purpose relates to sustainable food and agricultural management, not only to avoid human hunger but also to sustainably use food resources such as fish, agriculture, and seafood.²⁹⁶ To realize this goal, Article VI of its constitution recommends the formulation of commissions and fisheries management institutes that could work for the development and execution of policies related to sustainable agricultural food and fisheries management.²⁹⁷

The constitution of the FAO is an international action plan that recommends the sustainable use and management of food and agriculture.²⁹⁸ Its recommendations include sustainable management and conservation of biodiversity in the seas. For instance, the Fishery Committee for the Eastern Central Atlantic (CECAF) is an example of commissions formed by implementing Article VI of the FAO's constitution.²⁹⁹ To monitor and study the progress of such international bodies, the Committee on Fisheries was established by the FAO under the guidance of Article VI(2).³⁰⁰ The Committee on Fisheries can

293. See ANHEIER & TOEPLER, *supra* note 286.

294. *Id.*

295. PETER H. RAVEN, NATURE AND HUMAN SOCIETY: THE QUEST FOR A SUSTAINABLE WORLD 416 (NAT'L ACAD. 2000).

296. See Article I, Food and Agriculture Organization (FAO) Constitution, 1945.

297. See Article VI, FAO Constitution, 1945.

298. ERIK J. MOLENAAR, CURRENT LEGAL AND INSTITUTIONAL ISSUES RELATING TO THE CONSERVATION AND MANAGEMENT OF HIGH-SEAS DEEP-SEA FISHERIES 121 (FAO 2010) [hereinafter MOLENAAR], <ftp://ftp.fao.org/docrep/fao/010/a1341e/a1341e02c.pdf>.

299. *Id.* at 122.

300. See Article VI(2), FAO Constitution, 1945.

formulate additional commissions for dealing with certain issues related to agriculture or the marine environment.³⁰¹ In addition to dealing with the international seas, the FAO constitution also refers and applies to the jurisdictional areas of states.³⁰²

5. Other International Bodies

Several other international organizations are working toward the conservation of marine biodiversity. These include the International Union for the Conservation of Nature, which has the core mission of protecting the environment and maintaining the sustainable utilization of natural resources;³⁰³ Birdlife International, which works for protection of the biodiversity of birds and their habitats at the international level;³⁰⁴ Conservation International, which works for the conservation of natural sources of food;³⁰⁵ the Deep Sea Conservation Coalition, which works for the conservation of biodiversity in the high seas;³⁰⁶ and the Center for Biological Diversity, which is a regional U.S. organization with the core motto of “No species deserves extinction” that works for the protection of marine and other species.³⁰⁷

The above discussion illustrates that there are several agencies working for the implementation of rules and regulations to maintain safety at sea for ships as well as for living marine resources. The need to protect marine biodiversity has been acknowledged at both the regional and international levels but even more regulations and cooperation are necessary.

301. *Id.*; see also MOLENAAR, *supra* note 298, at 122.

302. See MOLENAAR, *supra* note 298, at 122.

303. See the official website of IUCN at <https://www.iucn.org>; see also GILL WILLIAMS, 100 ALIEN INVADERS 155 (BRADT TRAVEL GUIDES 2011).

304. See WILLIAMS, *supra* note 303, at 155.

305. See the official website of Conservation International at <http://www.conservation.org>.

306. See RALPH J. GILLIS, NAVIGATIONAL SERVITUDES 329 (MARTINUS NIJHOFF PUBLISHERS 2007); see also the official website of Deep Sea Conservation Coalition at <http://www.savethehighseas.org>.

307. See the official website of the Center for Biological Diversity at <http://www.biologicaldiversity.org>.

V. THE LAW OF THE SEA & BIODIVERSITY PRESERVATION IN AREAS BEYOND NATIONAL JURISDICTION

The law of the sea recommends the protection of biodiversity in the high seas, i.e., in areas beyond national jurisdiction.³⁰⁸ Part XII of the United Nations Convention on the Law of Sea (UNCLOS) and the regional fisheries management organizations provide the legal foundation of efforts for the protection of marine biodiversity in areas beyond national jurisdiction.³⁰⁹ Other international conventions have also been held that provide valuable recommendations for the sustainable employment and protection of marine biodiversity in areas beyond national jurisdiction. This section of the paper will elaborate the efforts that have been made at an international level within legal discourse as well as the practical manner for the protection of marine biodiversity in “areas beyond national jurisdictions” (ABNJ), alongside the underlying challenges and gaps that are present in the implementation of such efforts.

A. UNCLOS

The UNCLOS provides regulatory policies not only for territorial seas but also for the marine ABNJ.³¹⁰ It endorses the ABNJ as an inherited property of the whole of humanity and therefore no single nation or state has ownership of the ABNJ and their resources.³¹¹ Furthermore, the protection of the marine environment is among the most fundamental objectives

308. The area beyond national jurisdiction includes the high seas (area beyond exclusive economic zones) and the seabed beyond continental shelf limits. For details, visit the official website of U.N. Environment at <http://biodiversitya-z.org/content/areas-beyond-national-jurisdiction-abnj>; Despite this slight difference between the terms “area beyond national jurisdiction” and “high seas,” the terms are used interchangeably. See SIMONE BORG, CONSERVATION ON THE HIGH SEAS 4 (EDWARD ELGAR PUB. 2012). See also LILIAN DEL CASTILLO, LAW OF THE SEA, FROM GROTIUS TO THE INTERNATIONAL TRIBUNAL FOR THE LAW OF THE SEA 292 (HOTEL PUB. 2015)

309. ALEX G. OUDE ELFERINK, DONALD R. ROTHWELL, KAREN N. SCOTT, & TIM STEPHENS, THE OXFORD HANDBOOK OF THE LAW OF THE SEA 753 (OXFORD UNIV. PRESS 2015) [hereinafter ELFERINK ET AL.].

310. See ELFERINK ET AL., *supra* note 309, at 753.

311. See the text of the UNCLOS 1982, *supra* note 36, at art. 89 (which states that “No State may validly purport to subject any part of the high seas to its sovereignty.”).

of the UNCLOS.³¹² For this purpose, the UNCLOS also provides a legal basis for foundation of the ISA for making practical efforts to conserve the marine ABNJ and their marine biodiversity.³¹³ Article 145 of the UNCLOS draft states that the ISA has the essential responsibility to make new policies, guidelines, and strategies for conserving the ABNJ from all kind of risks to the marine biological diversity.³¹⁴ Although the policies and rubrics were devised by UNCLOS, the practical frameworks for implementation of these policies are prepared and implemented by the ISA.³¹⁵

1. Freedom of the Area

Article 87 of the UNCLOS endorses the marine ABNJ as the common property of all countries, including those countries that are not connected to the sea, which implies that the ABNJ is not the property of one or more states.³¹⁶ It further confirms the freedom of the ABNJ.³¹⁷ Such freedom includes the freedom of navigating, shipping, constructing cable pipelines, building infrastructure for artificial islands, fishing, and conducting scientific research in the ABNJ.³¹⁸ However, Article 87 and Article 88 also apply conditions on freedom of conducting activities by the states in the high seas. For instance, Article 87 restricts states from carrying out any action in ABNJ that may harm the interests of other states or may impede the freedom of other states in accessing the high seas.³¹⁹ On the other hand, Article 88 applies a condition that the high seas must be used for peaceful purposes only and in such a manner that may cause

312. DONALD ROTHWELL, *THE POLAR REGIONS AND THE DEVELOPMENT OF INTERNATIONAL LAW* 293 (CAMBRIDGE UNIV. PRESS 1996).

313. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, *REPORT AND DOCUMENTATION OF THE EXPERT WORKSHOP ON MARINE PROTECTED AREAS AND FISHERIES MANAGEMENT* 232 (FAO 2007).

314. See UNCLOS 1982 *supra* note 36, at art. 145.

315. See *e.g.* P. KEITH PROBERT, *MARINE CONSERVATION* 382 (CAMBRIDGE UNIV. PRESS 2017).

316. See UNCLOS 1982, *supra* note 36, at art. 87(1).

317. *Id.*

318. *Id.*

319. *Id.* at art. 87(2).

no harm to the marine life and environment.³²⁰ Hence, the freedom provided by the UNCLOS to perform the aforementioned activities in the ABNJ is a “restricted freedom” connected with the fulfillment of certain conditions intended for the protection of the marine environment in the ABNJ. Thus, any exploitative or exploratory activity in the ABNJ must be in accordance with the UNCLOS, otherwise such activity would be deemed illegal and not approved by international law.³²¹

2. Environment Impact Assessment

In accordance with United Nations Resolution 69/292 and Articles 204 and 206 of the UNCLOS, the environmental impact assessment (EIA) has been defined and endorsed.³²² It is aimed at evaluating the potential impacts on the marine environment from actions performed by humans in the ABNJ.³²³ The EIA also evaluates the nature of the impacts and subsequently provides recommendations to minimize their harms.³²⁴ The objectives of the EIA are the reflections of the recommendations set out in Articles 204 and 206 of the UNCLOS.³²⁵ The text of these two articles affirms that states have an obligation to perform environmental assessments in the seas within their national jurisdictions as well as the ABNJ.³²⁶ This obligation has also been endorsed by the International Court of Justice in its Advisory Opinion Judgment no. 17 of ITLOS.³²⁷ States can fulfill

320. *Id.* at art. 88.

321. *Id.* at art. 153.

322. U.N. Resolution 69/292 and the text of the Article 204 and 206 of UNCLOS recommend conducting environmental impact assessments in marine areas. *Id.* at art. 204, 206; *see also* G. A. Res. 69/292, at 3 (June 19, 2015).

323. STEVE COLE, MARIA JOSE ORTIZ, & CHRISTOPH SCHWARTE, *PROTECTING THE MARINE ENVIRONMENT IN AREAS BEYOND NATIONAL JURISDICTION* 15 (2d ed. 2012).

324. U.N. ENV'T. PROGRAMME, *PROTECTING THE ENVIRONMENT DURING ARMED CONFLICT* 35 (David Jensen & Silja Halle eds., 2009) [hereinafter U.N. ENV'T. PROGRAMME].

325. COLE, ORTIZ, & SCHWARTE, *supra* note 323, at 16 (explaining the objectives and approach of the EIA); *see also* UNCLOS 1982, *supra* note 36, at art. 204, 206.

326. *See* UNCLOS 1982, *supra* note 36, at art. 204, 206; *see also* G. A. Res. 69/292, *supra* note 322, at 1.

327. Advisory Opinion no. 17 of the International Tribunal for the Law of the Sea (ITLOS) held that “under the Convention (UNCLOS) and related instruments, sponsoring States also have obligations with which they have to comply independently of

this obligation in the ABNJ by coordinating with other states as well with international bodies that are performing environmental assessment operations in the ABNJ.³²⁸ In this way, the protection of the marine environment and biological diversity in the ABNJ can be realized.

3. Infrastructure Development in ABNJ

The Article 266 and Article 276 of UNCLOS are related to technological and research collaborations among states as well as international developmental organizations including the ISA.³²⁹ The Article 266 recommends the states to provide technological and scientific assistance to the geographically disadvantaged states for exploration, utilization, and conservation marine resources;³³⁰ whereas, Article 276 suggests the formation of regional research and technological centers in every country, especially in developing countries, for the progression and advancement of scientific research in the field of marine sciences.³³¹ Such cooperation among developed and developing states will also assist developing states in their quest for advancements in scientific research and will result in

their obligation to ensure a certain behavior by the sponsored contractor. These obligations may be characterized as “direct obligations.” Among the most important of these direct obligations incumbent on sponsoring States are: the obligation to assist the Authority in the exercise of control over activities in the Area; the obligation to apply a precautionary approach; the obligation to apply best environmental practices; the obligation to take measures to ensure the provision of guarantees in the event of an emergency order by the Authority for protection of the marine environment; the obligation to ensure the availability of recourse for compensation in respect of damage caused by pollution; and the obligation to conduct environmental impact assessments.” See Responsibilities and Obligations of States with Respect to Activities in the Area, Advisory Op. 17, 44 (Feb. 1, 2011 ITLOS Rep.); see also Raphael Magno Vianna Goncalves & Jonathan Ruille, *Conservation and Sustainable Use of Marine Biodiversity in Areas Beyond National Jurisdiction*, 23 2017/1, NEPTUNUS, E.REVUE UNIVERSITÉ DE NANTES (2017).

328. JOANNA MOSSOP, THE LAW APPLICABLE TO THE CONTINENTAL SHELF BEYOND 200NM 245 (2016); BARRY SADLER & JIŘÍ DUSÍK, EUROPEAN AND INTERNATIONAL EXPERIENCES OF STRATEGIC ENVIRONMENTAL ASSESSMENT: RECENT PROGRESS AND FUTURE PROSPECTS 72 (2016).

329. See UNCLOS 1982, *supra* note 36, at art. 266, 276.

330. *Id.* at art. 266(2).

331. *Id.* at art. 276(1).

enhancing their technological capacities.³³² Consequently, they would be able to adopt upgraded measures for sustainable use of their marine biodiversity as well as for the protection of the marine environment in the areas within and beyond their national jurisdictions. Notably, such cooperation is intended to provide opportunities to all states to benefit from the high seas within their capacities in such a manner that may cause no harm to the marine biological diversity in the ABNJ.³³³

4. Sustainable Use

The UNCLOS particularly recommends the sustainable utilization of the marine living resources in the ABNJ. Article 119 of the UNCLOS relates to the sustainable utilization and conservation of the living resources in the ABNJ.³³⁴ This is also in accordance with U.N. General Assembly Resolution 69/292, which endorses the sustainable utilization of marine biological diversity in the ABNJ.³³⁵

5. BBNJ WG

In accordance with U.N. Resolution 59/24,³³⁶ the United Nations created an Ad Hoc Open-Ended Informational Working Group, also referred to as BBNJ WG (Biodiversity Beyond National Jurisdiction Working Group).³³⁷ Since its establishment in 2004, the group has had particular objectives including evaluating former and ongoing actions, accomplishments, and undertakings of the United Nations in protecting the marine biodiversity in the high seas.³³⁸ The objectives also include recognizing the vital concerns and problems related to the conservation and sustainability of

332. *Id.* at art. 266(2), 276(1).

