Oceans in Transition: Incorporating Climate-Change Impacts into Environmental Impact Assessment for Marine Areas Beyond National Jurisdiction

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The oceans and their biodiversity are coming under increasing threat from climate-change impacts including increasing water temperatures, deoxygenation, and ocean acidification. The adverse effects of climate change are exacerbating the stresses experienced by species, habitats, and ecosystems in all marine areas and diminishing the ecological services they provide. Identifying the nature and extent of climate-change impacts on marine biodiversity through environmental impact assessment and associated mitigation measures is a critical step towards lessening adverse impacts and stemming biodiversity loss. While legal and institutional frameworks for environmental impact assessment are well established for marine areas under national jurisdiction, collaborative structures and mechanisms for environmental impact assessment in areas beyond national jurisdiction are still fragmentary and underdeveloped. This Article reviews the existing international law and policy framework for environmental impact assessment in areas beyond national jurisdiction and discusses options for incorporating consideration of climate-change impacts into environmental impact assessment processes through a new international legally binding instrument for conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction being developed through the United Nations General Assembly.

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INTRODUCTION

The oceans, covering approximately 72 percent of the Earth's surface, are the repository for a vast array of species, habitats, and ecosystems, which make up global marine biodiversity. Marine biodiversity is critical to human survival, providing a key source of food through fisheries and aquaculture. However, climate change presents an increasing threat to the oceans. Increasing water temperatures, deoxygenation, and ocean acidification profoundly affect the marine environment and its biodiversity.[1] Climate-change impacts add to and exacerbate the other anthropogenic stressors on marine biodiversity, such as overfishing, destructive fisheries practices, and pollution.[2] The effects of climate change on marine biodiversity are difficult to distinguish from these other stressors and their combined impact may also reach substantial distances across

1. LISA LEVIN & WILLIAM W. L. CHEUNG, NIPPON FOUND. – UNIV. OF B.C.: NEREUS PROGRAM, POLICY BRIEF: CLIMATE CHANGE IN OCEANS BEYOND NATIONAL JURISDICTIONS 1–3 (2016), http://www.nereusprogram.org/policy-brief-bbnj-climate-change/.

2. *Id.*

marine areas within and beyond national jurisdiction. In legal and policy terms, this highlights the need for multi-sectoral integration of conservation policy and management in marine areas beyond national jurisdiction (ABNJ) and the introduction of conservation and management measures that take into account the full range of impacts on marine biodiversity.

The United Nations General Assembly (UNGA) is in the process of developing a new international legally binding instrument (ILBI) for conservation and sustainable use of marine biodiversity in ABNJ. That process, initiated by UNGA Resolution 69/292,[3] has prompted wide-ranging research into existing ocean governance frameworks and their applicability to conservation and sustainable use of marine biodiversity in ABNJ. UNGA 69/292 provides that negotiations to develop the new ILBI should address the four elements of a package deal agreed to by states in 2011: marine genetic resources, including questions on the sharing of benefits; measures such as area-based management tools, including marine protected areas; environmental impact assessments (EIAs) and capacity building; and the transfer of marine technology. In the face of growing threats and pressures on the marine biodiversity in ABNJ, this process seeks to promote a more coherent system of ocean governance in all regions, which draws on modern conservation principles and measures developed under international environmental law.

Part I of this Article will examine the nature of climate-change impacts on marine biodiversity and their particular effect on open-ocean ecosystems in marine ABNJ.[4] Part II will then analyze the law and policy implications for environmental assessment processes in ABNJ. Parts III and IV will review the existing international law and policy framework for EIA in ABNJ and discuss options for incorporating consideration of climate-change impacts into EIA processes through UNGA 69/292.

I. CLIMATE-CHANGE IMPACTS ON MARINE BIODIVERSITY

Changes in the global climate are having profound impacts on the oceans and their marine biodiversity. These include increasing water temperature; changes in the chemical properties of seawater; sea-level rise; increased frequency, severity, and range of weather events; and increasing thermal and other stresses on species, habitats, and ecosystems due to all these factors.[5] In particular, increasing water temperatures, deoxygenation, and ocean acidification are having substantial impacts on marine biodiversity in ABNJ. The effects of these elements of climate change on marine biodiversity are discussed below, with specific commentary on areas in the open ocean and deep sea beyond national jurisdiction.

3. G.A. Res. 69/292, at 2–3 (July 6, 2015).
4. 'ABNJ' in this Article refers to the high seas and the deep seabed beyond national jurisdiction.
5. LEVIN & CHEUNG, *supra* note 1, at 1–3.

A. Increasing Water Temperature

The rising temperature of global oceans will result in the relocation, and in some cases, extinction of marine species.[6] The impact of global ocean warming on tropical species and communities illustrates how this process will probably occur.[7] Typically, the distribution of tropical marine species reflects a range close to the upper level of their thermal tolerance, beyond which the species will need to relocate or face extinction.[8] Under increasing temperatures, they are likely to become extinct in their original habitats.[9] For example, scholars have predicted reductions of up to 50 percent in maximum fishery catch potential by 2055 in most of the equatorial Asia Pacific region through a decline in current tropical fisheries.[10] Where possible, tropical species will likely shift through movement or larval transport to their preferred thermal range in higher latitudes.[11] This is likely to cause a cascade effect, with such relocation causing competition with and displacement of species for which the temperature range of the invaded location has become too high.[12] At polar latitudes, the pressures on the species already adapted to extremes of cold are expected to lead to some species loss.[13]

Carbon dioxide heat uptake occurs extensively in ABNJ and particularly in the Southern Hemisphere.[14] Sea surface temperature in the Southern Hemisphere increased approximately 0.24 degrees centigrade between 1951–1980 and 1986–2014.[15] Increasing water temperatures are predicted for the tropical regions including the South China Sea and South East Asia, which will lead to increased stratification, reduced primary productivity, and reduced food supplies for fish species.[16]

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6. *See* William W. L. Cheung et al., *Projecting Global Marine Biodiversity Impacts Under Climate Change Scenarios,* 10 FISH & FISHERIES 235, 236 (2009).

7. *See id.* at 241, 245–46.

8. *See id.* at 245.

