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# **SUSTAINABLE CONSERVATION OF OCEAN RESOURCES IN THE HIGH SEAS: A STUDY ON BIODIVERSITY PROTECTION BEYOND NATIONAL JURISDICTION**

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## **ABSTRACT**

Since the oceans make up more than 70% of the planet's surface and provide vital nutrients for human survival, they constitute an integral part of the ecosystem. Rich biodiversity and priceless resources can be found in the oceans or high seas outside of any nation's territorial waters. Because of overfishing, pollution, climate change, and other human activities, the long-term existence of marine species and ecosystems is seriously threatened. It is necessary to look into the preservation of marine resources and the long-term viability of marine life. This study examines the state of high seas conservation today, the difficulties in preserving high seas biodiversity, and the efficacy of present conservation efforts by analysing pertinent literature and gathering information from a wide range of sources. As part of an all-encompassing and integrated strategy for ocean protection, the study emphasises the significance of improved governance, stronger enforcement of conservation measures, and the establishment of marine protected areas.

This article offers suggestions for enhancing ongoing efforts as well as insights on the future of ocean conservation outside of national borders. The modern, globalised world requires improved scientific understanding and data interchange, as well as the creation of a legally required instrument for the protection and equitable use of natural resources in areas outside national borders with conservation programs. In order to preserve the long-term health and vitality of the ocean and its biodiversity and to ensure the welfare of future generations, it is necessary to address the challenges influencing the protection of the high seas and promote the sustainable governance of ocean flora and fauna.

**Keywords:** Conservation, Ocean Resources, High Seas, Biodiversity, Sustainability

## I. INTRODUCTION

The survival of life on Earth and its human inhabitants depends on the health of the oceans. Much of the ocean's marine resources and biodiversity are found in the high seas, however they are currently in danger.<sup>1</sup> The loss of marine species on the high seas is mostly caused by exploitation, pollution, and climate change, which might have catastrophic environmental consequences. Policymakers, conservationists, and the scientific community must act swiftly to protect marine life on the high seas. The complicated and dispersed governance of the oceans outside of state borders, a lack of political will, and a lack of scientific knowledge and data have all impeded conservation efforts.

The purpose of the study is to evaluate different approaches to long-term resource management in order to identify solutions for issues related to the preservation of marine life in the high seas. Examining the prospects and challenges of preserving biodiversity in international waters, as well as the present status of marine conservation.<sup>2</sup> Additionally, it will evaluate the effectiveness of current conservation strategies, such as marine protected areas, and identify areas for improvement. We must encourage the sustainable management of ocean resources and find answers to the challenges associated with high seas conservation if we are to preserve the ocean's complexity and sustainability across time and ensure the welfare of future generations.

### 1.1 Meaning of Biodiversity

The diversity of living things from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part, as well as the diversity within and between species and ecosystems, is referred to as variability. The biodiversity of today is a product of natural processes, evolution, and, more recently, human action spanning billions of years. The biodiversity of the Earth was far higher before the arrival of *Homo sapiens* than it is now. Because of human activity's use of Earth's resources and exponential population increase, biodiversity has been greatly impacted.

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<sup>1</sup> ELIZABETH M. DE SANTO, *GOVERNANCE OF MARINE BIODIVERSITY IN AREAS BEYOND NATIONAL JURISDICTION* 12–15 (1st ed. 2018).

<sup>2</sup> Robin Warner, *Oceans Beyond National Jurisdiction: Environmental Governance Frameworks and the Role of Marine Protected Areas*, 27 INT'L J. MARINE & COASTAL L. 1, 8–10 (2012).

## 1.2 Marine Biodiversity

The diversity of life in our oceans is referred to as marine biodiversity.<sup>3</sup> It encompasses all marine life, including coral reefs, whales, barnacles, and plants and microbes. The quantity of species present in a region is also referred to by this phrase. Some locations are known as biological "hotspots" because they are home to such a wide range of unique and uncommon species. Important biological processes like spawning, nurseries, and feeding regions are typically supported by these high biodiversity sites<sup>4</sup>. Additionally, some have species that are unique to their respective regions.<sup>5</sup> The Central Indo-Pacific region, which includes the coral reefs of Australia and Southeast Asia and has the greatest number of species of any ocean region, and the Benguela Current Large Marine Ecosystem off the coast of Namibia are two examples of hotspots for marine biodiversity. The ocean's ecosystems and marine life are intricately linked in terms of their diversity and enrichment. As a result, a variety of natural and man-made catastrophes can notably affect the ocean and coastal areas. Overfishing, plastic pollution, and the effects of climate change are just a few of the enormous problems facing our ocean that are caused by anthropogenic activity. Because of its marine biodiversity, our ocean can continue to be healthy, productive, and responsive to environmental changes. maritime biodiversity helps prevent broader negative impacts on a maritime environment when a species goes extinct.