333. *See* Goncalves & Ruille, *supra* note 327.

334. *See* UNCLOS 1982, *supra* note 36, at art. 119.

335. *See* G. A. Res. 69/292, *supra* note 322, at 3.

336. G.A. Res. 59/24, at 13–14 (Nov. 17, 2004) (creating the Ad Hoc Open-Ended Informational Working Group); G.A. Res. 69/780, 2, annex, Outcome of the Ad Hoc Open-Ended Informational Working Group to Study Issues Relating to the Conservation and Sustainable Use of Marine Biological Diversity beyond Areas of National Jurisdiction and Co-Chair's Summary of Discussion (Feb. 13, 2015).

337. G.A. Res. 59/24, *supra* note 336, at 13–14

338. *Id.*; *see also* Goncalves & Ruille, *supra* note 327.

resources in the area. These concerns or problems can also be related to the legal, social, economic, scientific, technical, or environmental facets of the area.³³⁹ The Working Group also investigates the reasons and contextual background of the problems that can be thoroughly assessed and resolved.³⁴⁰ In addition, the group also highlights the potential chances of cooperation among states for not only resolving such problems but also protecting biological diversity and promoting the sustainable use of resources in the ABNJ.³⁴¹ The group also recommends certain approaches to increase the meaningfulness of such cooperation.³⁴²

6. Binding Instrument

The UNCLOS also developed an implementing agreement for states to preserve marine biological diversity in the ABNJ.³⁴³ The first meeting of the preparatory committee of this agreement was held on March 28 to April 8, 2016, at the U.N. headquarters.³⁴⁴ The meeting evaluated the objectives of a globally implemented binding instrument and compared its scope and objectives with other instruments.³⁴⁵ The participants of the meeting recommended that the scope of the internationally binding instrument—which covers all of the resources and environment in the ABNJ—must not affect the scope of other instruments.³⁴⁶ The scope particularly includes the sustainable use and preservation of living resources in the ABNJ.³⁴⁷

The participant states in the meeting also suggested

339. Goncalves & Ruille, *supra* note 327.

340. *Id.*

341. G.A. A/69/780, *supra* note 336, at 2.

342. *Id.* at 2–3.

343. JINPENG WANG & TIANBAO QIN, SUSTAINABLE DEVELOPMENT AND THE LAW OF THE SEA 201 (Zou Keyuan ed., 2016).

344. Elisa Morgera, Daniela Diz, Tallash Kantai & Asterios Tsioumanis, *Summary of the First Session of the Preparatory Committee on Marine Biodiversity of Areas beyond National Jurisdiction*, 25 No. 125, EARTH NEGOT. BULL., 1 (2016) <http://enb.iisd.org/vol25/enb25106e.html>.

345. *Id.* at 1.

346. *Id.* at 4.

347. *See* WANG & QIN, *supra* note 343, at 201.

strategies for protecting the marine ABNJ, which include establishing cooperation among states for the protection of marine biological diversity, penalizing polluters with heavy fines, the sustainable use of marine living resources, the equitable utilization of marine resources, transparent decision-making, technological and scientific collaborations, etc.³⁴⁸ The participants also recognized the ABNJ as a common heritage of humanity, which should be protected cooperatively and used sustainably.³⁴⁹ The formation of protected areas in the marine areas beyond national jurisdiction was also endorsed in the meeting.³⁵⁰ In addition, the EIA instrument was also endorsed by the participants in the meeting, who recommended its wide-ranging implementation.³⁵¹ The entire set of recommendations by each state participant in the meeting was concluded into a joint set of recommendations and these recommendations were approved in the meeting as principles of the internally applicable legally binding instrument of the UNCLOS.³⁵²

In summary, the UNCLOS has provided valuable recommendations and instruments for the conservation of the marine biological diversity and environment in the ABNJ.³⁵³ In addition to the protection, the sustainable use of the marine resources, the UNCLOS also addresses the development of the marine area, the utilization conditions of the resources in the ABNJ, continuous monitoring of the protective efforts, and the impacts of human activities in the ABNJ.³⁵⁴ The implementation of the strategies and rules recommended by the UNCLOS and its binding instruments are necessary for the complete protection of the marine biological diversity in the ABNJ.³⁵⁵

348. Morgera et al., *supra* note 344, at 5, 10.

349. *Id.* at 5–7.

350. *Id.*; see also WANG & QIN, *supra* note 343, at 201.

351. Morgera et al., *supra* note 344, at 19.

352. WANG & QIN, *supra* note 343, at 201.

353. See UNCLOS 1982, *supra* note 36, at art. 192; ELFERINK ET AL., *supra* note 309, at 753.

354. See UNCLOS 1982, *supra* note 36, at art. 165, 192, 193.

355. WANG & QIN, *supra* note 343, at 201.

B. Fisheries Management in Areas Beyond National Jurisdiction

Fisheries management in the high seas is vitally important for protection of marine biological diversity in the ABNJ. In this regard, the scope of operations of the regional fisheries management organizations and arrangements (RFMO/As) is applicable to marine ABNJ.³⁵⁶

1. RFMO/As

The RFMO/As provide the legal regulations, fundamental rules, and strategies for the protection fisheries in the ABNJ.³⁵⁷ Several RFMO/As have been working at the international and regional levels for the preservation of marine environment in the high seas.³⁵⁸ They impose legally binding rules and instruments on their member states.³⁵⁹ The scope and objectives of the RFMO/As were modified significantly after the conclusion of the Fish Stocks Agreement.³⁶⁰ That is, the scope and objectives of RFMO/As instituted before the Fish Stocks Agreement were narrower than of those RFMO/As created afterwards.³⁶¹ The newer RFMO/As are now focused on the conservation of all marine species, especially targeted species, in the high seas. On the other hand, the older RFMO/As are only focused on protecting and managing their targeted species and not beyond that. Both the older and newer RFMOs are currently in operation.³⁶²

356. Alf Hakon Hoel, *Performance Reviews of Regional Fisheries Management Organizations*, in DAWN A. RUSSELL AND DAVID L. VANDERZWAAG, RECASTING TRANSBOUNDARY FISHERIES MANAGEMENT ARRANGEMENTS IN LIGHT OF SUSTAINABILITY PRINCIPLES 449 (2010).

357. *Id.*

358. *Id.*

359. XUE, *supra* note 16, at 43.

360. Erik Molenaar, *Regional Fisheries Management Organization: Issues of Participation, Allocation and Unregulated Fishing*, in ALEX G. OUDE ELFERINK & DONALD ROTHWELL, OCEANS MANAGEMENT IN THE 21ST CENTURY: INSTITUTIONAL FRAMEWORKS AND RESPONSES 81 (2004).

360. *See* Molenaar, *supra* note 298, at 125.

361. *Id.*

362. *Id.* at 123.

Examples of the older RFMO/As are the CBS Convention,³⁶³ the NAFO Convention,³⁶⁴ the CCAMLR Convention,³⁶⁵ the NEAFC,³⁶⁶ and the GFCM Convention.³⁶⁷ On the other hand, the newer RFMO/As are the STR Arrangements,³⁶⁸ the SPOF Agreement,³⁶⁹ and the SEAFC Convention.³⁷⁰ These conventions are applicable to all marine living resources and marine environments in their targeted marine regions in the high seas. Only the STR Arrangements contain exceptions, as they are focused on targeted species in the Tasman marine region between Australia and New Zealand.³⁷¹

The scope of the RFMO/As includes conserving the high seas as well as the deep seabed living resources that are defined in the Article 77 of UNCLOS.³⁷² The STR Arrangements and the SEAFC particularly include the objective of protecting deep-sea living resources.³⁷³ Most of the RFMO/As are also in full or partial congruence with the Fish Stocks Agreement.³⁷⁴ For instance, the SPOF Agreement and the SEAFC Convention were

363. *Id.* at 125.

364. Convention on Cooperation in Northwest Atlantic Fisheries, Sept. 28, 2017, T.I.A.S. No. 17-518 (binding on member states from the North Atlantic).

365. The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) (part of the Antarctic Treaty System).

366. Convention on Future Multilateral Cooperation in North East Atlantic Fisheries, Nov. 18, 1980.

367. General Fisheries Commission for the Mediterranean, 2016, FAO (establishing the scope of the international agreement in the Mediterranean marine region).

368. Jane Willing, *Arrangement Between the Government of Australia and the Government of New Zealand for the Conservation and Management of Orange Roughy on the South Tasman Rise*, in 695 FAO FISHERIES REPORT, SUPPLEMENT (FAO 2003).

369. South Pacific Ocean Fisheries Agreement, Nov 14, 2009, T.I.A.S. No. 17-218.

370. Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean, Apr. 1, 2001, 2221 U.N.T.S. 189 (entered into force Apr. 13, 2003).

371. *See* Molenaar, *supra* note 298, at 125–26.

372. *Id.* at 125, 131.

373. *Id.* at 125.

374. *See* U.N., Resumed Review Conference on the Agreement Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (May 2010), http://www.un.org/depts/los/convention_agreements/reviewconf/FishStocks_EN_F.pdf.

implemented after the Fish Stocks Agreement.³⁷⁵ Most of the instruments of the RFMO/As, similar to the Fish Stocks Agreement, consider all the fish stocks in the high seas.³⁷⁶

The RFMO/As provide frameworks, policies, and instruments for the protection of marine living resources in the high seas,³⁷⁷ particularly from harmful fishing practices.³⁷⁸ Some RFMO/As, including NEAFC, focus in particular on protecting and preserving fisheries from the effects of bottom trawling and other harmful fishing practices.³⁷⁹ Owing to their binding nature, the RFMO/As' instruments can play a crucial role in regulating harmful fishing practices in the high seas.³⁸⁰ There is a need to implement them in the high seas and, for this purpose, the member states of the RFMO/As need to extend collaboration and facilitate the implementation of the suggested frameworks and instruments of the RFMO/As in the high seas.³⁸¹

2. Ecosystem Approach to Fisheries

The ecosystem approach to fisheries (EAF) is gaining particular attention from international fisheries management bodies.³⁸² This approach emphasizes the sustainable management and utilization of the fisheries in the high seas.³⁸³ It is based upon the UNCLOS 1982, the United Nations Conference on Environment and Development (UNCED) 1992,

375. See Molenaar, *supra* note 298, at 124.

376. *Id.*

377. See Hoel, *supra* note 356.

378. DORIS KÖNIG ET AL., LEGAL REGIMES FOR ENVIRONMENTAL PROTECTION: GOVERNANCE FOR CLIMATE CHANGE AND OCEAN RESOURCES 174 (Brill 2015).

379. See *generally id.* at 174.

380. See XUE, *supra* note 16, at 43; see also Hoel, *supra* note 356.

381. U.N. Secretary-General, *Impacts of Fishing on Vulnerable Marine Ecosystems: Actions Taken by States and Regional Fisheries Management Organizations and Arrangements to Give Effect to Paragraphs 66 to 69 of General Assembly Resolution 59/25 on Sustainable Fisheries, Regarding the Impacts of Fishing on Vulnerable Marine Ecosystems*, ¶¶ 1, 101–17, U.N. Doc. A/61/154 (July 14, 2006).

382. *Ecosystem Approach to Fisheries (EAF)*, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, <http://www.fao.org/fishery/topic/16034/en>.

383. GREAT BRITAIN ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION, TURNING THE TIDE: ADDRESSING THE IMPACT OF FISHERIES ON THE MARINE ENVIRONMENT 171 (25th ed. 2004), https://www.fcrn.org.uk/sites/default/files/Turning_the_tide_%20Report.pdf.

and the Code of Conduct for Responsible Fisheries 1995 for the preservation and sustainable utilization of fisheries.³⁸⁴ In addition, the EAF also includes the principles added in the CBD and Agenda 21 for the protection of biological diversity in the marine areas within and beyond national jurisdiction.³⁸⁵

As the EAF appears pragmatic and realistic in its mission to preserve the fisheries in a sustainable manner, this approach should be implemented by the regional as well as international bodies for the preservation and sustainable management of fisheries in the marine environment. The FAO particularly publicizes the directives of the EAF and works for its implementation.³⁸⁶ Its Code also contains several principles of the ecosystem approach.³⁸⁷ In this regard, it is pertinent to note that the FAO is not an RFMO/A. This suggests that non-RFMOs are also working for the preservation of the fisheries and biological diversity in the marine environment.

In conclusion, RFMO/As can become more effective if the RFMO/As collaborate with those organizations that are working to implement the EAF. In this way, the preservation and sustainable utilization of fisheries in the ABNJ would be realized more efficiently.

C. Nonbinding Instruments

In addition to the binding instruments of UNCLOS and RFMO/As, there are several nonbinding instruments applicable to the ABNJ. These instruments have the core purpose of establishing cooperative frameworks for the preservation of marine biological diversity in the high seas.³⁸⁸ These instruments have been devised from recommendations provided

384. S.M. GARCIA, *THE ECOSYSTEM APPROACH TO FISHERIES: ISSUES, TERMINOLOGY, PRINCIPLES, INSTITUTIONAL FOUNDATIONS, IMPLEMENTATION AND OUTLOOK*, Issue 443, 16–17 (FAO 2003).

385. *Id.*

386. For instance, as mentioned on its website, see *infra* note 491.

387. DAWN A. RUSSELL & DAVID L. VANDERZWAAG, *RECASTING TRANSBOUNDARY FISHERIES MANAGEMENT ARRANGEMENTS IN LIGHT OF SUSTAINABILITY PRINCIPLES* 31–32 (MARTINUS NIJHOFF PUBLISHERS 2010).