9. *See* Ove Hoegh-Guldberg, *Implications of Climate Change for Asian-Pacific Coastal and Oceanic Environments*, *in* CLIMATE CHANGE AND THE OCEANS: GAUGING THE LEGAL AND POLICY CURRENTS IN THE ASIA PACIFIC AND BEYOND 39–40, 43 (Robin Warner & Clive Schofield eds., 2012).

10. William W. L. Cheung et al., *Large-Scale Redistribution of Maximum Fisheries Catch Potential in the Global Ocean Under Climate Change*, 16 GLOBAL CHANGE BIOLOGY 24, 28 (2010). The authors modeled likely patterns of changes and predicted species extinction in the equatorial South Asian-Indian Ocean and west Pacific Ocean, with the highest levels being in the enclosed Java Sea. Cheung et al., *supra* note 6, at 242 fig.3(b).

11. *See* Cheung et al., *supra* note 6, at 243–45.

12. *See id.* at 245.

13. *Id.*

14. LEVIN & CHEUNG, *supra* note 1, at 1.

15. *Id.*

16. WORKING GROUP II, INT'L PANEL ON CLIMATE CHANGE [IPCC], CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY: CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 480–82 (2007); *see also* WORLDFISH CTR., POLICY BRIEF: THE THREAT TO FISHERIES AND AQUACULTURE FROM CLIMATE CHANGE 2–4 (2007), http://pubs.iclarm.net/resource_centre/ClimateChange2.pdf.

Higher water temperatures are also forecast to affect the timing and success of fish migrations, spawning, sex ratios, and peak abundance for some species.[17] They will also result in more frequent algal blooms, less dissolved oxygen, and an increased incidence of disease and parasites, leading to less abundant species and composition.[18]

In addition to the changes expected to flow from gradually rising mean sea-surface temperatures, relatively short periods of extreme temperature rise can also have major impacts on marine biodiversity. In 1998 substantial areas of the Indo-Pacific Ocean experienced a prolonged period of severe high-water temperature, which caused widespread coral bleaching.[19] The stress continued for so long that it caused widespread coral death, with up to 90 percent mass bleaching and 50 percent mortality in bleached coral.[20] In many of these areas, there has been short-term recovery of coral cover through recruitment of some new coral species. However, recovery of the structural complexity and necessary habitat for the broad range of species associated with healthy coral reefs is a much longer-term prospect. In recent years, rising sea-surface temperatures, as well as ocean acidification, have caused similar widespread coral bleaching events on the Great Barrier Reef and in the Pacific.[21]

B. Deoxygenation

A key consequence of warmer oceans is that they hold less oxygen due to declining solubility of oxygen with increasing temperature.[22] Another consequence is greater stratification of the oceans and changes in ocean circulation affecting the upwelling of deeper water and its absorption of oxygen.[23] These changes will result in an expansion of areas in the water column which have less oxygen (suboxic) or no oxygen at all (anoxic), leading to die-off or displacement of marine species.[24] The areas of ocean affected by this process of deoxygenation include vast swaths of the open and deep ocean in ABNJ. Ocean warming and associated effects of deoxygenation, therefore, increasingly expose marine species in ABNJ to conditions beyond their tolerance levels.

C. Ocean Acidification

Seawater is a complex and dynamic solution of salts and ions that interact directly with the atmosphere at the sea surface. Atmospheric gases dissolve in

17. WORLDFISH CTR., *supra* note 16, at 3.
18. *Id.*
19. Hoegh-Guldberg, *supra* note 9, at 36.
20. *Id.*
21. *Id.* at 36–37.
22. *See* WORLDFISH CTR., *supra* note 16, at 3.
23. *See* Hoegh-Guldberg, *supra* note 9, at 40–41.
24. Lothar Stramma et al., *Ocean Oxygen Minima Expansions and their Biological Impacts*, 57 DEEP-SEA RESEARCH I 587, 587–88 (2010) (highlighting the negative impacts of deoxygenation on marine species, leading to migration or death).

seawater to an extent determined by their partial pressure and the resultant chemical reactions with other solutes.[25] The rising level of atmospheric carbon dioxide in the oceans has lowered their pH and led to increasing acidification of seawater.[26] The ocean surface is 26 percent more acidic than it was 150 years ago.[27] The areas "most vulnerable to declining pH and carbonate saturation are the Arctic, [Northeast] Pacific, and [Northwest] Atlantic."[28] Ocean acidification has reduced the availability of carbonate ions vital to the production of calcium carbonate in the skeletons of corals, including deep water corals, and other calcifying species, including planktons.[29] These species are most vulnerable to ocean acidification and, combined with the effects of ocean warming and deoxygenation, are expected to suffer reduced growth and increased mortality.[30]

II. LAW AND POLICY IMPLICATIONS OF CLIMATE-CHANGE IMPACTS ON MARINE BIODIVERSITY

States will need to adjust their conservation and management regimes in response to the changing and dwindling pool of marine resources and biodiversity caused by climate change. To begin tackling this challenge, the tenth meeting of the Conference of the Parties (COP 10) to the Convention on Biological Diversity (CBD),[31] held in October 2010, issued recommendations on a range of matters relating to biodiversity and climate change.[32] COP 10 recommended that states monitor the impacts of climate change and ocean acidification on biodiversity and ecosystem services, and assess future risks using the latest available vulnerability and impact-assessment frameworks.[33] It also recommended a number of strategies to mitigate the impacts of climate change on biodiversity and to increase the adaptive capacity of species and the resilience of ecosystems.[34]

COP 10 recommended that states develop a strategy for biodiversity conservation and sustainable use in those areas that are becoming accessible to new uses as a consequence of climate change, and adopt specific measures for

25. Katja Fennel & David L. VanderZwaag, *Ocean Acidification: Scientific Surges, Lagging Law and Policy Responses*, *in* ROUTLEDGE HANDBOOK OF MARITIME REGULATION AND ENFORCEMENT 342, 343 (Robin Warner & Stuart Kaye eds., 2016).

26. *Id.* at 343–44.

27. *Id.*

28. LEVIN & CHEUNG, *supra* note 1, at 3.

29. Fennel & VanderZwaag, *supra* note 25, at 346–47.

30. Hoegh-Guldberg, *supra* note 9, at 36–37.

31. Convention on Biological Diversity, *opened for signature* June 5, 1992, 1760 U.N.T.S. 79 (entered into force Dec. 29, 1993).

32. Convention on Biological Diversity Dec. X/33, *Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting*, ¶ 1, UNEP/CBD/COP/DEC/X/33 (Oct. 29, 2010).

33. *Id.* ¶ 8(a).

34. *Id.* ¶ 8(d).

species that are vulnerable to climate change, including migratory species.[35] Ecosystem-based approaches for mitigation were suggested, including enhancing "the conservation, sustainable use and restoration of marine and coastal habitats that are vulnerable to the effects of climate change or which contribute to climate-change mitigation."[36] COP 10 emphasized the need to take into account the effects of mitigation and adaptation measures on marine biodiversity and ecosystem services through building on a scientifically credible knowledge base and developing ecosystem and species vulnerability assessments.[37] In particular, states were urged to refrain from climate-related geoengineering activities that may affect biodiversity, such as ocean fertilization, until there is an adequate scientific basis to justify such activities. Further, appropriate consideration of the associated risks to the environment and biodiversity was encouraged.[38]

COP 10 highlighted the adverse impact of climate change on marine and coastal biodiversity and recognized that "the ocean is one of the largest natural reservoirs of carbon, which can significantly affect the rate and scale of global climate change."[39] COP 10 expressed "serious concern that increasing ocean acidification, as a direct consequence of increased carbon dioxide concentration in the atmosphere, reduces the availability of carbonate minerals in seawater," which are "important building blocks for marine plants and animals."[40] Therefore, it recommended that the ecological effects of ocean acidification be considered in conjunction with the impacts of global climate change.[41] To this end, COP 10 proposed that the CBD develop a series of joint expert review processes to monitor and assess the impacts of ocean acidification on marine and coastal biodiversity in collaboration with other international organizations.[42]

The COP 10 decision on marine and coastal biodiversity placed particular emphasis on the application of the scientific criteria developed by the previous

35. *Id.* ¶ 8(f)–(g), (i). These strategies included: reducing non-climatic stresses such as pollution, over-exploitation, habitat loss and fragmentation, and invasive alien species; reducing climate-related stresses where possible, through enhanced adaptive and integrated marine and coastal management; strengthening protected area networks; integrating biodiversity into wider seascape and landscape management; restoring degraded ecosystems and ecosystem functions; and facilitating adaptive management by strengthening monitoring and evaluation systems.

36. *Id.* ¶ 8(t). Marine and coastal habitats that are vulnerable to climate change or contribute to mitigation include mangroves, peat lands, tidal salt marshes, kelp forests, and seagrass beds.

37. *Id.* ¶ 8(v).

38. *Id.* ¶ 8(w).

39. Convention on Biological Diversity Dec. X/29, *Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting,* ¶ 7, UNEP/CBD/COP/DEC/X/29 (Oct. 29, 2010) [hereinafter COP Decision X/29].

40. *Id.* ¶ 64.

41. *Id.* ¶ 65.

42. *Id.* ¶ 66. Proposed collaborators included: the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization; the Food and Agriculture Organization; the Secretariat of the United Nations Framework Convention on Climate Change; the World Conservation Monitoring Centre of the United Nations Environment Programme; the International Coral Reef Initiative; the Ramsar Convention; the Antarctic Treaty; and the Arctic Council.

conference of parties for the identification of ecologically and biologically significant areas (EBSAs).[43] These criteria provide a tool that contracting parties and competent intergovernmental organizations can use to identify areas and features of the marine environment, both within national jurisdiction and in ABNJ, that are important for conservation and sustainable use of marine and coastal biodiversity.[44] The CBD sponsored a series of regional workshops prior to the eleventh meeting of the conference of parties in 2012, to facilitate the description of EBSAs.[45] At the national level, COP 10 recommended that states further integrate climate change-related aspects of marine and coastal biodiversity into national biodiversity strategies and action plans; national integrated marine and coastal management programs; and the selection, design and management of marine and coastal protected areas.[46] COP 10 also proposed convening an expert workshop with the United Nations Framework Convention on Climate Change on the role of marine and coastal biodiversity and ecosystems in adaptation to and mitigation of climate-change impacts.[47] The workshop aimed to provide guidance for planning and implementing ecosystem-based approaches to climate-change mitigation and adaptation and their integration in broader adaptation, mitigation, and disaster risk reduction strategies.[48] The focus on climate-change impacts on marine and coastal biodiversity in the COP 10 decisions reflects an approach that seeks to incorporate climate change considerations into the traditional tools for ecosystem-based management of the marine environment, including EIA, establishment of marine protected areas, or areas in which special conservation measures are applied, and marine spatial planning.

III. INTERNATIONAL LAW AND POLICY FRAMEWORK FOR ENVIRONMENTAL IMPACT ASSESSMENT IN AREAS BEYOND NATIONAL JURISDICTION

EIA is acknowledged as a key element in the suite of tools for biodiversity conservation and is fundamental to identifying and mitigating the adverse impacts of climate change on marine biodiversity. Typical components of an EIA process include screening to determine whether activities or projects will be subject to an EIA, scoping of the terms of reference for the EIA, public notification and consultation with relevant stakeholders, reporting, and post-

43. *Background on the EBSA Process*, CONVENTION ON BIOLOGICAL DIVERSITY, https://www.cbd.int/ebsa/about (last visited Jan. 28, 2018); *see generally Ecologically or Biologically Significant Marine Areas*, CONVENTION ON BIOLOGICAL DIVERSITY, https://www.cbd.int/ebsa/ (last visited Jan. 28, 2018).

44. COP Decision X/29, *supra* note 39, ¶ 25.

45. *See Background on the EBSA Process*, *supra* note 43; *Ecologically or Biologically Significant Marine Areas*, *supra* note 43. Regional workshops were co-sponsored by the Food and Agricultural Organization, regional seas conventions and action plans, and regional fisheries management organizations.

46. COP Decision X/29, *supra* note 39, ¶ 7.

47. *Id.* ¶ 77.

48. *Id.*

report decisions on whether to impose conditions on the activity or to disallow it.[49] Assessing the impact of human activities on the marine environment introduces additional challenges to those confronted on land. Many of these differences stem from the three-dimensional nature of the marine environment, with its great depths, pressure and, lack of light beneath the photic zone. Thus, the extensive interconnections between marine ecosystems compound the adverse effects of an initial impact. Other additional challenges relate to the slow growth rates of many marine organisms, leading to delays in recovery from impacts.