388. JOANNA MOSSOP, *THE LAW APPLICABLE TO THE CONTINENTAL SHELF BEYOND 200NM* 224 (OXFORD UNIV. PRESS 2016).

in certain international conventions.³⁸⁹ For instance, the most prominent of such instruments were devised from the Rio Declaration (1992), which stressed the protection of the marine environment and natural ecosystem in the ABNJ; Agenda 21 (1992), whose seventeenth chapter is related to the protection of marine environment; the Johannesburg Plan (2002), paragraphs 30 to 36 of which are on the subject of marine environmental protection; and the recommendations of the United Nations Conference on Sustainable Development, of which paragraphs 159–176 address marine environmental protection.³⁹⁰

These nonbinding instruments provide recommendations to participating states for the protection of biological diversity in the marine environment within as well as beyond their national jurisdictions.³⁹¹ These instruments are also considered policy guidelines and rules for the states and for the organizations that are looking to exploit the resources in the marine environment.³⁹² Though these are not binding upon member states, they are sufficient to suggest rules for devising new, binding instruments that can be applied to the ABNJ.³⁹³

In a nutshell, both binding and nonbinding instruments provide a basis for regulations for preserving marine biological diversity in the ABNJ.³⁹⁴ The ABNJ is not in the control of any particular state and therefore there is freedom of fishing and exploitation of marine living resources in such areas.³⁹⁵ In the absence of these binding and nonbinding instruments and regulatory organizations, including the RFMO/As, the exploitation of marine living resources may become harmful or irresponsible. As a consequence, the marine population could be

389. KAREN MAKUCH & RICARDO PEREIRA, ENVIRONMENTAL AND ENERGY LAW, Section 1.3.4 (JOHN WILEY & SONS 2012).

390. See, e.g., ALISTAIR RIEU-CLARKE, INTERNATIONAL LAW AND SUSTAINABLE DEVELOPMENT 60 (IWA Pub. 2005).

391. KATHARINA KUMMER, INTERNATIONAL MANAGEMENT OF HAZARDOUS WASTES 17 (OXFORD UNIV. PRESS 1999) [hereinafter KUMMER].

392. See also S.M. GARCIA, *supra* note 384, at 16–17.

393. See KUMMER, *supra* note 391.

394. KEVERN L. COCHRANE & SERGE M. GARCIA, A FISHERY MANAGER'S GUIDEBOOK 133 (JOHN WILEY & SONS 2009).

395. ALLAN ROSAS ET AL., THE NEW CHEMICAL WEAPONS CONVENTION: IMPLEMENTATION AND PROSPECTS 61 (MARTINUS NIJHOFF PUBLISHERS 1998).

at risk of extinction. RFMO/As and nonbinding instruments are in operation to provide regulations to states and international as well as regional organizations to help prevent overexploitation of the marine environment. Thus, both binding instruments and nonbinding instruments are vital for the preservation of biological diversity in the marine ABNJ.

VI. ARMED CONFLICTS AND BIODIVERSITY CONSERVATION

Armed conflicts among states can result in harm to biological diversity on land and in the sea.³⁹⁶ Modern era arms and ammunitions are weapons of mass destruction, which have the tendency to destroy marine and land-based living resources and environment.³⁹⁷ Nuclear weapons in particular make the survival of living resources and the ecosystem precarious. Several contemporary armed conflicts have occurred among states. The ongoing conflict in Syria, the recent tragic armed conflict in Libya, the Iraq war, and the U.S. operation in Afghanistan are some examples of the many armed conflicts that have taken place in the last decade.³⁹⁸ Therefore, when evaluating the factors that affect biological diversity, one must discuss the impacts of armed conflicts on the subject.³⁹⁹

A. *Wars and Their Impacts on Environmental Biodiversity*

Wars have resulted in a very high number of human casualties and the destruction of infrastructure, cities, and houses.⁴⁰⁰ This destruction also adversely affects the natural

396. Greg Bankoff, *A Curtain of Silence: Asia's Fauna in the Cold War*, in ENVIRONMENTAL HISTORIES OF THE COLD WAR 208–09 (Corinna R. Unger & J.R. McNeill eds., CAMBRIDGE Univ. Press 2010).

397. See GARY ACKERMAN & JEREMY TAMSETT, JIHADISTS AND WEAPONS OF MASS DESTRUCTION 160 (CRC PRESS 2009), for details about the effects of such destructive weapons.

398. See SOIL SECURITY FOR ECOSYSTEM MANAGEMENT: MEDITERRANEAN SOIL ECOSYSTEMS 1, 78–79 (Selim Kapur & Sabit Ersahin eds., Springer 2014).

399. See KAREN HULME, WAR TORN ENVIRONMENT: INTERPRETING THE LEGAL THRESHOLD 10 (MARTINUS NIJHOFF PUBLISHERS 2004).

400. Iris Kesternich, et al., *The Effects of World War II on Economic and Health Outcomes Across Europe*, 10 REV. ECON. & STAT. 10 (Mar. 2014).

ecosystem and biological diversity in warzones.⁴⁰¹ Though the material damages of war may be restricted to areas of active conflict, their environmental damage has a wider area of effect.⁴⁰²

The destructive effects of war on the environment continue for a long time, even after the conflict ends.⁴⁰³ The Vietnam War is a prime example of continuous environmental destruction.⁴⁰⁴ A hazardous chemical weapon, Agent Orange, was used in the war, causing significant levels of deforestation, destruction of soil, and human health problems in Vietnam.⁴⁰⁵ In 1990–1991, the Gulf War resulted in a significant amount of air and marine pollution caused by the destruction of hundreds of oil wells by the retreating Iraqi Army.⁴⁰⁶ The total cost of the environmental damage was estimated to be beyond 85 billion U.S. dollars.⁴⁰⁷ In the same manner, the armed conflict in Kosovo in 1998–99 resulted in severely hazardous pollution owing to the bombing of industrial sites.⁴⁰⁸ The Israel–Lebanon conflict is another example: more than 14,000 tons of oil were leaked into the sea due to air strikes by Israel on the Jiyeh power station in 2006.⁴⁰⁹ As a consequence, a significant amount of regional marine life was put at risk owing to heavy marine pollution. Of the several wars that have taken place over the last three decades, each has produced colossal damage to the natural environment and biological diversity on land and in the sea. Natural resources, such as oil and minerals, are particularly over exploited in the aftermaths of these wars.⁴¹⁰ For instance, the wars in Cambodia,

401. See Robin Burgess et al., *War and Deforestation in Sierra Leone*, 10 ENV'T. RES. LETT. (2015).

402. *Id.*

403. See ROY MAY, *ENDING AFRICA'S WARS: PROGRESSING TO PEACE* 17 (ROUTLEDGE 2016).

404. *Vietnam: War and The Environment*, GREEN LEFT (July 13, 1993), <https://www.greenleft.org.au/content/vietnam-war-and-environment>.

405. SUSAN L. SMITH, *TOXIC EXPOSURES: MUSTARD GAS AND THE HEALTH CONSEQUENCES OF WORLD WAR II IN THE UNITED STATES* 6 (RUTGERS UNIV. PRESS 2017).

406. See HULME, *supra* note 399, at 11.

407. See U.N. ENV'T. PROGRAMME, *supra* note 324, at 8.

408. *Id.* at 8.

409. *Id.*

410. *Id.*

Libya, and Iraq are prominent examples of not only the destruction of local infrastructure but also of the damaging exploitation of natural resources such as oil wells, diamonds, and other minerals.⁴¹¹

B. Efforts for the Protection of Environmental Biological Diversity in Wars

A number of efforts have been made by the international community, particularly by the United Nations General Assembly, to preserve the natural environment and biological diversity from wars.⁴¹² For instance, in the aftermath of the environmental destruction caused by the Gulf War 1990–1991, the United Nations General Assembly approved a resolution in 1992 for deriving instrumental policies and rules for protecting the environment during wars.⁴¹³ The resolution not only recommended that states follow international legal principles in wars, but also urged states to add these principles into their military manuals.⁴¹⁴ Subsequently, in 1993–1994, the International Committee of the Red Cross issued recommendations that were mainly a combination of strategies, rules, and procedures for preserving the environment in war situations.⁴¹⁵ The Committee also urged states to add the recommendations into their laws and their military manuals.⁴¹⁶

1. UNEP and ELI

The UNEP has also issued legal instruments in collaboration with the Environmental Law Institute (ELI).⁴¹⁷ These instruments are focused on protecting the natural resources, ecosystem, and biological diversity in war

411. *Id.* at 8.

412. DIETRICH RAUSCHNING ET AL., KEY RESOLUTIONS OF THE UNITED NATIONS GENERAL ASSEMBLY 1946–1996 206 (CUP ARCHIVE 1997).

413. *See* General Assembly Resolution 47/37, Protection to the Environment in Times of Armed Conflict, U.N. Doc. GA/RES/47/37 (Nov. 25, 1992).

414. *Id.*

415. *See* 1 CUSTOMARY INTERNATIONAL HUMANITARIAN LAW 144 (Jean-Maries Henckaerts et al. eds., 2005).

416. *Id.*

417. UNEP, UNEP'S NEW WAY FORWARD: ENVIRONMENTAL LAW AND SUSTAINABLE DEVELOPMENT 4 (UNEP 1995).

situations.⁴¹⁸ In 2009, the UNEP-ELI collaboration invited legal experts from several states and issued a joint set of recommendations for preserving the environment.⁴¹⁹ These recommendations particularly address the challenges that are present in protecting the environment during wars.⁴²⁰

In addition to these measures by the UNEP and ELI, several other international law principles have been implemented at the global level for environmental protection during armed conflict. For instance, the principles of international humanitarian law, criminal law, human rights law, and environmental law also provide rules, recommendations, and instruments from a global perspective for the protection of the environment during all kinds of armed conflicts.

2. International Humanitarian Law

International Humanitarian Law is the leading legal body of work providing valuable and pragmatic laws for environmental protection from a humanitarian perspective.⁴²¹ In this regard, it particularly provides guidelines and protocols for the protection of the environment during armed conflict.⁴²² It applies constraints on the line of attack, including on weaponry systems, in a war.⁴²³ In particular, it requires the safety of those humans who are not participating in the war.⁴²⁴ It is pertinent to mention here that IHL is only applicable once the war or armed conflict has started and it applies equally on all parties to the

418. *Id.* at 8.

419. *Id.*

420. *Id.*

421. *See* 1 CUSTOMARY INTERNATIONAL HUMANITARIAN LAW, *supra* note 415, at 144.

422. *See id.*

423. *See* Neil Davison, *A Legal Perspective: Autonomous Weapon Systems Under International Humanitarian Law*, in PERSPECTIVES ON LETHAL AUTONOMOUS WEAPON SYSTEMS 5, 7 (United Nations Office of Disarmament Affairs, UNODA Occasional Papers No. 30, 2017); Duncan B. Hollis, *Re-Thinking the Boundaries of Law in Cyberspace: A Duty to Hack?*, in CYBERWAR: LAW AND ETHICS FOR VIRTUAL CONFLICTS 130 (Jens David Ohlin, Kevin Govern, and Claire Finkelstein eds., 2015).

424. *Civilians Protected Under International Humanitarian Law*, INT'L COMM. OF THE RED CROSS (Oct. 29, 2010), <https://www.icrc.org/eng/war-and-law/protected-persons/civilians/overview-civilians-protected.htm>.

war.⁴²⁵ Furthermore, it is applicable to non-international conflicts but has a more limited scope.⁴²⁶ This is because it provides several rules and instrumental guidelines on international armed conflicts, i.e., conflicts between two or more states, but has only a limited number of laws to regulate conflicts that take place within a state.⁴²⁷

a. Law of Armed Conflict: Fundamental Principles of IHL for Environmental Protection in Wars

The law of armed conflict governs the conduct of warring parties in order to reduce the destruction of war.⁴²⁸ The law of armed conflict consists of the four principles of International Humanitarian Law.⁴²⁹ These principles are fundamental to the scope of IHL and relate to providing protection for the environment during armed conflicts.⁴³⁰ These principles are universally acceptable, and their implementation can directly or indirectly ensure protection for the environment.⁴³¹

i. The Principle of Distinction

The principal of distinction forms the foundation of

425. MICHAEL KOEBELE, CORPORATE RESPONSIBILITY UNDER THE ALIEN TORT STATUTE: ENFORCEMENT OF INTERNATIONAL LAW THROUGH U.S. TORTS LAW 79 (2009) (quoting *Prosecutor v. Tadic*, IT-94-1, Decision on Defence Motion for Interlocutory Appeal on Jurisdiction, ¶ 70 (Int'l Crim. Trib. For the Former Yugoslavia Oct. 2, 1995)); UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 10.

426. JAN KLABBERS, INTERNATIONAL LAW 225 (2d ed. 2017).

427. See Emiliano J. Buis, *The Implementation of International Humanitarian Law by Human Rights Courts: The Example of the Inter-American Human Rights System*, in INTERNATIONAL HUMANITARIAN LAW AND HUMAN RIGHTS: TOWARDS A NEW MERGER IN INTERNATIONAL LAW 269, 272 (Roberta Arnold & Noëlle N.R. Quénié eds., 2008).

428. Erik V. Koppe, *The Principle of Ambiguity and the Prohibition against Excessive Collateral Damage to the Environment during Armed Conflict*, in WAR AND THE ENVIRONMENT: NEW APPROACHES TO PROTECTING THE ENVIRONMENT IN RELATION TO ARMED CONFLICT 59, 61–62 (Rosemary Rayfuse ed., 2014).

429. *Id.* at 61.