The deep ocean characteristics associated with ABNJ—such as highly stable environmental conditions, slow growth rates, and greater longevity of species—increase the vulnerability of species and habitats in these areas to climate-change impacts. Some species show decreased growth and body size and compromised reproduction, while others move to areas with more favorable conditions.[50] In addition to these physical challenges, there are practical challenges in assessing the impacts of activities that occur in remote locations far from land with scant logistical support. While governance structures generally exist to facilitate environmental assessment in marine areas within national jurisdiction closer to the shore, these structures are still developing for ABNJ.

The application of EIA to activities affecting the marine environment has been endorsed in the decisions of international tribunals, many international law instruments, and policy statements by governments and international organizations.[51] However, the international legal framework for EIA in ABNJ is still underdeveloped in comparison to marine areas within national jurisdiction. Many of the instruments and decisions concerning ABNJ only discuss general obligations to conduct an EIA, rather than specific implementing provisions or underpinning institutional infrastructure.[52] There is also no specific reference in these instruments and decisions on the need to include climate-change impacts in EIA processes for marine areas.

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49. *What is Impact Assessment?*, CONVENTION ON BIOLOGICAL DIVERSITY, https://www.cbd.int/impact/whatis.shtml (last visited Mar. 17, 2018).

50. LEVIN & CHEUNG, *supra* note 1, at 3.

51. These instruments include the regional seas conventions, the 1982 United Nations Convention on the Law of the Sea (LOSC), the 1991 Protocol on Environmental Protection to the Antarctic Treaty ("Madrid Protocol"), the United Nations Fish Stocks Agreement, and the International Seabed Authority's Regulations for exploration contractors.

52. *See, e.g.*, United Nations Convention on the Law of the Sea arts. 165, 204–06, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994); Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks art. 5(d), *opened for signature* Aug. 4, 1995, 2167 U.N.T.S. 3 (entered into force Dec. 11, 2001).

A. Decisions of International Tribunals

The process of environmental assessment, particularly EIA, is one of the means by which states can implement a range of international environmental law principles. An EIA plays a fundamental role in discharging states' obligations to prevent transboundary harm, adopt a precautionary approach, and promote sustainable development.[53] The customary international law status of EIA, including its marine components, has been discussed in several recent judgments of the International Court of Justice (ICJ) and an advisory opinion of the International Tribunal for the Law of the Sea (ITLOS). In the Gabčíkcovo-Nagymaros Case, the ICJ considered assessment, notification, and consultation—effectively the elements of an EIA process—to be a necessary step in a state's implementation of the duty to prevent transboundary harm and the concept of sustainable development.[54] Hungary argued that Slovakia, in unilaterally implementing a project to build a series of hydroelectric dams on the Danube under a treaty between the two countries, had failed to take account of ecological problems or to undertake an adequate EIA.[55] The ICJ held that in operating the works that had been constructed, the parties were obliged to apply new norms of international environmental law, including the obligation to conduct an EIA and engage in ongoing monitoring of the impacts of the project on the surrounding environment.[56] In the Pulp Mills Case, which concerned a dispute between Uruguay and Argentina over the construction of pulp mills on the Uruguay River, the ICJ found that:

> [I]t may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource.[57]

In the Mox Plant Case, ITLOS concluded that the United Kingdom had breached its obligations under Article 206 of the United Nations Convention on the Law of the Sea (LOSC) by failing to carry out an adequate assessment of the potential impacts of a nuclear fuel reprocessing plant in Cumbria on the marine environment of the Irish Sea.[58] A later 2011 advisory opinion by the Seabed

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53. NEIL CRAIK, THE INTERNATIONAL LAW OF ENVIRONMENTAL IMPACT ASSESSMENT: PROCESS, SUBSTANCE AND INTEGRATION 54, 77, 224 (2008).

54. The Gabčíkovo-Nagymaros Project (Hung. v. Slovk.), Judgment, 1997 I.C.J. Rep. 7, ¶¶ 112, 140–41 (Sept. 25); *see* CRAIK, *supra* note 53, at 114–15; A.E. Boyle, *The* Gabčíkovo-Nagymaros *Case: New Law in Old Bottles*, 8 Y.B. INT'L ENVTL. L. 13, 18 (1998).

55. The Gabčíkovo-Nagymaros Project, *supra* note 54, ¶¶ 40–41.

56. *Id.* ¶¶ 112, 140–41; *see* CRAIK, *supra* note 53, at 114–15; Boyle, *supra* note 54.

57. Pulp Mills on the River Uruguay (Arg. v. Uru.), Judgment, 2010 I.C.J. Rep. 14, ¶ 204 (Apr. 20).

58. The Mox Plant Case (Ir. v. U.K.), Case No. 10, Order of Dec. 3, 2001, 5 ITLOS Rep. 89, ¶¶ 26, 82; Markus W. Gehring, *Impact Assessments of Investment Treaties*, *in* SUSTAINABLE DEVELOPMENT IN WORLD INVESTMENT LAW 147, 152 (Marie-Claire Cordonier Segger et al. eds., 2011); *see also* Alan Boyle, *The Environmental Jurisprudence of the International Tribunal for the Law of the Sea*, 22 INT'L J. MARINE & COASTAL L. 369, 377 (2007).

Disputes Chamber of ITLOS also acknowledged the customary international law status of the obligation to conduct EIAs for activities with the potential for significant impacts on the marine environment, specifically for deep seabed mining activities in ABNJ.[59]

B. Global Instruments

1. United Nations Convention on the Law of the Sea

The 1982 LOSC imposes a general obligation on States parties to assess the potential effects of activities under their jurisdiction or control that may cause substantial pollution of, or significant and harmful changes to, the marine environment.[60] Although the general obligation to conduct environmental assessment of activities with the potential for significant and harmful impacts on the marine environment is well established in both customary and conventional international law, implementation of this obligation for ABNJ is fragmented between different sectors and regions. Some sectors of activity in ABNJ—such as fisheries, deep seabed mining, and shipping—have EIA processes for some aspects of their activities. Some regions, such as Antarctica, have EIA processes for proposed activities in ABNJ.[61]

However, the obligation to conduct an EIA for proposed activities in ABNJ is by no means comprehensive. There is no overarching international agreement that develops in more specific terms the obligation to assess the potential effects of planned activities under state jurisdiction or control in ABNJ. The LOSC obligations extend to all parts of the marine environment, but there are no detailed methodological or procedural requirements specified for environmental assessment in marine and coastal areas.[62] States parties have a duty to publish reports of assessments to "competent international organizations," but these organizations are not specified, and the timescale for provision of reports is not prescribed.[63] Similarly, institutional coverage for ABNJ under the LOSC is far from comprehensive. No global body bears overarching responsibility for protection and preservation of the marine environment, conservation, or sustainable use of marine biodiversity. The International Seabed Authority (ISA) has comprehensive environmental protection powers for seabed mining activities affecting ABNJ, but there is no comparable global institution with environmental

59. Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Case No. 17, Advisory Opinion, Order of Feb. 1, 2011, 11 ITLOS Rep. 10, ¶ 145.

60. United Nations Convention on the Law of the Sea arts. 192–94, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994).

61. Protocol on Environmental Protection to the Antarctic Treaty, art. 3, *opened for signature* October 4, 1991, 30 I.L.M. 1455 (entered into force Jan. 14, 1998).

62. *See* United Nations Convention on the Law of the Sea, arts. 165, 204–06, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994).

63. *Id.* at art. 205.

protection powers for the high-seas water column.[64] These general obligations to conduct environmental assessment and monitoring under the LOSC must therefore be read in conjunction with the more specific environmental principles and procedural provisions that have been developed in international environmental law instruments such as the CBD and its biodiversity-inclusive EIA guidelines.

2. Convention on Biological Diversity

The CBD establishes a link between the fundamental obligation of contracting parties to conserve biodiversity and conduct environmental assessment and monitoring. Contracting parties must introduce appropriate procedures requiring EIA of proposed projects that are likely to have significant adverse effects on biodiversity, with a view to avoiding or minimizing such effects.[65] They are then required to monitor significant adverse effects through sampling and other techniques.[66] These obligations apply to processes and activities carried out under the jurisdiction or control of contracting parties in all parts of the marine and terrestrial environment, regardless of where their effects occur.[67] The critical importance of collaboration between states in minimizing adverse impacts on biodiversity in transboundary areas and ABNJ is emphasized in Article 14(1)(c), which requires contracting parties to promote reciprocal notification, exchange information, and consult on covered activities affecting the biological diversity of other states or ABNJ.[68] If an activity originating under a contracting party's jurisdiction or control poses a risk of imminent or grave damage to biodiversity under the jurisdiction of other states or in ABNJ, the party must immediately notify the endangered states and initiate action to eliminate the danger or minimize the damage.[69]

The obligations in the CBD have been elaborated in Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment (Guidelines), which emphasize the importance of including biodiversity-related criteria in the screening process,[70] including a detailed level of knowledge of species, habitats and ecosystems, and their interconnections in a particular marine area. A process has also begun under the CBD to define the special considerations to be considered in EIAs of activities that may affect biodiversity in marine and coastal areas, including

64. *See Scientific Activities and Promotion*, INT'L SEABED AUTH., https://www.isa.org.jm/scientific-activities (last visited Mar. 18, 2018).

65. Convention on Biological Diversity, *supra* note 31, at art. 14(1)(a).

66. *Id.* at art. 7(c).

67. *Id.* at art. 4(b).

68. *Id.* at art. 14(1)(c).

69. *Id.* at art. 14(1)(d).

70. Secretariat of the Convention on Biological Diversity, *Biodiversity in Impact Assessment: Background Document to Decision VIII/28 of the Convention on Biological Diversity: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment*, CBD Technical Series No. 26 (2006), https://www.cbd.int/doc/publications/cbd-ts-26-en.pdf.

ABNJ.[71] The Conference of Parties has been proactive in investigating the scientific and technical aspects of EIA for activities in ABNJ. It convened an Expert Workshop on Scientific and Technical Elements of the CBD EIA Guidelines in November 2009, which focused on ABNJ.[72] The workshop's report highlighted some of the governance and practical challenges related to the implementation of EIA for activities in ABNJ.[73] It observed that industry groups proposing the activity and the national flag state jurisdiction are often far from the marine area affected.[74] As a result, the conduct of the EIA and management, control, monitoring, surveillance, and follow-up activity were likely to be more costly and potentially less effective. The report also noted that capacity-building needs for EIA in ABNJ would be greater where customs of practice were less established, methodologies were less mature, and multiple assessment cultures might converge in the same area.[75] The complex and fragmentary nature of the law and institutions governing ABNJ were accentuated, including the split legal framework; the diverse institutional framework, including states, non-state actors, and global and regional organizations; the need for cooperation between all these actors to conserve biodiversity; and the fact that stakeholders are harder to define for ABNJ because communities do not have immediate proximity to these areas. A further complicating factor was the variable standards of compliance among states with EIA obligations under international conventions.[76]

The workshop's report was considered by COP 10, which endorsed its recommendation for the development of voluntary guidelines for the consideration of biodiversity in EIAs for marine and coastal areas.[77] Guidelines were then developed for all marine and coastal areas, rather than simply for ABNJ, emphasizing the interconnections between ocean ecosystems across jurisdictional boundaries. These guidelines were endorsed by the eleventh meeting of the COP in 2012.[78] This initiative represents an important step in defining the special characteristics of EIA for activities in ABNJ and provides an initial repository for scientific and technical information on EIA for all sectors operating in ABNJ.

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71. Convention on Biological Diversity, *Report of the Expert Workshop on Scientific and Technical Aspects Relevant to Environmental Impact Assessment in Marine Areas Beyond National Jurisdiction*, ¶ 4, UNEP/CBD/EW-EIAMA/2 (Nov. 20, 2009).

72. *Id.*

73. *Id.* at annex II.

74. *Id.* at annex II, ¶ 11.

75. *Id.* at annex II, ¶¶ 10–14.

76. *Id.* at annex II, ¶¶ 7–9.

77. COP Decision X/29, *supra* note 39, ¶ 50.

78. Convention on Biological Diversity Dec. XI/18, *Decision by the Conference of the Parties to the Convention on Biological Diversity at its Eleventh Meeting*, ¶ 7, UNEP/CBD/COP/DEC/XI/8 (Dec. 5, 2012).