430. See 1 CUSTOMARY INTERNATIONAL HUMANITARIAN LAW, *supra* note 415, at 143.

431. *The Environment and International Humanitarian Law*, INT'L COMM. OF THE RED CROSS, <https://casebook.icrc.org/case-study/environment-and-international-humanitarian-law#toc-protecting-the-environment-during-armed-conflict>.

international humanitarian law.⁴³² The principle of distinction has been regarded as the primary and fundamental test that must be first applied in every war.⁴³³ This principle distinguishes the unarmed noncombatant from the armed fighter⁴³⁴ and proscribes warring parties from attacking noncombatants.⁴³⁵ Moreover, it outlaws indiscriminate attacks, because such attacks have the tendency to not only harm innocent civilians but also to destroy the natural environment, including the natural habitat of living beings.⁴³⁶ Thus, it makes it mandatory on warring parties that the environmental sites must not be harmed, particularly those sites that provide no strategic advantage to any belligerent.

ii. The Principle of Humanity

The principle of humanity prohibits warring parties from causing any unnecessary damage in the war-hit region.⁴³⁷ Crops, gardens, and sources of food must not be harmed during wars so that no warring party can use famine as a war tactic.⁴³⁸ Any such damage done to the agrarian land, water resources, forests, etc. is considered unlawful according to this principle.⁴³⁹

iii. The Principle of Military Necessity

The principle of military necessity permits the use of force wherever it is required to do so as per military strategy.⁴⁴⁰

432. See HELEN M. KINSELLA, *THE IMAGE BEFORE THE WEAPON: A CRITICAL HISTORY OF THE DISTINCTION BETWEEN COMBATANT AND CIVILIAN* 2–3 (2011) (“The principle of distinction is a peremptory obligation of international humanitarian law; it requires universal observance from which no derogation is permitted”).

433. *Id.*

434. YOUNGINDRA KHUSHALANI, *THE DIGNITY AND HONOUR OF WOMEN AS BASIC AND FUNDAMENTAL HUMAN RIGHTS* 57 (1982); MICHAEL N. SCHMITT, *ESSAYS ON LAW AND WAR AT THE FAULT LINES* 177 (2012).

435. KHUSHALANI, *supra* note 434, at 57.

436. 1 *CUSTOMARY INTERNATIONAL HUMANITARIAN LAW*, *supra* note 415, at 143–44.

437. HUMAN RIGHTS WATCH, *JUSTICE IN THE BALANCE: RECOMMENDATIONS FOR AN INDEPENDENT AND EFFECTIVE INTERNATIONAL CRIMINAL COURT* 21 (1998).

438. UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 13.

439. *See id.*

440. Nilz Melzer, *The Principle of Distinction Between Civilians and Combatant*, in *THE OXFORD HANDBOOK OF INTERNATIONAL LAW IN ARMED CONFLICT* 296, 330

However, this principle proscribes the use of armed force at a nonmilitary site where the use of force is not needed.⁴⁴¹ Furthermore, this principle also prohibits using additional and unnecessary force after the military objectives have already been achieved.⁴⁴² This means that any environmental site, for instance the natural habitats of animals, forests, etc., should be protected from the damaging effects of the use of military force.⁴⁴³ Hence, weapons such as missiles and bombs that have the capacity to destroy a significant area should not be used in wars to target such places because there is no apparent need or requirement by any warring party to destroy such sites, as such environmental sites are harmless to them.⁴⁴⁴

iv. The Principle of Proportionality

The principle of proportionality makes it mandatory for warring parties to use only proportional force in armed conflict.⁴⁴⁵ For instance, it is not justified to use heavy ammunitions, e.g., nuclear arms or other missile systems, in response to conventional or light weapons.⁴⁴⁶ Moreover, it is not legitimate to destroy an entire town, village, forest, etc. for killing one or a few persons. This is because such a disproportionate use of force can result in the destruction of the

(Andrew Clapham et al. EDS., 2014).

441. *See id.*

442. *See* Nobuo Hayashi, *Requirements of Military Necessity in International Humanitarian Law and International Criminal Law*, 28 *BOSTON UNIV. INT'L L.J.* 39, 44 (2010) ("what is deemed materially unnecessary becomes impermissible"). By definition, once a military objective has been achieved, additional force would be materially unnecessary to achieve the objective and would therefore be impermissible.

443. Using force against such environmental sites is unnecessary, and the principle of military necessity prohibits violence that is unnecessary. *See* UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 13; *see also*, Mika Nishimura Hayashi, *The Martens Clause and Military Necessity*, in *THE LEGITIMATE USE OF MILITARY FORCE: THE JUST WAR TRADITION AND THE CUSTOMARY LAW OF ARMED CONFLICT* 142–43 (Howard M. Hensel ed., 2016).

444. *See* UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 20; Hayashi, *supra* note 443, at 142–43.

445. GERD OBERLEITNER, *HUMAN RIGHTS IN ARMED CONFLICT* 134 (2015); GARY D. SOLIS, *THE LAW OF ARMED CONFLICT: INTERNATIONAL HUMANITARIAN LAW IN WAR* 301 (2016).

446. RAJIV NAYAN, *THE NUCLEAR NON-PROLIFERATION TREATY AND INDIA* 82 (2013).

natural habitat of species in the region, as well as in the killing of innocent citizens.⁴⁴⁷

The principle of proportionality is also reflected in Article 57 of Additional Protocol I and Article 3 of Additional Protocol II of the Geneva Conventions.⁴⁴⁸ The International Court of Justice has also ratified the application of the principle of proportionality as necessary in any armed conflict.⁴⁴⁹ The disproportionate use of force can lead to damage to the environment as well as suffering for humanity and other living creatures, which can result in destruction to biological diversity in the region.

All of these principles of international humanitarian law are endorsed in the Protocols of the Geneva Conventions.⁴⁵⁰ A thorough application of these principles can prevent the unnecessary use of force, the waste of military resources, the loss of environmental biological diversity, and the loss of civilians in an armed conflict.⁴⁵¹

3. Treaty Law

Treaty law consists of the recommendations and principles provided by international treaties and protocols to the conventions.⁴⁵² These treaties and protocols are approved as part of international law by the states that participate in such conventions and treaties.⁴⁵³ For instance, the Geneva Conventions and Additional Protocols I and II, the Environmental Modification Convention, the Hague Conventions, the Convention on Certain Conventional Weapons

447. UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 13.

448. PILLOUD ET AL, COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 12 AUGUST 1949 683 (Yves Sandoz, Christophe Swinarski & Bruno Zimmerman eds., 1987).

449. Mary Ellen O'Connell, *The United Nations Security Council and the Authorization of Force: Renewing the Council Through Law Reform*, in *THE SECURITY COUNCIL AND THE USE OF FORCE: THEORY AND REALITY – A NEED FOR CHANGE?* 47, 59 (Niels M. Blokker & Nico Schrijver eds., 2005).

450. See UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 12–13; HUMAN RIGHTS WATCH, *supra* note 437, at 21; Hayashi, *supra* note 442, at 47.

451. See UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 13, 28, 51.

452. See *id.* at 10–11.

453. *Id.* at 10.

(CCW), and several other conventions and treaties provide regulations for the use of selective force in armed conflicts in order to ensure protection to marine and land-based environmental biological diversity in areas struck by armed conflict⁴⁵⁴ Regulations provided by the conventions and treaties are included in international law.⁴⁵⁵ In this regard, Articles 35 and 55 of the Geneva Conventions Additional Protocol I forms the basis of the restrictions on the use of force for the protection of the environment in armed conflicts.⁴⁵⁶

Among the aforementioned conventions, the Environmental Modification Convention (ENMOD) has been particularly active in providing regulations for the conduct of states during war for the protection of the environment. The ENMOD was held in 1976 by the United Nations after the United States used environmental modification techniques in the Vietnam War.⁴⁵⁷ The convention prohibited the use of all kinds of environmental modification war tactics.⁴⁵⁸ Some tactical weapons can cause adverse changes in the environment and can provoke tsunamis, etc.⁴⁵⁹ The ENMOD strictly banned the use of such tactical weapons and all other kind of hazardous chemical weapons that can cause any negative effect on the natural environment, animal habitats, forests, marine living resources, and biological

454. *Id.* at 11–12, 14.

455. *Id.* at 10.

456. *Id.* at 11. The text of Article 35 of Additional Protocol I of the Geneva Conventions states “[I]t is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.” Protocols Additional to the Geneva Conventions of 12 August 1949, art. 35, ¶ 2, Aug. 12, 1949, 1125 U.N.T.S. 21. On the other hand, the text of Article 55 states, “[c]are shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population.” *Id.* at 28.

457. Regina Rauxloh, *The Role of International Criminal Law in Environmental Protection*, in *NATURAL RESOURCE INVESTMENT AND AFRICA’S DEVELOPMENT* 423, 429 (Francis N. Botchway ed., 2011).

458. This is inscribed in Article I of the ENMOD Convention, 1976. 2 *CUSTOMARY INTERNATIONAL HUMANITARIAN LAW* 903 (Jean-Marie Henckaerts et al. eds., 2005).

459. UNITED NATIONS ENV’T PROGRAMME, *supra* note 324, at 11.

diversity.⁴⁶⁰ These prohibitions are mentioned in Article 1 of ENMOD and Article 35 of the Geneva Conventions' Additional Protocol I.⁴⁶¹

On a similar note, the Chemical Weapons Convention prohibited the use of harmful chemical weapons, particularly those which have the capacity to destroy fields, forests, crops, and natural habitats of wildlife and threaten the lives and health of human beings.⁴⁶² Similar implications were drawn in Article 2 of the CCW Convention, which obligated states not to use any such weapons or tactics that may cause extensive havoc and destruction to the environment.⁴⁶³ Article 1 of this convention applies to noninternational armed conflicts.⁴⁶⁴ Furthermore, Protocol III of the CCW Convention further applies restrictions to any military to refrain from using force that can destroy forests or natural habitats of living beings.⁴⁶⁵ Thus, no military action that can threaten biological diversity is justified according to this convention.

Some conventions have also made contributions to the formulation of principles of international humanitarian law in certain aspects. For instance, the Geneva Convention Additional Protocol I made significant contributions to the formulation of

460. See 2 CUSTOMARY INTERNATIONAL HUMANITARIAN LAW, *supra* note 458, at 903–04.

461. G.A. Res. 31/72, art. 1, Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (Dec. 10, 1976); Protocol Additional to the Geneva Conventions of 12 August 1949 and Relating to the Protection of International Armed Conflicts (Protocol I), art. 35, ¶ 3, June 8, 1977, 1125 U.N.T.S. 21. [hereinafter Additional Protocol I]; see also HULME, *supra* note 399, at 10–11; JONATHAN CROWE & KYLIE WESTON-SCHEUBER, PRINCIPLES OF INTERNATIONAL HUMANITARIAN LAW 39 (2013).

462. See Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, art. 2, ¶¶ 1–2, Apr. 29, 1997, 1974 U.N.T.S. 319–20 (“‘Toxic Chemical’ means: [a]ny chemical which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals”).

463. WILLIAM H. BOOTHBY, THE LAW OF TARGETING 204 (2012) (applying only to incendiary weapons).

464. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, art. 1, Apr. 10, 1981, 1342 U.N.T.S. 164 (referencing Additional Protocol I, *supra* note 456, at 7).

465. BOOTHBY, *supra* note 463, at 204.

the principles of military necessity, proportionality, and humanity.⁴⁶⁶ On the other hand, the Hague Convention IV included the principle of military necessity in its Article 23, which prohibits the use of destructive force unless it becomes an essential military requirement.⁴⁶⁷

The principles and rules provided in all of the aforementioned and other conventions are considered as part of treaty law, which itself is an essential part of international law.⁴⁶⁸ As elucidated above, treaty law and international humanitarian law provide protection in an indirect manner to the land-based and marine environments during armed conflicts.⁴⁶⁹ However, they cannot be enforced directly because there are no enforcement authorities. The suggested principles and instruments stand as recommendations for the warring parties. Therefore, it becomes a moral obligation for warring parties and all concerned states to follow these recommendations for the protection of biological diversity and the environment.

4. The Law of the Sea

The law of the sea includes several recommendations and rules for the protection of marine biological diversity.⁴⁷⁰ In this regard, the UNCLOS appears to have some ambiguity in its application during armed conflicts.⁴⁷¹ Some legal experts have asserted that the UNCLOS recommendations are only related to peacetime,⁴⁷² while other experts maintain that its recommendations are for both peace and armed conflict situations.⁴⁷³ This ambiguity is evidently attributed toward Article 236 of the UNCLOS, which provides exemptions to

466. See UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 13.

467. U.C. JHA, INTERNATIONAL HUMANITARIAN LAW: THE LAWS OF WAR 33 (2011).

468. See UNITED NATIONS ENV'T PROGRAMME, *supra* note 324, at 10.

469. *Id.*

470. William Y. Brown, *Conserving High Seas Biodiversity*, BROOKINGS (Aug. 19, 2011), <https://www.brookings.edu/opinions/conserving-high-seas-biodiversity/>.

471. See NATALIE KLEIN, MARITIME SECURITY AND THE LAW OF THE SEA 259–60 (2011).

472. *Id.* at 259; see Brian Wilson & James Kraska, *American Security and Law of the Sea*, 40 OCEAN DEV. & INT'L L. 268, 277 (2009).

473. U.N. ENV'T PROGRAMME, *supra* note 324, at 35–36.

military aircraft and ships in its applicability.⁴⁷⁴ However, the second sentence of the same Article also elaborates that the aircraft and warships must act in a reasonable manner that is consistent with this convention.⁴⁷⁵ Consequently, the language of Article 236 indicates that, though the UNCLOS may not directly apply restrictions on military aircraft and warships, it is obligatory for warships and aircrafts to not cause a disturbance to the application of the UNCLOS principles. This obligation is applied because UNCLOS has the core objective of ensuring the protection of the marine environment and marine living resources;⁴⁷⁶ therefore, any damage done to the marine environment and living resources by military aircraft and warships would be deemed against the spirit of the UNCLOS. This is because the UNCLOS requires states use the seas for peaceful purposes.⁴⁷⁷

To clarify further, for instance, it is one of the core objectives of the UNCLOS to prevent pollution in the marine environment.⁴⁷⁸ However, if a warship or a military force spreads pollution in the marine region by damaging the marine area or oil wells, then such an action by the military would be regarded as illegal and in opposition to the UNCLOS. As the UNCLOS is the leading authority in the law of the sea and international law, a violation of its rules should be considered a violation of international law.