C. Sectoral Frameworks for Environmental Assessment in ABNJ

The principal sectors of activity in ABNJ—fishing, shipping, and deep seabed mining—are covered by limited environmental assessment measures, which only apply to some activities. However, there are no mandatory EIA instruments or processes for some newer activities already taking place in ABNJ.

1. Fisheries Sector

Parties to the United Nations Fish Stocks Agreement must assess the impacts of fishing, other human activities, and environmental factors on target stocks and species belonging to the same ecosystem or associated or dependent ecosystems.[79] They must then develop data-collection and research programs to measure impacts.[80] These obligations have been further elaborated in the 2009 Food and Agriculture Organization of the United Nations International Guidelines for the Management of Deep Sea Fisheries in the High Seas, which were developed to help states and regional fisheries management organizations implement a call from the UNGA to prevent significant adverse impacts on vulnerable marine ecosystems (VMEs) or not authorize bottom-fishing activities.[81] Significant adverse impacts are defined as those that compromise ecosystem structure or function in a manner that "(i) impairs the ability of affected populations to repair themselves; (ii) degrades the long-term natural productivity of habitats; or (iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types."[82]

The guidelines also specify that impacts should be evaluated individually, in combination, and cumulatively.[83] They call for states to conduct assessments of individual bottom-fishing activities and adopt measures to prevent significant adverse impacts on VMEs. These procedures include identifying areas or features where VMEs are known or likely to exist, identifying the location of fisheries in relation to these areas and features, and then developing data-collection and research programs to assess the impact of fishing on target and non-target species and their environment.[84] The guidelines list the characteristics of VMEs that should be subject to assessments and give examples of potentially

79. Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks art. 5(d), *opened for signature* Aug. 4, 1995, 2167 U.N.T.S. 3 (entered into force Dec. 11, 2001).

80. *Id.* at art. 6(3)(d).

81. Food & Agric. Org. of the United Nations, *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas* ¶¶ 24–60 (2009), http://www.fao.org/docrep/011/i0816t/i0816t00.htm.

82. *Id.* ¶ 17.

83. *Id.*

84. *Id.* ¶¶ 38–53.

vulnerable species groups, communities and habitats, and features that potentially support them.[85]

2. Shipping Sector

In the shipping sector, only specific activities that ships may engage in beyond national jurisdiction, such as dumping of wastes and ocean-based climate-change mitigation activities such as ocean fertilization, are subject to risk and EIA processes. Other activities that ships may engage in, such as support for offshore oil and gas drilling or seabed mineral exploration and exploitation, are not subject to EIA. For state parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter ("London Convention"),[86] dumping of non-prohibited substances is only allowed subject to the requirements of a prior EIA, as well as permitting and ongoing monitoring set out in Annex III of the Convention.[87] For states parties to the revised version of the London Convention, the London Protocol,[88] dumping of all waste and other matter is prohibited, except for eight listed categories of substances, the dumping of which is nevertheless subject to stringent assessment, permitting, and ongoing monitoring requirements.[89] Any application for a permit to dump these listed substances must be accompanied by an assessment of the sea-disposal options, including information on waste characteristics, conditions at the proposed dump site, fluxes, and proposed disposal techniques.[90] Assessments must also specify the potential effects on human health, living resources, amenities, and other legitimate uses of the sea.[91] These assessments can apply to dumping of wastes in marine ABNJ, as well as to areas within national jurisdiction.[92]

A statement adopted by the Scientific Groups of the London Convention and London Protocol in July 2007 "noted with concern the potential for large-scale ocean iron fertilization to have negative impacts on the marine environment and human health" and recommended that the parties to the London Convention

85. *See id.* ¶¶ 14–16.

86. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter art. 1, *opened for signature* Dec. 29, 1972, 26 U.S.T. 2403 (entered into force Aug. 30, 1975).

87. *Id*. at art. 4, annex III.

88. 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, *opened for signature* Nov. 7, 1996, 36 I.L.M. 1 (1997) (entered into force Mar. 24, 2006).

89. *See id*. at art. 4, annex I–II. Annex I lists the following as wastes that may be considered for dumping: (1) dredged material; (2) sewage sludge; (3) fish waste, or material resulting from industrial fish processing; (4) vessels and platforms or other man-made structures at sea; (5) inert, inorganic geological material; (6) organic material of natural origin; (7) bulky items primarily comprising iron, steel, concrete and similarly unharmful materials; and (8) carbon dioxide streams for sequestration. *Id.* at Annex I.

90. *Id.* at Annex II.

91. *Id.*

92. *Id.* at art. 10.

and London Protocol consider the issue with a view to its regulation.[93] This statement was endorsed by the states parties during their joint annual meeting in November 2007. The parties agreed that while it was the prerogative of each state to consider proposals for ocean fertilization projects on a case-by-case basis in accordance with the Convention and/or Protocol, knowledge about the effectiveness and potential environmental impacts of open-ocean fertilization was currently insufficient to justify large-scale projects.[94] They also agreed that ocean fertilization fell within their regulatory competence, and that they would "further study the issue from the scientific and legal perspectives with a view to its regulation."[95]

The discussions in the London Convention/London Protocol Scientific Groups concerning ocean fertilization prompted the Conference of the Parties of the CBD at their Ninth meeting in May 2008 to urge governments "to ensure that ocean fertilization activities do not take place until there is an adequate scientific basis on which to justify such activities, including assessing associated risks, and a global, transparent and effective control and regulatory mechanism is in place for these activities."[96] An exception was noted in the case of "small scale scientific research studies within coastal waters," which "should only be authorized if justified by the need to gather specific scientific data, and should also be subject to a thorough prior assessment of the potential impacts of the research studies on the marine environment."[97] An intercessional technical working group was established to develop a framework for assessing, on a case-by-case basis, whether proposals for ocean fertilization activities represent legitimate scientific research.[98] The draft framework[99] was adopted, by consensus, in a nonbinding resolution at the October 2010 meeting of the parties.[100] The assessment framework is described as a "tool . . . to determine if the proposed activity constitutes legitimate scientific research that is not contrary to the aims of [the London Convention/Protocol]."[101] It sets out a two-stage process involving an initial assessment and an environmental assessment.[102] The

93. Int'l Maritime Org. [IMO], *Statement of Concern Regarding Iron Fertilization of the Ocean to Sequester CO_2*, at 1, IMO Doc. LC-LP.1/Circ.14 (July 13, 2007), https://www.whoi.edu/cms/files/London_Convention_statement_24743_29324.pdf.