Articles 192 and 194 of the UNCLOS apply obligations on states to protect the marine environment and to prevent and control pollution in the marine region.⁴⁷⁹ Therefore, states should give particular attention to ensuring the protection of the marine environment and to not causing pollution in the marine

474. *Id.*

475. See UNCLOS 1982, *supra* note 36, at art. 236.

476. BRIAN GROOMBRIDGE & MARTIN JENKINS, WORLD ATLAS OF BIODIVERSITY: EARTH'S LIVING RESOURCES IN THE 21ST CENTURY 215 (2002).

477. PHILIPPE SANDS, PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 396 (2d ed. 2003).

478. *Id.*

479. Howard S. Schiffman, *The Law of the Sea and Other Instruments of International Law as a Framework for Environmental Conservation In North American Waters*, in WIDENING THE SCOPE OF ENVIRONMENTAL POLICIES IN NORTH AMERICA 57, 62 (Gustavo Sosa-Nunez ed., 2017).

environment during armed conflicts.⁴⁸⁰ Bombings of environmental sites in the marine region would not only cause pollution but also result in the loss of marine living resources. Therefore, states should be careful to not cause damage to the marine environment when indulging in war and using force against each other in a marine region or in an area that is close to the marine region. States should respect the marine biological diversity during armed conflicts. In this way, marine biological diversity and the marine natural ecosystem can be preserved even during armed conflicts.

Article 88 of the UNCLOS recommends that “[t]he high seas shall be reserved for peaceful purposes.”⁴⁸¹ This indicates that the high seas should not be the theater of war because they have to be kept preserved and protected for only peaceful purposes.⁴⁸² This further implies that Article 88 of the UNCLOS actually prevents warfare in a marine area.⁴⁸³ Thus, warring parties must not take their fight to the marine region. On the other hand, some experts regard this meaning of Article 88 of the UNCLOS as partially incorrect,⁴⁸⁴ because states have the sovereign right to exercise force within their jurisdictions, whether at sea or on land, for defending themselves in light of Article 51 of the U.N. Charter.⁴⁸⁵ However, upon reading Articles 192 and 194, in light of Article 88 of the UNCLOS, it can be asserted that states have no right to cause pollution in areas that are beyond their jurisdictions. This principle is also endorsed by international law that states have no legitimacy to cause pollution or distress in areas beyond their national jurisdictions.⁴⁸⁶ So, any warfare in marine areas beyond the national jurisdiction of states would be deemed unnecessary, illegal, and harmful for the marine environment and its living

480. *Id.* at 62–63.

481. UNCLOS 1982, *supra* note 36, at art. 88.

482. *Id.*; see U.N. ENV'T. PROGRAMME, *supra* note 324, at 36.

483. See also U.N. ENV'T. PROGRAMME, *supra* note 324, at 36.

484. *Id.*

485. See U.N. Charter art. 51; see Walter Gary Sharp Sr., *Proliferation Security Initiative: The Legacy of Operacion Socotora*, in *TOP TEN GLOBAL JUSTICE LAW REVIEW ARTICLES 2007 337, 356* (Amos N. Guiora ed., 2008).

486. U.N. ENV'T. PROGRAMME, *supra* note 324, at 24–25, and 36.

resources. Thus, one point becomes clear: states must not disturb the marine environment beyond national jurisdictions during armed conflicts.

The duties to protect the marine environment and to prevent pollution in marine regions are levied by Article 192 of UNCLOS on all warring parties or states as well as on all neutral states.⁴⁸⁷ Hence, a state cannot destroy a particular site in a state with which it is at war if the destruction of that site can harm the marine environment by causing pollution there or if the destruction can harm the environment in the neighboring state, particularly if such destruction is unnecessary and has no military importance.⁴⁸⁸ Thus, it becomes evident that the UNCLOS has played an essential role in regulating armed conflict in a marine region in such a manner so as to cause minimal or no damage to the marine environment during any armed conflict.

VII. REGULATORY GAPS AND CHALLENGES

There are several regulatory and institutional gaps in implementation of policies and instruments for the protection of environment and biological diversity in the landlocked and marine areas.⁴⁸⁹

A. *Absence of Monitoring of Marine Areas beyond National Jurisdiction*

At present, there is no such tool or mechanism to monitor the activities of ships, vessels, fishing, etc. in the ABNJ.⁴⁹⁰ A few international bodies, including the UNCC, are there for this work, but their efforts have proven ineffective owing to the recurrent unreported harmful exploitation of fisheries and

487. *Id.* at 35–36.

488. *See also supra* text accompanying note 443 (discussing the principle of military necessity).

489. Dr. Meinhard Doelle, *Climate Geoengineering and Dispute Settlement under UNCLOS and the UNFCCC: Stormy Seas Ahead?*, in *CLIMATE CHANGE IMPACTS ON OCEAN AND COASTAL LAW*, 345, 371 (Randall S. Abate ed., 2015).

490. *See U.N. ENV'T. PROGRAMME, supra* note 324, at 5.

marine living resources.⁴⁹¹ This is a large gap in the successful implementation of the recommendations given by the UNCLOS and RFMO/As. Another relevant issue is that there are no measures defined or adopted in the ABNJ for mitigating the harmful effects of pollution or any other damage to the marine environment caused by any accidental incident, such as the collision of ships or spills.⁴⁹² Therefore, there is an urgent need to define the monitoring tools and identify or set up a monitoring body for evaluating the environmental impact assessments in the areas beyond national jurisdictions.

*B. Marine Protected Areas*⁴⁹³

Owing to the absence of monitoring processes, the marine protected areas (MPAs) beyond national jurisdiction lack proper governance and management.⁴⁹⁴ As a result, the purpose of forming MPAs becomes ineffective, because MPAs require special regulatory governance and monitoring.⁴⁹⁵ Furthermore, it also essential to note that not all MPAs are uniform and therefore each one must be protected and monitored distinctly as per their own geographical patterns and requirements.⁴⁹⁶ Each

491. Food and Agric. Org., *Report of the Expert Consultation on International Guidelines for the Management of Deep-Sea Fisheries in the High Seas*, 12 (Sept. 11–14, 2007) <http://www.fao.org/tempref/docrep/fao/010/i0003e/i0003e00.pdf>; see INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES, DOLPHINS, WHALES AND PORPOISES: 2002–2010 CONSERVATION ACTION PLAN FOR THE WORLD'S CETACEANS (2003), http://cpps.dyndns.info/cpps-docsweb/planaccion/docs2011/oct/turismo_biodiv/Doc.7.Dolphins_whales_porpoises.pdf.

492. See U.N. ENV'T. PROGRAMME, *supra* note 324, at 51.

493. See HAROLD FRANK UPTON, *MARINE PROTECTED AREAS: AN OVERVIEW* 2 (2010) (“[T]he International Union for the Conservation of Nature (IUCN) states that an MPA is an area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect par tor all of the enclosed environment.”); see also DANIELA DIZ PEREIRA PINTO, *FISHERIES MANAGEMENT IN AREAS BEYOND NATIONAL JURISDICTION: THE IMPACT OF ECOSYSTEM BASED LAW-MAKING* 160 (2012).

494. See COLE, ORTIZ, & SCHWARTE, *supra* note 323, at 30.

495. See INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES *supra* note 491, at 26.

496. See INDIRA HIRWAY & SUBHRANGSU GOSWAMI, *VALUATION OF COASTLAND RESOURCES: THE CASE OF MANGROVES IN GUJARAT* 38 (2007).

area may have different protective requirements,⁴⁹⁷ which need to be given particular and individualized attention. However, no criteria or instruments with area-specific approaches have been developed so far that can deal with each MPA.⁴⁹⁸ This appears to be an egregious gap in ensuring environmental and biological diversity protection in MPAs.

C. Coordination Gap

A major gap in the successful implementation of the marine environmental protective measures is the lack of coordination among different regional and international organizations that work to safeguard environmental biological diversity in the marine areas.⁴⁹⁹ Several organizations are working for the protection of environment and biological diversity in the ABNJ, but there is minimal coordination among them.⁵⁰⁰ For instance, the RFMOs are working within their regional areas and these organizations do not coordinate with each other owing to their different regional goals.⁵⁰¹ The regional agreements restrict the goals of the participants to a specific targeted region and reduce global cooperation.⁵⁰² This is because the organizations consider working outside their targeted region as either unrequired or beyond the scope of their operation. This creates a lack of coordination not only among the regional RFMOs, but also among all other international bodies, including different United Nations organizations.⁵⁰³ As a result, the marine environment in untargeted areas is left unregulated and unprotected.

497. MARINE PROTECTED AREAS: PRINCIPLES AND TECHNIQUES FOR MANAGEMENT 43 (Susan Gubbay, ed., Chapman & Hall 1995).

498. See COLE, ORTIZ, & SCHWARTE, *supra* note 323, at 28.

499. VERONICA FRANK, THE EUROPEAN COMMUNITY AND MARINE ENVIRONMENTAL PROTECTION IN THE INTERNATIONAL LAW OF THE SEA: IMPLEMENTING GLOBAL OBLIGATIONS AT THE REGIONAL LEVEL 3 (Vaughan Lowe ed., 2007).

500. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, REPORT OF THE EXPERT CONSULTATION ON INTERNATIONAL GUIDELINES FOR THE MANAGEMENT OF DEEP-SEA FISHERIES IN THE HIGH SEAS 13 (2008) <http://www.fao.org/tempref/docrep/fao/010/i0003e/i0003e00.pdf>.

501. *Id.*

502. *Id.*; see also COLE, ORTIZ, & SCHWARTE, *supra* note 323, at 29.

503. *Id.* (“There is also a lack of integration, coordination and knowledge sharing between the various global, sectoral and regional scientific bodies.”).

Although certain bodies, especially the International Union for Conservation of Nature, the UNEP, and the United Nations General Assembly, are taking steps to promote cooperation among organizations as well as among states for conserving and sustainably using resources and the environment in the marine ABNJ,⁵⁰⁴ there are still gaps,⁵⁰⁵ which need to be filled urgently in order to protect the environment. For instance, the foremost gap is the absence of any method or framework for establishing coordination among states or RFMOs.⁵⁰⁶

D. Regulatory Gaps in Wars

There are several regulatory gaps related to ensuring protection for the environment when dealing with an armed conflict.⁵⁰⁷ For instance, there is nothing in international law about who has authority to enforce the rules and recommendations provided by international humanitarian law, treaty law, and the law of the sea during incidents of war, particularly in the marine ABNJ.⁵⁰⁸ Moreover, in the aftermath of causing a particular harm to the environment, the question arises as to who has authority to charge the wrongdoer and what penalty can be imposed in such instances.⁵⁰⁹ Who will define or ratify certain action in an armed conflict as aggression, as it is possible that both warring parties may accuse each other of causing aggression in the war as well as blame each other for the damage done to the environment?⁵¹⁰

Above all, the foremost concern and gap is the implementation of the agreements and recommendations provided by the Geneva Conventions and their Additional Protocols regarding protecting the environment.⁵¹¹ The

504. IUCN UNGA, 19th Sess., *Proceedings* 96 (1994).

505. See COLE, ORTIZ, & SCHWARTE, *supra* note 323, at 28.

506. *Id.*

507. See JONAS EBBESSON & PHOEBE OKOWA, ENVIRONMENTAL LAW AND JUSTICE IN CONTEXT 57 (2009).

508. See U.N. ENV'T. PROGRAMME, *supra* note 324, at 9.

509. *Id.*

510. *Id.*

511. FRAUKE LACHENMANN & RÜDIGER WOLFRUM, THE LAW OF ARMED CONFLICT AND THE USE OF FORCE 380 (CAMBRIDGE UNIV. PRESS 2017).

environmental losses due to war in the last two decades indicates an inefficacy in the implementation of such agreements and conventions.⁵¹² Such gaps and issues related to their resolution should be resolved urgently in order to protect the environment and biological diversity during wars, particularly to ensure protection for the ABNJ.

E. Gaps Related to International Humanitarian Law

There exists an important gap related to the application of international humanitarian law that provides a basis for regulating the conduct of warring parties in an armed conflict.⁵¹³ International humanitarian law is applicable in armed conflicts between two or more states.⁵¹⁴ This is because almost all of the principles of IHL were drafted in times of wars between states.⁵¹⁵ Therefore, these principles relate to dealing with the conduct of states as belligerents.⁵¹⁶ Hence, IHL lacks applicability in internal conflicts, whether such conflicts are between local groups or tribes or between the state and nonstate actors.⁵¹⁷ In contemporary times, most armed conflicts are internal state conflicts,⁵¹⁸ but IHL principles lack applicability there.⁵¹⁹ If we deliberately try to apply the principles of IHL to internal conflicts in a state in the same manner as we apply them to conflicts between states, then such an application becomes restricted and confusing in nature, and does not provide the clear analysis and instrumental framework necessary for the objectives of IHL.⁵²⁰ This gap needs to be filled immediately and accurately in order to protect the environment

512. *Id.*

513. U.N. ENV'T. PROGRAMME, *supra* note 324, at 10.

514. *See* KLABBERS, *supra* note 426, at 225; *see also* Buis, *supra* note 427, at 269.

515. *See* THEORETICAL BOUNDARIES OF ARMED CONFLICT AND HUMAN RIGHTS 239 (Jens David Ohlin ed., 2016) [hereinafter Ohlin].

516. *Id.*

517. *See also* Ohlin, *supra* note 515, at 239.

518. Richard Kapan, *Governance Rule and Reconstruction After War*, in *RETHINKING INSECURITY, WAR AND VIOLENCE BEYOND SAVAGE GLOBALIZATION?* 169 (Damien Grenfell & Paul James eds., 2009).

519. *See* KLABBERS, *supra* note 426, at 208; *see also* Buis, *supra* note 427, at 272.