94. *Id.*

95. IMO, *Report of the Twenty-Ninth Consultative Meeting and the Second Meeting of Contracting Parties*, at 22, IMO Doc. LC 29/17 (Dec. 14, 2007).

96. Convention on Biological Diversity Dec. IX/16, *Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Ninth Meeting*, ¶ 4, UNEP/CBD/COP/IX/16 (Oct. 9, 2008).

97. *Id.*

98. IMO, *Report of the Thirtieth Consultative Meeting and the Third Meeting of Contracting Parties*, annex 6, IMO Doc. LC 30/16 (Dec. 14, 2007).

99. IMO, *Report of First Meeting of the Intersessional Technical Working Group on Ocean Fertilization,* annex 2, IMO Doc. LC/SG-CO2 3/5 (Feb. 16, 2009).

100. IMO, *Report of the Thirty-Second Consultative Meeting and the Fifth Meeting of Contracting Parties*, annex 5, IMO Doc. LC 32/15 (Nov. 9, 2010).

101. *Id.* at annex 6, ¶ 1.2.

102. *Id.* at annex 6, ¶ 1.3.

purpose of the initial assessment is to determine whether the proposed ocean fertilization activity constitutes legitimate scientific research. To qualify as such the proposed activity must have the following "proper scientific attributes:"[103]

> 1. [T]he proposed activity should be designed to answer questions that will add to the body of scientific knowledge. Proposals should state their rationale, research goals, scientific hypotheses and methods, scale, timings and locations with clear justification for why the expected outcomes cannot reasonably be achieved by other methods;
>
> 2. [E]conomic interests should not influence the design, conduct and/or outcomes of the proposed activity. There should not be any financial and/or economic gain arising directly from the experiment or its outcomes. This should not preclude payment for services rendered in support of the experiment of the future financial impacts of patented technology;
>
> 3. [T]he proposed activity should be subject to scientific peer review at appropriate stages in the assessment process. The outcome of the scientific peer review should be taken into consideration by the Contracting Parties. The peer review methodology should be stated and the outcomes of the peer review of successful proposals should be made publicly available together with the details of the project. . . . and
>
> 4. [T]he proponents of the proposed activity should make a commitment to publish the results in peer reviewed scientific publications and include a plan in the proposal to make the data and outcomes publicly available in a specified time-frame.[104]

Proposals that meet these criteria may then proceed to the environmental assessment, which includes requirements of risk management and monitoring. The environmental assessment stage entails several components, including problem formulation, site selection and description, an exposure assessment, an effects assessment, risk characterization, and risk management sections.[105] Only after completion of the environmental assessment is a decision made on whether the proposed activity constitutes legitimate scientific research that may proceed. In October 2013, the Contracting Parties to the London Convention and London Protocol adopted an amendment to the protocol which made the risk assessment

103. *Id.* at annex 6, ¶ 2.2.
104. *Id.*
105. *Id.* at annex 6, ¶¶ 1.3, 3.1–3.6.

framework mandatory for all specified marine geoengineering activities.[106] The only marine geoengineering activity specified at this stage is ocean fertilization.[107]

3. Deep Seabed Mining Sector

The ISA has prescribed some environmental assessment obligations for exploration contractors in the ABNJ. An exploration contractor must submit to the ISA an assessment of the potential environmental impacts of proposed activities with an application for approval of a plan of work, together with a description of proposed measures for the prevention, reduction, and control of possible impacts on the marine environment.[108] The sponsoring state for an exploration contractor is under a due diligence obligation to ensure that an exploration contractor fulfills all these obligations.[109] The ISA is currently developing draft environmental regulations for the exploitation phase of deep seabed mining.

IV. INTEGRATING CLIMATE CHANGE AND BIODIVERSITY INTO ENVIRONMENTAL ASSESSMENT PROCESSES FOR ABNJ

The earlier Parts of this Article have demonstrated that the impacts of climate change and biodiversity loss are inextricably linked. EIA processes are critical in identifying the impacts of climate change on marine biodiversity in ABNJ. The current international law framework for EIA in ABNJ is far from comprehensive and has yet to specifically incorporate climate-change impacts

106. IMO, *Report of the Thirty-Fifth Consultative Meeting and the Eighth Meeting of Contracting Parties*, annex 4, IMO Doc. LC 35/15 (Oct. 21, 2013) ("On the Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and Other Marine Geoengineering Activities"); Philomène Verlaan, *Current Legal Developments: London Convention and London Protocol*, 28 INT'L J. MARINE & COASTAL L. 729, 731 (2013).

107. Verlaan, *supra* note 106, at 732.

108. Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, annex, § 1, ¶ 7, *opened for signature* July 28, 1994, 1836 U.N.T.S. 3 (entered into force July 28, 1996); Int'l Seabed Auth. [ISA], *Regulations for Prospecting and Exploration of Polymetallic Nodules*, Regulation 18(c)–(d) (July 13, 2000), http://www.isa.org.jm/files/documents/EN/Regs/PN-en.pdf. The Recommendations for the Guidance of the Contractors for the Assessment of the Possible Environmental Impacts Arising from Exploration for Polymetallic Nodules in the Area, issued by the ISA Legal and Technical Commission in revised form in 2013 specify the particular activities of exploration contractors that are subject to EIA. *Decision of the Council of the International Seabed Authority Relating to Amendments to the Regulation on Prospecting and Exploration for Polymetallic Nodules in the Area and Related Matters*, at annex, Regulation 39, ISA Council, Nineteenth Ordinary Session, ISBA/19/C/17 (July 22, 2003), https://www.isa.org.jm/sites/default/files/files/documents/isba-19c-17_0.pdf.

109. Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, *supra* note 59, ¶¶ 141–43; *see* Polymetallic Nodules Regulations, *supra* note 108, at Regulation 31, ¶ 6; ISA, *Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area*, Regulation 33, ¶ 6 (May 7, 2010), https://www.isa.org.jm/files/documents/EN/Regs/ Polymetallic Sulphides.pdf; ISA, *Draft Regulations on Prospecting and Exploration for Cobalt-Rich Ferromanganese Crusts in the Area*, annex, Regulation 33, ¶ 6, ISBA/16/C/WP.2 (Nov. 29, 2009).

on marine biodiversity. It follows that the development of more integrated environmental assessment processes for existing and proposed activities in ABNJ should consider the impacts of climate change on marine biodiversity. The ILBI currently being developed in the UNGA could provide a basis for the development of best-practice, climate-change-inclusive EIA and strategic environmental assessment guidelines. Key institutions under the ILBI, including scientific advisory bodies, and a future COP could also work with existing global, regional, and sectoral organizations to incorporate climate-change impacts into their environmental assessment regimes. This Part will discuss some of the elements that might be included in climate-change and biodiversity-inclusive EIA guidelines developed under the ILBI.