520. U.N. ENV'T. PROGRAMME, *supra* note 324, at 10.

and biological diversity during internal conflicts.

An important gap is related to the applicability of the IHL principles of military necessity and distinction. The principle of military necessity means that no site should be targeted with military force if there is no particular military strategic importance associated with its targeting.⁵²¹ On the other hand, the principle of distinction means that there should be a proper distinction made by the attacking party between environmentally significant sites and military sites, as well as between noncombatants and armed personnel.⁵²² Consequently, the attacking party must not target environmentally significant sites.⁵²³ However, there are gaps between the implementation of both of these principles. For instance, let us consider an example where a state wants to destroy the military weaponry or armed chemical factories in a state with which it is at war. Now such an action may probably be seen as in line with the principle of distinction as such factories are not environmental, but military sites. However, such an action would be in contradiction to the principle of military necessity because it might be considered unnecessary to destroy such factories if the pollution caused by their destruction results in irreparable damage to the environment. On the other hand, such factories can be destroyed under military necessity if such factories are contributing as strategic sources of weapons.⁵²⁴ Nonetheless, the consequence of such destruction will be intense pollution that will eventually cause damage to the environment and biological diversity.⁵²⁵ This further indicates the intricately complex contradiction between two distinct justifications of a single action. Such gaps and contradictions in the applications of the principles of IHL need to be addressed effectively and thoroughly. That leaves the question as to what international body will address such gaps

521. See Melzer, *supra* note 434, at 329.

522. See KHUSHALANI, *supra* note 434, at 57; see also SCHMITT, *supra* note 434, at 502.

523. *Id.* at 178; see also Hayashi, *supra* note 443, at 142–43.

524. See also Melzer, *supra* note 440, at 327.

525. See MICHAEL G. FAURE, PREVENTION AND COMPENSATION OF MARINE POLLUTION DAMAGE RECENT DEVELOPMENTS IN EUROPE, CHINA AND THE US 202 (2006); see also SEAN KAY, GLOBAL SECURITY IN THE TWENTY-FIRST CENTURY: THE QUEST FOR POWER AND THE SEARCH FOR PEACE 291 (2006).

and consequently implement them in armed conflict situations.⁵²⁶

Furthermore, no mechanism has been defined for the implementation of IHL principles.⁵²⁷ Therefore, there is an urgent need to fully define these principles and also implement them for the protection of the marine environment and biological diversity during armed conflict.

All of the gaps above are regulatory in nature and they need to be filled by devising mechanisms for their implementation as well as by requiring cooperation of separate international or regional bodies for their successful implementation.⁵²⁸ Moreover, such bodies should also monitor the implementation of these strategies and rules. This further implies a necessity to form an independent monitoring body for performing environmental impact assessments as well as for measuring the success of the strategies and rules.⁵²⁹ Such assessments will lead to a practice of continuous improvement in regulating the marine environment in marine areas within as well as beyond national jurisdictions. There is an urgent need to fill these gaps and adopt protective measures for the marine environment and biological diversity in times of war and peace.

VIII. THE UNITED STATES AND MARINE BIODIVERSITY CONSERVATION

This section explains the role played by the United States in the conservation of marine biological diversity. The United States has made several important laws as well as forming organizations to devise instruments and strategies for conserving the marine environment and biodiversity.⁵³⁰ In this

526. U.N. ENV'T PROGRAMME, *supra* note 324, at 9.

527. *See id.* at 51–52.

528. *See* COLE, ORTIZ, & SCHWARTE, *supra* note 323, at 30.

529. *See* U.N. ENV'T PROGRAMME, *supra* note 324, at 51–53.

530. *See generally* NOAA FISHERIES, ENDANGERED SPECIES ACT (ESA), (Feb. 11, 2016) [hereinafter ESA]; NOAA FISHERIES, MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT, (Feb. 7, 2018), [hereinafter NOAA]; ENVIRONMENTAL PROTECTION AGENCY, SUMMARY OF THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT, (Feb. 7, 2017) [hereinafter Marine Protection]; ENVIRONMENTAL PROTECTION AGENCY, LAWS & REGULATIONS, SUMMARY OF THE NATIONAL

regard, it has also made valuable contributions towards protecting marine biological diversity in the ABNJ.⁵³¹

A. Prominent Laws Related to Marine Environmental Biodiversity Conservation

Several laws and regulations have been made in the United States for the protection of the marine environment and biological diversity.⁵³²

1. Marine Mammal Protection Act 1972

The Marine Mammal Protection Act (MMPA) 1972 provides protection to all marine mammals within the United States jurisdictional marine area as well as beyond it.⁵³³ The Act prohibits any activity that could cause harm to marine mammals.⁵³⁴ The MMPA was passed in response to the fear felt in the 1970s of the extinction of certain marine mammal species.⁵³⁵ The MMPA suggests taking appropriate measures to prevent the loss of endangered marine mammal species below a certain number.⁵³⁶ It suggests increasing the population of these mammals.⁵³⁷

An amendment to MMPA was made in 1994, which gave some exceptions to the prohibitions on the use of marine mammals.⁵³⁸ The amendment made it necessary to acquire a license or permit to conduct scientific research in marine areas, particularly on marine mammals.⁵³⁹ It also allowed the commercial use of marine mammals, but in a sustainable

ENVIRONMENTAL POLICY ACT, (Aug. 14, 2017) [hereinafter NEPA]; NOAA FISHERIES, MARINE MAMMAL PROTECTION ACT (MMPA) OVERVIEW, (May 10, 2016) [hereinafter MMPA]; *see also* MARINEBIO, MARINE CONSERVATION ORGANIZATIONS, <http://marinebio.org/oceans/conservation/organizations/>.

531. *See* EDWARD O. WILSON AND FRANCES M. PETER, BIODIVERSITY 415 (1988).

532. *See* LEO J. BOUCHEZ, THE FUTURE OF THE LAW OF THE SEA 31 (SPRINGER 2013).

533. *See* MMPA, *supra* note 530.

534. *Id.*

535. MMPA, *supra* note 530.

536. *See id.*

537. *Id.*

538. *Id.*

539. *See id.*

manner.⁵⁴⁰ More importantly, the amendment called for stock counts of marine mammals in the waters within the jurisdiction of the U.S..⁵⁴¹

2. Endangered Species Act 1973

The Endangered Species Act (ESA) 1973 offers protection to endangered and threatened species.⁵⁴² A species is endangered if it is on the verge of extinction.⁵⁴³ On the other hand, a species is threatened if it is anticipated to become endangered in the near future.⁵⁴⁴ The ESA 1973 replaced the old Endangered Species Conservation Act 1969.⁵⁴⁵ The ESA listed around 2,300 species in the category of threatened or endangered species,⁵⁴⁶ among which the ESA has jurisdiction over 161 endangered or threatened marine species.⁵⁴⁷ The ESA completely prohibits all actions that can cause harm to endangered or threatened species.⁵⁴⁸ It also applies a total ban on the export, import, trade, etc. of endangered or threatened marine species.⁵⁴⁹

The United States Fish and Wildlife Service (USFWS) is responsible for ensuring protection and management of the endangered and threatened species that are listed by the ESA.⁵⁵⁰ In addition to the USFWS, the National Marine Fisheries Service (NMFS)⁵⁵¹ also works to implement ESA guidelines regarding endangered and threatened marine species.⁵⁵²

3. Magnuson–Stevens Fishery Conservation and

540. *Id.*

541. *Id.*

542. ESA, *supra* note 530.

543. *Id.*

544. *Id.*

545. *Id.*

546. *Id.*

547. *Id.*

548. See Memorandum from the United States Government Accountability Office (GAO) to the House of Representatives, (Dec. 19, 2008) [hereinafter GAO Memo].

549. NOAA Fisheries, *Endangered Species Conservation & Management*, <https://www.fisheries.noaa.gov/topic/endangered-species-conservation/conservation-management> (last visited Feb. 24, 2018).

550. *Id.*

551. *Id.*

552. GAO Memo, *supra* note 548.

Management Act 1976

The original name of this Act was Fishery Conservation and Management Act and it was passed in 1976.⁵⁵³ However, it was renamed after Senator Warren G. Magnuson in 1980.⁵⁵⁴ This Act proscribes overfishing.⁵⁵⁵ It also encourages rebuilding of the fishery stock.⁵⁵⁶ It also places stress on acquiring economic benefits in the long term from sustainable management of fisheries.⁵⁵⁷ Furthermore, the Act also recommends making sustainable and safe use of seafood.⁵⁵⁸ The Act increased the jurisdictional limit of U.S. waters from 12 to 200 nautical miles.⁵⁵⁹ It also established fishery management councils and assigned each council the duty of creating fishery management plans.⁵⁶⁰ These plans are required to promote sustainable fisheries management.⁵⁶¹

The Magnuson–Stevens Act (MSA) has been revised twice by the U.S. Congress, i.e., first in 1996 and second in 2007.⁵⁶² The 1996 revision came in coordination with the passing of the Sustainable Fisheries Act, while the 2007 revision came along with the Magnuson–Stevens Fishery Conservation and Management Reauthorization Act.⁵⁶³ The amendments were meant to strengthen the measures for sustainably managing fisheries. Consequently, the MSA has become the leading law that governs the sustainable management of fisheries in the United States jurisdictional waters.⁵⁶⁴

553. Committee on Fisheries, National Research Council, *Improving the Management of U.S. Marine Fisheries*, 12 (1994).

554. *Id.*

555. NOAA, *supra* note 530.

556. *Id.*

557. *Id.*

558. *Id.*; *see also* National Oceanic and Atmospheric Administration, 50 C.F.R. 300.324(a)(2) (2018).

559. *See* NOAA, *supra* note 530.

560. *Id.*

561. *Id.*

562. *Id.*

563. *Id.*

564. *Id.*

4. Marine Protection, Research, and Sanctuaries Act 1972

The Marine Protection, Research, and Sanctuaries Act (MPRSA), also called the Ocean Dumping Act, prohibits dumping at seas.⁵⁶⁵ Dumping can cause damaging effects to the marine environment as well as to the health of the human population residing nearby or eating affected seafood.⁵⁶⁶ However, the MPRSA allows dumping only if the party has a valid permit.⁵⁶⁷ The Environmental Protection Agency has been assigned the responsibility of establishing the “criteria for dumping” to be used in permits.⁵⁶⁸ Such criteria are found in the U.S. Code under Title 33.⁵⁶⁹ In this regard, the National Oceanic and Atmospheric Administration (NOAA) is charged with the additional responsibility of administering and implementing the legal provisions provided by the MPRSA.⁵⁷⁰

5. National Environmental Policy Act 1969

The National Environmental Policy Act has the essential role of requiring all government divisions to give particular consideration to the protection of environment in implementation of each of their projects, policies and actions.⁵⁷¹ Therefore, the obligations of the NEPA are applicable to developmental and construction projects, such as the construction of roads and buildings. The NEPA also makes it obligatory for federal organizations to consider environmental impact assessments in their operations.⁵⁷²

6. Nuclear Waste Policy Act 1982

The Nuclear Waste Policy Act (NWPA) endorses the disposal of nuclear waste in the deep-sea geological repositories.⁵⁷³ This

565. Marine Protection, *supra* note 530.

566. See London Convention, *supra* note 172.

567. See Marine Protection, *supra* note 530.

568. *Id.*; see also D. CLOUGH, EARTH OBSERVATION SYSTEMS FOR RESOURCE MANAGEMENT AND ENVIRONMENTAL CONTROL 106 (SPRINGER 2013).

569. *Id.*

570. *Id.*

571. NEPA, *supra* note 530.

572. *Id.*

573. 42 U.S.C. § 10101 et seq. (1982); see *Laws & Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <https://www.epa.gov/laws->

is because such disposal is safe for the environment.⁵⁷⁴ The NWPA also formulates strategies to examine and choose certain deep-sea sites as geological repositories.⁵⁷⁵ In this regard, it places a major obligation on the Department of Energy (DOE) to build up each deep-sea site as a geological repository and dispose of the nuclear waste there.⁵⁷⁶

It also assigns a timeline for targets to federal organizations,⁵⁷⁷ and these timelines are mandatory for environmental organizations to implement.⁵⁷⁸ In this regard, it orders the EPA to create such standards which ensure complete protection of the environment from any kind of radiation generated from nuclear waste disposed in the repositories.⁵⁷⁹ It also instructs the Nuclear Regulatory Commission to provide licenses to the DOE to work on the deep-sea geological repositories if doing so is in accordance with the standards set by the EPA.⁵⁸⁰

Several amendments have also been made to the NWPA. These include the consideration of Yucca Hills as the first place for a geological repository and the prohibition on working at a second place without acquiring permission from the U.S. Congress.⁵⁸¹ The amendment also created a separate commission that was assigned the task of examining the requirements and

regulations/summary-nuclear-waste-policy-act (last visited Mar. 24, 2018); *see also* LINDA PILKEY-JARVIS & ORRIN H. PILKEY, *USELESS ARITHMETIC: WHY ENVIRONMENTAL SCIENTISTS CAN'T PREDICT THE FUTURE* 49 (COLUMBIA UNIV. PRESS 2007).

574. National Research Council (U.S.), Panel on Radioactivity in the Marine Environment, *Radioactivity in the Marine Environment*, 35–36 (1971).

575. *See* Office of Technology Assessment, OTA-O-171, *Managing the Nation's Commercial High-Level Radioactive Waste* 3, 12 (1984).

576. 42 U.S.C. § 10101 et seq. (1982); *see Laws & Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-nuclear-waste-policy-act> (last visited Mar. 24, 2018).

577. *See Laws & Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-nuclear-waste-policy-act> (last visited Mar. 24, 2018).

578. *Id.*

579. *Id.*

580. *Id.*

581. MARK HOLT, *NUCLEAR WASTE DISPOSAL: ALTERNATIVES TO YUCCA MOUNTAIN* 21 (2010).

viability of nuclear fuel storage facilities.⁵⁸² In this way, the Nuclear Waste Policy Act provides regulation to the activities related to nuclear fuel and consequently prevents the spread of any kind of pollution or harmful radiation caused by nuclear waste in the marine environment.⁵⁸³

7. Oil Pollution Act 1990

The Oil Pollution Act regulates and improves the EPA's capacities to avert and give emergency response to oil spills in the oceans.⁵⁸⁴ It also manages a fund that is accumulated by taxing oil.⁵⁸⁵ This fund is used for cleaning any oil spills where the party at fault cannot.⁵⁸⁶

The Oil Pollution Act also applies an obligation on U.S. federal environmental agencies to provide thorough plans of their responses in the event of massive oil spills in the marine regions.⁵⁸⁷ In this regard, the U.S. Coast Guard makes the regulations for oil-carrying ships; all ships in U.S. waters are required to follow such regulations.⁵⁸⁸

8. Pollution Prevention Act 1990

The Pollution Prevention Act prohibits industrial and other organizations from spreading pollution in land and marine regions.⁵⁸⁹ The disposal of industrial waste without recycling is

582. 42 U.S.C. § 10101 et seq. (1982); see *Laws & Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-nuclear-waste-policy-act> (last visited Mar. 24, 2018).

583. See *Laws & Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-nuclear-waste-policy-act> (last visited Mar. 24, 2018).

584. 33 U.S.C. § 2701 et seq. (1990); see *Laws & Regulations: Summary of the Oil Pollution Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-oil-pollution-act> (last visited Mar. 24, 2018).

585. See *Laws & Regulations: Summary of the Oil Pollution Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-oil-pollution-act> (last visited Mar. 24, 2018).

586. *Id.*

587. *Id.*

588. *Id.*

589. 42 U.S.C. § 13101 et seq. (1990); see *Laws & Regulations: Summary of the Pollution Prevention Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-pollution-prevention-act> (last visited Mar. 24, 2018).

prohibited by this Act.⁵⁹⁰ For this purpose, it also recommends the adoption of modern techniques for recycling and disposing of industrial waste and unused raw materials.⁵⁹¹

9. Shore Protection Act 1988

The Shore Protection Act prohibits dumping and transportation of wastes on the oceans without a permit.⁵⁹² The EPA and U.S. Coast Guard issue these permits.⁵⁹³ This Act was derived from Title IV of the MRPSA⁵⁹⁴ but is considered a separate Act owing to its special role. That is, it also regulates the offloading and transportation of waste materials.⁵⁹⁵

B. Prominent Organizations Working for Marine Biodiversity Protection

The United States has several organizations that are working within their jurisdictions as well as beyond them. These include USAID, which works beyond national jurisdiction for environmental protection;⁵⁹⁶ the Bureau of Oceans and International Environmental and Scientific Affairs, which promotes the implementation of policies for sustainable utilization of marine resources and the environment at a regional and global level;⁵⁹⁷ the Office of Marine Conservation (OMC), which plays an effective role as an environmental protection body in the United States;⁵⁹⁸ the NMFS, which works

590. See *Laws & Regulations: Summary of the Pollution Prevention Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-pollution-prevention-act> (last visited Mar. 24, 2018).

591. *Id.*

592. 33 U.S.C. §2601 et seq. (1988); see *Laws & Regulations: Summary of the Shore Protection Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-shore-protection-act> (last visited Mar. 24, 2018).

593. See *Laws & Regulations: Summary of the Shore Protection Act*, U.S. E.P.A., available at <https://www.epa.gov/laws-regulations/summary-shore-protection-act> (last visited Mar. 24, 2018).

594. *Id.*

595. *Id.*

596. See EDWARD O. WILSON & FRANCES M. PETER, BIODIVERSITY 415 (1988).

597. For details, visit the official website of the U.S. Dep't of State at <https://www.state.gov/e/oes>.

598. Office of Marine Conservation is under the authority of the Bureau of Oceans and International Environmental and Scientific Affairs (OES). See FISHERIES AND

for sustainable fisheries management and operates under the Department of Commerce in the United States;⁵⁹⁹ the EPA,⁶⁰⁰ and the Interagency Marine Debris Coordinating Committee (IMDCC).⁶⁰¹

Among these organizations, the IMDCC is a multi-organizational entity that consists of several other organizations such as the NOAA, the Bureau of Safety and Environmental Enforcement, the U.S. Coast Guard, the U.S. Navy, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Marine Mammal Commission, the OMC, the Bureau of Safety and Environmental Enforcement, the Environmental and Natural Resources Division, and the U.S. EPA.⁶⁰² Among these organizations, the chairmanship of IMDCC resides with the NOAA, while the U.S. EPA holds the vice chairmanship.⁶⁰³

The main role of the IMDCC is centered on rationalizing, structuring, and organizing the actions of the U.S. federal government in dealing with marine debris.⁶⁰⁴ Its suborganizations hold meetings in which they plan and formulate programs for dealing with marine debris as well as suggesting implementation procedures, regulatory mechanisms, and monitoring strategies for eliminating marine debris.⁶⁰⁵ The IMDCC also submits biannual reports to Congress providing updates on its operations, achievements, and suggestions for dealing with marine debris.⁶⁰⁶

The EPA is also an important regulatory authority that

MARINE CONSERVATION, U.S. DEP'T OF STATE, <https://www.state.gov/e/oes/ocns/fish>.

599. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ABOUT US, <https://www.fisheries.noaa.gov/about-us> (last visited Mar. 24, 2018).

600. OFFICE OF THE FEDERAL REGISTER, *Code of Federal Regulations, Title 40, Protection of Environment, 501.1* (GOVERNMENT PRINTING OFFICE 2010) [hereinafter OFFICE OF THE FEDERAL REGISTER].

601. See DANIEL VALLERO & TREVOR M. LETCHER, WASTE: A HANDBOOK FOR MANAGEMENT, 278 (2011).

602. See 2014–2015 PROGRESS REPORT ON THE IMPLEMENTATION OF THE MARINE DEBRIS ACT, 9 (2016), available at https://marinedebris.noaa.gov/sites/default/files/2014-2015_IMDCC_Report_0.pdf.

603. *Id.*

604. *Id.*

605. *Id.* at 10.

606. *Id.*

creates regulations required for implementing environmental laws.⁶⁰⁷ Hence, it is a source of environmental laws in the United States.⁶⁰⁸ The EPA's regulations are obligatory and applicable to every entity, organization, industry, local administrative setup, etc. in the United States.⁶⁰⁹ Several regulations of the EPA have qualified as environmental laws, providing protection to the marine environment and biological diversity. These include The Endangered Species Act 1973, the Marine Protection, Research, and Sanctuaries Act 1988, the National Environmental Policy Act 1969, the Nuclear Waste Policy Act 1982, the Oil Pollution Act 1990, the Pollution Prevention Act 1990, and the Shore Protection Act 1988.⁶¹⁰

C. United States Coordination with International Agencies for Biodiversity Protection

The United States also coordinates with international organizations for the protection of marine biological diversity in regional seas as well as in the high seas.⁶¹¹ For instance, the United States works with the FAO and its Committee on Fisheries, which works on the protection and sustainable use of fisheries,⁶¹² the UNEP, and other United Nations organizations that work for the protection of natural ecosystems and biological diversity,⁶¹³ as well as with several RFMOs in protecting fisheries, marine living resources, and the marine environment.⁶¹⁴

607. IAN L. PEPPER, CHARLES P. GERBA, & MARK L. BRUSSEAU, ENVIRONMENTAL AND POLLUTION SCIENCE 234 (2011).

608. SAEID MOKHATAB & WILLIAM A. POE, HANDBOOK OF NATURAL GAS TRANSMISSION AND PROCESSING 640 (2012). *See also* PETER E. SMIRNIOTOPOULOS, REAL ESTATE LAW: FUNDAMENTALS FOR THE DEVELOPMENT PROCESS 198 (2016).

609. *See* OFFICE OF THE FEDERAL REGISTER, *supra* note 600, at 501.1.

610. These laws have already been explained earlier in this section and all of these laws are ENVIRONMENTAL PROTECTION AGENCY, *available at* <https://www.epa.gov/laws-regulations>.

611. *See* MARINE DEBRIS AND DERELICT FISHING GEAR, U.S. DEP'T OF STATE [hereinafter U.S. DEP'T OF STATE], <https://www.state.gov/e/oes/ocns/fish/debris/index.htm>.

612. *See* Molenaar, *supra* note 298.

613. *See* U.S. DEP'T OF STATE, *supra* note 611.

614. *Id.*

Furthermore, it also coordinates with several international conventions including the CBD, whose core function is the conservation of land and marine biological diversity.⁶¹⁵ This collaboration with the CBD backs up U.S. efforts for the protection of biological diversity and marine environment in the ABNJ.⁶¹⁶

The U.S. is very keen on making efforts to protect fisheries and other marine living resources in its jurisdictional marine areas as well as in the ABNJ. Furthermore, the U.S. pays particular attention to maintaining the sustainability of the marine living resources, particularly of fisheries and marine mammals in its jurisdictional seas, and collaborates with other international organizations including RFMOs for sustainable fisheries management in the ABNJ.

IX. CONCLUSION

Biological diversity naturally maintains order in the different food chains as well as in several other activities on Earth, including maintaining a balance of the gases in the atmosphere and the chemical nutrients in the soil.⁶¹⁷ Therefore, the conservation of biological diversity is essential for the Earth to maintain a balance in the food chain, which includes animals, plants, and marine living resources.⁶¹⁸ However, it is pertinent to note that several species are facing an enormous threat of extinction owing to hostile factors such as global warming, pollution, overfishing, and over-hunting.⁶¹⁹ As per estimates provided by the International Union for Conservation of Nature (IUCN), one-third of species on Earth are at risk of extinction.⁶²⁰

615. Although the U.S. Congress did not initially ratify the nation's membership of the CBD, it was the U.S. that facilitated negotiations for its establishment and it then continued to coordinate with the convention as an observer. See SARAH ELDERIDGE, *FOOD BIOTECHNOLOGY: CURRENT ISSUES AND PERSPECTIVES* 89 (2003).

616. *Id.*

617. See also NILES ELDREDGE, *LIFE ON EARTH: A-G* 35 (ABC-CLIO 2002).

618. See PERILLO ET AL., *supra* note 130, at 335.

619. P. K. MOHAPATRA, *TEXTBOOK OF ENVIRONMENTAL BIOTECHNOLOGY* 512 (I. K. INT'L PVT LTD. 2010).

620. See JOHN ORCUTT, *EARTH SYSTEM MONITORING: SELECTED ENTRIES FROM THE ENCYCLOPEDIA OF SUSTAINABILITY SCIENCE AND TECHNOLOGY* 91 (Springer 2012). As per detailed estimates provided by the IUCN in 2009, 30 percent of amphibian

The IUCN has also issued a Red List, which includes detailed numbers of species that are either at risk of extinction or in the “endangered” category.⁶²¹ According to this list, the total number of species that are at risk of extinction is 16,928,⁶²² whereas 8,012 species are in the endangered category.⁶²³ The increase in Earth’s temperature is considered the primary exacerbating factor in making species extinct, as 1.5–2.5 degrees Celsius increase in Earth’s temperature can push 30 percent of world species toward extinction.⁶²⁴ This was elucidated by the United Nations Climate Panel in 2007.⁶²⁵

These numbers indicate the grave nature of the threat to all life, and especially to mammals, on Earth.⁶²⁶ Therefore, it is essential to make special efforts to preserve all living species, because they together constitute the natural biological diversity of Earth.⁶²⁷ The preservation of species, which in fact means the preservation of biological diversity and ecosystems,⁶²⁸ is essentially important for several reasons.⁶²⁹ For instance, biological diversity contributes toward maintaining several natural beneficial processes on Earth,⁶³⁰ including increasing

species, 35 percent of invertebrate species, 12 percent of all birds, 37 percent of fish, 30 percent of reptiles, and 20 percent of mammals are at risk of extinction. See *Extinction Crises Continues Apace*, IUCN (Nov. 3, 2009), (providing detailed estimates) <https://www.iucn.org/content/extinction-crisis-continues-apace>.

621. See KEVIN WEHR, *GREEN CULTURE: AN A-TO-Z GUIDE* 48 (2011).

622. The list also identifies 869 species as ‘extinct’.

623. 3,246 species among the 8012 are critically endangered species.

624. CLARE LESIEUR, HELEN EATON, SAMUEL TOTTEN, & SHELLEY DIRST, *SPARK THE BRAIN, IGNITE THE PEN* 184 (2009).

625. *Id.*

626. Scott Waldman, *Climate Change Has Already Harmed Almost Half of All Mammals*, *SCI. AM.* (Feb. 15, 2017), <https://www.scientificamerican.com/article/climate-change-has-already-harmed-almost-half-of-all-mammals/>.

627. See ANWAR SHAHZAD, SAEED A. SIDDIQUI, & SHIWALI SHARMA, *BIOTECHNOLOGICAL STRATEGIES FOR THE CONSERVATION OF MEDICINAL AND ORNAMENTAL CLIMBERS* 24 (SPRINGER 2015); see also CRAIG W. THOMAS, *BUREAUCRATIC LANDSCAPES: INTERAGENCY COOPERATION AND THE PRESERVATION OF BIODIVERSITY* 8 (2003).

628. CRAIG W. THOMAS, *supra* note 627, at 8.

629. See Anup Shah, *Why is Biodiversity Important? Who Cares?*, *GLOBAL ISSUES* (Jan. 19, 2014) [hereinafter Shah], <http://www.globalissues.org/article/170/why-is-biodiversity-important-who-cares>.