A. Screening and Scoping Provisions

At the screening phase, triggering conditions or thresholds for conducting an EIA of a proposed project or activity in ABNJ should recognize the significant nature of impacts associated with climate change, especially the more vulnerable state of marine ecosystems and marine living resources over time due to stressors such as ocean warming, deoxygenation, and ocean acidification.[110] Where it is concluded that an EIA is required for a specific project or activity, scoping should be conducted to define those impacts that may have a significant effect on the environment. Scoping provisions for EIA and strategic environmental assessments should include an assessment of the ecosystem services provided by the area in question and how those ecosystem services are affected by climate-change stressors.[111] Scoping should take into account climate-change impacts on both the water column and seabed elements of the area in question, as well as the fact that ecosystem services derive from different life stages, migrations, and water or chemical movements. Scoping should also "reflect the potential for cumulative impacts to these services by activities in widely separated areas."[112]

B. Environmental Baseline Studies

After scoping, it is essential to collect all relevant information on the current status of the environment. This step is referred to as a baseline study, as it provides a baseline against which change due to a project or activity can be measured. A variety of biodiversity considerations should be taken into account in the baseline study, including the significance and value of particular species habitats and ecosystems within the relevant area, their distribution and status elsewhere for comparison, vulnerability, and likely exposure to the proposed project or activity.[113] The key ecological processes or species-activity periods

110. *See* LEVIN & CHEUNG, *supra* note 1, at 6.
111. *See id.* at 5.
112. *See id.*
113. *See* EUROPEAN COMM'N, GUIDANCE ON INTEGRATING CLIMATE CHANGE AND BIODIVERSITY INTO ENVIRONMENTAL IMPACT ASSESSMENT 34–35 (2013), http://ec.europa.eu/environment/eia/pdf/

should be included in the study, as well as any critical interdependencies between species. The study should also consider whether any other projects or activities planned within the same area or time frame may contribute to cumulative impacts on the biodiversity and the ecosystem services provided by that biodiversity.[114]

A climate-change vulnerability assessment should be incorporated into the baseline study.[115] Baseline studies of ABNJ where new activities are proposed should include climate stressors such as ocean warming, deoxygenation, and ocean acidification. For long-term activities such as deep seabed mineral exploration and exploitation, the biodiversity in a project area will change over time due to a range of ecological considerations and changing climatic conditions. Where a project is set to continue over a longer period—such as fifteen to twenty years—different climate-change scenarios may need to be modeled and the project designed to cope with very different environmental conditions. The combined effect of climate-change stressors and other stressors—such as pollution, overfishing, and destructive fisheries practices—should also be considered in developing such models.

C. *Identifying Alternatives and Mitigation Measures*

Where adverse impacts are identified in an EIA process for an activity in ABNJ, potential alternatives and mitigation measures will need to be considered. This will often entail devising mitigation conditions and alternatives to prevent net biodiversity loss in a project area.[116] For example, irreversible biodiversity loss may be avoided by altering the spatial arrangement of different activities. Activities could be located away from habitats that are experiencing long-term decline or those that contain rare and fragile ecosystems. Where biodiversity loss is unavoidable, other areas could be reserved as high biodiversity habitats, or biodiversity resources could be restored elsewhere in ABNJ.[117] Mitigation measures designed to conserve biodiversity can also assist in mitigating and adapting to climate-change impacts. For example, the design of conservation and management measures, such as marine protected areas and marine spatial planning, could reduce climate-induced changes to habitats through protecting migratory corridors and facilitating connections between fragmented environments.[118]

D. Monitoring and Adaptive Management

Ongoing monitoring of the environmental impacts of projects and activities is an integral element of the environmental assessment process. Project approval

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114. *See id.*; LEVIN & CHEUNG, *supra* note 1, at 5.
115. *See* EUROPEAN COMM'N, *supra* note 113, at 35.
116. *Id.* at 35–38.
117. *See id.* at 38.
118. *See id.*; LEVIN & CHEUNG, *supra* note 1, at 5.

can be conditioned on regular monitoring of environmental impacts during the implementation phase to identify any unforeseen adverse effects and take appropriate remedial action.[119] For this purpose, undisturbed zones could be used as reference areas to monitor the changing environmental conditions at a project site. Ideally, projects in ABNJ should be flexible enough to allow for changes in project structure and operation if environmental conditions alter due to climate change or other adverse impacts. Adaptive management measures might include the creation of buffer areas around threatened and endangered species and habitats, the protection of migration corridors as species shift to more tolerable habits, and relocation or scaling-down of activities with adverse impacts on biodiversity.

CONCLUSION

The adverse effects of climate change are compounding the stresses experienced by species, habitats, and ecosystems in all marine areas and diminishing the ecological services they provide. Identifying the nature and extent of climate-change impacts on marine biodiversity is a critical step towards mitigating adverse impacts and stemming biodiversity loss. While legal and institutional frameworks for environmental assessment are well established for marine areas under national jurisdiction, collaborative structures and mechanisms for environmental assessment in ABNJ are still fragmentary and underdeveloped, with limited sectoral involvement. Establishing these governance structures in ABNJ involves multiple stakeholders, including states, global and regional organizations, marine industries, and nongovernmental organizations focused on conservation of marine biodiversity. The potential negotiation of the ILBI on conservation and sustainable use of marine biodiversity in ABNJ offers the opportunity to develop best-practice standards for environmental assessment of all activities with the potential for adverse impacts on the marine biodiversity of ABNJ. Drawing on existing EIA instruments and practice, the ILBI could provide a transparent and inclusive focal point for relevant stakeholders to develop a set of best-practice guidelines on climate change and biodiversity-inclusive EIA for in ABNJ.

119. EUROPEAN COMM'N, *supra* note 113, at 41.