630. *Id.*

soil fertility by producing beneficial nutrients, controlling climate change, managing the food chains, etc.⁶³¹ All of these processes are vital for the survival of life on Earth.⁶³²

The preservation of all living species is important, as every living species plays in some aspects an essential role in the conservation of the soil, ecosystem, and natural environment on Earth.⁶³³ For instance, microorganisms, which are an essential part of natural biological diversity, play an essential role in maintaining the balance of nutrients in the soil through decomposing organic matter in the soil, which results in increasing the health and fertility of the soil.⁶³⁴ In addition, earthworms, which are not often seen as useful creatures, actually serve greatly toward maintaining soil fertility and the life cycle of ecosystems.⁶³⁵ Earthworms grind organic materials on the surface of the soil and leave behind enriched manure.⁶³⁶ This process enhances the fertility and richness of nutrients in the soil.⁶³⁷ Thus, every species contributes in some aspects to the ecosystem.⁶³⁸

Biological diversity is also essential for conducting research in the field of medicine and genetic engineering.⁶³⁹ For instance, different species of microorganisms, animals, and plants provide

631. *Id.*

632. *Id.*

633. See KIRAN CHHOKAR, MAMATA PANDYA, & MEENA RAGHUNATHAN, UNDERSTANDING ENVIRONMENT 52 (SAGE 2004); see also BRENDAN GEORGE, IAN NUBERG, & ROWAN REID, AGROFORESTRY FOR NATURAL RESOURCE MANAGEMENT 108 (CSIRO PUB. 2009).

634. Christina Menta, *Soil Fauna Diversity – Function, Soil Degradation, Biological Indices, Soil Restoration*, in BIODIVERSITY CONSERVATION AND UTILIZATION IN A DIVERSE WORLD (GBOLAGADE AKEEM LAMEED ED., 2012).

635. EARTHWORMS, SUSTAINABLE AGRICULTURE ACTIVITY GUIDES, <http://asi.ucdavis.edu/programs/sf/publications/sustainable-ag-activities-guide-earthworms.pdf>.

636. *Id.*

637. *Id.*

638. Ecological Society of America, *Biodiversity and Ecosystem Functioning: Maintaining Natural Life Support Processes*, ISSUES IN ECOLOGY (Fall 1999) 1, 3, <http://www.esa.org/esa/wp-content/uploads/2013/03/issue4.pdf>.

639. TIMOTHY J. FARNHAM, SAVING NATURE'S LEGACY: ORIGINS OF THE IDEA OF BIOLOGICAL DIVERSITY 123 (YALE UNIV. PRESS 2007).

sources of medicines for curing different diseases,⁶⁴⁰ which can only be obtained after conducting rigorous research on such species.⁶⁴¹ In this regard, the greatest biodiversity is found in the seas, where there are several thousand species of plants and animals.⁶⁴² These marine species are totally dependent on the quality of the marine environment.⁶⁴³ Polluting the sea or its environment in a way that disturbs the natural habitats of marine species can cause damaging effects on the lives and survival of such species.⁶⁴⁴ Furthermore, the inability to successfully migrate to other waters makes them especially vulnerable to changes in the seawater.⁶⁴⁵ Therefore, because of adverse changes in the sea and the quality of water, a significant amount of marine life is on the verge of dying. Extinction can be a consequence in extreme cases, e.g., when the pollution of the sea or the overexploitation of its resources through mining, shipping, or similar endeavors completely terminates the natural habitats of rare marine species.⁶⁴⁶ Consequently, the loss of biological diversity will likely occur, which can result in further damage to the natural processes and environment of Earth.

Biological diversity is also important for poor people, who are largely dependent on it for their livelihoods and food.⁶⁴⁷ As per estimates provided by the Convention on Biological Diversity, approximately 80 percent of poor people depend on biological diversity for their food and other needs.⁶⁴⁸ For

640. Carrie Byrne, *The Importance of Biodiversity for Medicine*, RESET (Mar. 14, 2013), <https://en.reset.org/blog/importance-biodiversity-medicine>.

641. *Id.*

642. NAT'L GEOGRAPHIC, BIODIVERSITY, NAT'L GEOGRAPHIC ENCYCLOPEDIA <https://www.nationalgeographic.org/encyclopedia/biodiversity/>.

643. See Shah, *supra* note 629.

644. WHAT IS OCEAN POLLUTION?, CONSERVE ENERGY FUTURE, <https://www.conserve-energy-future.com/causes-and-effects-of-ocean-pollution.php> (explaining how ocean pollution affects the marine environment).

645. See, e.g., U.S. NAT'L PARK SERV., CORAL REEFS, <https://www.nps.gov/subjects/oceans/coral-reefs.htm>.

646. Anup Shah, *Loss of Biodiversity and Extinctions*, GLOBAL ISSUES (Jan. 19, 2014), <http://www.globalissues.org/article/171/loss-of-biodiversity-and-extinctions>.

647. CARMEN RICHERZHAGEN, PROTECTING BIOLOGICAL DIVERSITY: THE EFFECTIVENESS OF ACCESS AND BENEFIT-SHARING REGIMES 60 (ROUTLEDGE 2013).

648. Secretariat of the Convention on Biological Diversity, *Biodiversity for*

instance, a significant number of poor people in the coastal regions of Bangladesh, Sri Lanka, and India rely on fishing as their source of food and livelihood.⁶⁴⁹ Therefore, overfishing can directly harm their source of food and can result in starvation as they and their families do not have any particular alternative source of livelihood or food.⁶⁵⁰ This further indicates the importance of the preservation of marine biological diversity from the threat from overfishing as well as from harmful fishing practices such as bottom trawling that can harm the number of fish in rivers and oceans.⁶⁵¹ In order to control harmful fishing practices to preserve fish stocks and to protect biological diversity from all kinds of threats, the international community needs to join hands to exert collective efforts. Furthermore, it also needs to act more actively in protecting endangered species in landlocked regions and in marine areas in order to preserve the natural biological diversity and ecosystems of Earth.⁶⁵²

At present, the law of the sea provides a number of legal provisions and recommendations to coastal states to adopt special measures to prevent damage to marine biodiversity.⁶⁵³ The UNCLOS has also applied a general obligation on states to take adequate steps to prevent pollution in the seas.⁶⁵⁴ Furthermore, the UNCLOS also provides certain regulations

Development and Poverty Alleviation, <https://www.cbd.int/doc/publications/bd-brochure-en.pdf>.

649. Liz Creel, *Ripple Effects: Population and Coastal Regions*, Population Reference Bureau, <http://www.prb.org/Publications/Reports/2003/RippleEffectsPopulationandCoastalRegions.aspx>.

650. *Id.*

651. For a discussion about harmful effects of bottom trawling and overfishing, see THEODORE GROVES & DALE SQUIRES, *FISHERIES BUYBACKS* 20 (2008).

652. The protection is necessary because fish as well as all other living species comprising biological diversity have a great importance associated with them in maintaining the natural processes on earth, as elucidated above. See Elisa Morgera, *Do We Need a New Treaty to Protect Biodiversity in the Deep Seas?* (Jan. 20, 2015), <http://sdg.iisd.org/commentary/policybriefs/do-we-need-a-new-treaty-to-protectbiodiversity-in-the-deep-seas/>; see also CHHOKAR ET. AL., *supra* note 633, at 52.

653. Tommy T.B. Koh, *A Constitution for the Oceans*, Remark at the Third U.N. Conference on the Law of the Sea (Dec. 6 and 11, 1982), http://www.un.org/Depts/los/convention_agreements/texts/koh_english.pdf.

654. See UNCLOS 1982, *supra* note 36, at art. 194(1).

related to harmful shipping, overfishing, dumping at sea, and deep-sea mining.⁶⁵⁵

In addition to the UNCLOS, the Fish Stocks Agreement regulates fisheries management and the exploitation of marine living resources by coastal states.⁶⁵⁶ It also regulates overfishing in the high seas.⁶⁵⁷ The agreement endorses the adoption of measures for sustainable fisheries management.⁶⁵⁸ In this regard, it also suggests certain measures that coastal states can adopt for regional fisheries management.⁶⁵⁹ For instance, it advocates the adoption of scientific measures for analyzing the sustainability requirements of fisheries management.⁶⁶⁰ Moreover, it recommends that coastal states practice strong cooperation by sharing data related to fisheries and devising collective policies to achieve sustainability in the management of their fisheries.⁶⁶¹

In addition, several international conventions and regional agreements aim at preserving natural ecosystems and biodiversity.⁶⁶² CITES, the CMS Convention, the CBD, the London Convention, and the SOLAS Convention are some examples of international conventions held for the conservation of biological diversity and marine living resources. CITES is related to the protection of endangered species,⁶⁶³ while the CMS Convention is focused on the protection of migratory species.⁶⁶⁴ Similarly, the CBD has put forward frameworks and regulations for the protection of biological diversity at the global level.⁶⁶⁵ The London Convention regulates the dumping of waste materials in

655. The relevant provisions of the UNCLOS preventing pollution, dumping at sea, overfishing, deep sea mining, etc. have already been discussed in Section 2 of this paper.

656. Swan, *supra* note **Error! Bookmark not defined.**, at 3–4.

657. *See Fish Stocks Agreement*, *supra* note 108, at art. 5(h).

658. *Id.* at art. 5(a).

659. *Id.* at art. 9.

660. *Id.* at art. 10.

661. *Id.* at art. 8, 10(f).

662. *See Organisation for Economic Co-operation and Development*, *supra* note 133, at 139.

663. CITES, What is CITES?, <https://www.cites.org/eng/disc/what.php>.

664. *See TIŠMA ET AL.*, *supra* note 134, at 15.

665. UNEP & UNESCO, *supra* note 149, at 2.

the seas by dividing the waste into three main categories and prohibiting the harmful waste of the first category while requiring permits to be obtained for the dumping of waste of the second and third categories.⁶⁶⁶ On the other hand, the SOLAS Convention has provided regulations and recommendations for adopting safety measures on ships in order to protect marine living resources from the activities of ships.⁶⁶⁷

Certain regional conventions such as the Barcelona Convention, the OSPAR Convention, and the Noumea Convention have been adopted by contracting states. These regional conventions provide for the protection of the marine environment and biological diversity in their respective marine areas. They have generated beneficial results in protecting the natural environment of the marine areas of the contracting states.⁶⁶⁸

In a similar way, several international organizations are working to ensure the protection of biological diversity in marine and land areas. Some of these organizations have provided regional and international legal frameworks for the conservation of biological diversity and ecosystems, while some have provided platforms for other conventions to be held and adopted by the relevant coastal states. For instance, the United Nations General Assembly has provided a platform for the adoption of the UNCLOS and the CBD.⁶⁶⁹ On the other hand, the IMO has provided binding and nonbinding regulations for ships' safety and other activities to protect the natural ecosystems and biological diversity.⁶⁷⁰ In addition, the IMO has also offered several binding and nonbinding instruments in the form of detailed conventions such as the Ballast Water Management Convention and COLREG, which are legally binding instruments of the IMO relating to the safety of the marine environment from harmful materials carried by ships as ballast and the prevention of collisions of ships at sea, respectively.⁶⁷¹

666. See London Convention, *supra* note 172, at Annex I, Annex II, and Annex III.

667. SOLAS, *supra* note 183, at 44.

668. BEAN, *supra* note 203, at 13.

669. VIG & AXELROD, *supra* note 269, at 36.

670. BANKES & TREVISANUT, *supra* note 2722, at 67.

671. SHINE ET AL., *supra* note 2744, at 28; *see also* 13 IMO Conventions 2014,

The Food and Agricultural Organization, the WWF, the International Union for the Conservation of Nature, and Conservation International are some of the other organizations that are working globally to conserve biological diversity and natural ecosystems.⁶⁷² Thus, international law and the law of the sea have provided adequate platforms and regulatory bodies for natural ecosystems and biological diversity protection, especially in marine areas. However, there are still several challenges in assuring the complete protection of the marine environment. These challenges exist owing to the current gaps in implementing the rules and recommendations provided by environmental organizations, international agreements, and conventions in times of peace and war.⁶⁷³

The United States has also played an essential role in protecting the marine environment and biological diversity at the regional as well as international level. Furthermore, it has established federal agencies and promulgated laws and regulations to protect fisheries, marine mammals, and other marine living resources within its jurisdiction as well as regional high seas.⁶⁷⁴ It has also collaborated with other international environmental organizations to make collective efforts for the protection of the marine environment and biological diversity in the marine areas beyond national jurisdictions.⁶⁷⁵

Despite the aforementioned legislative and practical efforts, serious threats exist to biological diversity that put several species at risk of extinction, as already elucidated above. Therefore, special measures are needed to be implemented immediately by all coastal states to protect biological diversity,

supra note 2755, at 31.

672. See IUCN, *About* <https://www.iucn.org/about>; FAO, *Biodiversity* <http://www.fao.org/biodiversity/en>; WWF, *What Does WWF Do?* http://wwf.panda.org/what_we_do/.

673. RANDALL ABATE, *CLIMATE CHANGE IMPACTS ON OCEAN AND COASTAL LAW* 371 (2015).

674. See FISH AND WILDLIFE SERVICE, *Endangered Species: Federal Agencies Programs* (Jan. 16, 2018), <https://www.fws.gov/endangered/what-we-do/federal-agency-programs.html>.

See also WATER EDUCATION FOUNDATION, *Federal Agencies Involved in Water Interests*, <http://www.watereducation.org/federal-agencies-involved-water-issues>.

675. See U.S. DEP'T OF STATE, *supra* note 611.

particularly in marine regions. Appropriate legislation at the national as well as the international level have been implemented in a more effective and rigorous manner, particularly to prevent factories from dumping waste materials into the sea, to discourage ships from spreading pollution in the sea water, and to prevent other sources of pollution. Furthermore, special laws and policies should be adopted in order to control deep-sea mining and similar activities that pose a threat to the biological diversity of the marine environment. Overfishing also needs to be prevented by the coastal state authorities to prevent the loss of biodiversity. The international organizations that are working to protect biological diversity should collaborate with the authorities of the coastal states in order to assist them in formulating policies, goals, and frameworks to achieve those goals, including the prevention of harmful fishing practices and overfishing. Through such collaborative efforts, biological diversity in the marine regions can be protected and utilized in a sustainable manner.