An ecological system is considered robust if it can function even in the face of a declining or extinct species' population. All of nature's processes, including those that provide humans with goods and services like carbon storage and water filtering, work effectively when an ecosystem is healthy. Each species in the water has a distinct purpose, such as marine worms converting organic matter into carbon dioxide that marine plants can use for photosynthesis or sharks controlling prey populations. Since several species perform comparable functions in an ecosystem, another will be able to fulfil the same function or "service" in the event that one falls extinct.<sup>6</sup>

## II. CURRENT SITUATION

The severe risks to the ocean's resources and biodiversity make the current state of conservation

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<sup>3</sup> EDWARD O. WILSON, *THE DIVERSITY OF LIFE* 271–73 (1st ed. 1992).

<sup>4</sup> David Tilman, *Biodiversity and Ecosystem Functioning*, 405 *NATURE* 208, 209–11 (2000).

<sup>5</sup> Nancy Knowlton, *Coral Reef Biodiversity—Habitat Size Matters*, 37 *SCI.* 134, 135–36 (2001).

<sup>6</sup> Boris Worm et al., *Impacts of Biodiversity Loss on Ocean Ecosystem Services*, 314 *SCI.* 787, 789–90 (2006).

in the high seas concerning. Human activities such as pollution, exploitation, and climate change have had a significant impact on the high seas' biodiversity and ecosystems, endangering the systems' long-term stability. The absence of an efficient governance framework is one of the primary challenges to managing the marine ecosystem on the world's oceans. A network of international treaties and organisations oversee the region outside of territorial jurisdiction that makes up the seas, yet they frequently lack the authority and resources necessary to carry out conservation efforts successfully. The high seas may have spotty environmental protection at best due to the challenge of centrally coordinating efforts<sup>7</sup>. The extreme risks to the sea's resources and biodiversity are the direct cause of the alarming momentum protection situation in the high oceans. The biodiversity and biological systems of the great oceans are fundamentally impacted by human activities such as deceit, pollution, and environmental change, which pose a threat to the long-term stability of these systems. One of the biggest challenges to managing marine biodiversity on the high oceans may be the lack of an effective administrative framework. Although there are many international communities and organisations that guard the high seas, they usually lack the resources and capacity to effectively implement protective measures. In the best case scenario, ecological insurance on the high oceans may be shady due to the difficulty of half-hearted planning efforts.

## 2.1 The BBNJ Agreement

The United Nations Conventions on the Law of the Seas (UNCLOS) contain an international agreement known as the BBNJ Agreement (Biodiversity Beyond National Jurisdiction) on "High Seas Treaty." 1982 saw the adoption of UNCLOS. This convention lays forth some rules for controlling how seas and their resources are used. The main international agreement governing human activity at sea, known as UNCLOS and sometimes called the "constitution of the ocean," provided the framework for the creation of this new pact. The BBNJ Agreement was finalised in March 2023 and ratified on June 19, 2023 at the Intergovernmental Conference on Marine Biodiversity in Areas Beyond National Jurisdiction, which was sponsored by the UN. The BBNJ Agreement was made available for signature by several countries in September 2023, making it the third implementing agreement for the UN Convention on the Law of the Sea.<sup>8</sup> It needs to be ratified by at least 60 countries in order to be enforceable. It will take effect

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<sup>7</sup> U.N. Secretary-General, *OCEANS AND THE LAW OF THE SEA*, U.N. Doc. A/72/70, at 18–20 (2017).

<sup>8</sup> United Nations, *BBNJ Agreement: High Seas Treaty*, U.N. (Sept. 20, 2023, 12:00 PM), <https://www.un.org/bbnjagreement>.

120 days after the 60 countries ratify. As of June 2024,<sup>9</sup> 91 countries had signed the pact, and 8 countries had ratified it.<sup>10</sup> The adoption of this treaty marks a historic achievement that successfully wraps up nearly a decade of international negotiations.

On July 2, 2024, the Prime Minister-led Union Cabinet approved India's signing of the "Biodiversity Beyond National Jurisdiction" (BBNJ) Agreement. This international accord, which is governed by the United Nations Convention on the Law of the Sea (UNCLOS), attempts to protect and sustainably use marine biodiversity in areas outside state borders. Regions beyond state boundaries that are open to everybody for internationally acceptable purposes, such as overflight, navigation, installing underwater cables and pipelines, etc., are commonly known as the "High Seas." India is committed to promoting governance, accountability, transparency, and the rule of law in addition to actively supporting the global objective of marine environment conservation and sustainable development. It also aims to support scientific advancement and international cooperation in this field. Therefore, it is crucial to examine every aspect of protecting marine biodiversity and promote its sustainable use.

### **2.1.1 Features of the Agreement:**

The following subjects are covered by the Preamble provisions of the BBNJ Treaty.<sup>11</sup> The duty to safeguard and maintain the marine environment Through international coordination and collaboration, the agreement creates a framework for the preservation and sustainable use of marine biodiversity in regions outside of state borders<sup>12</sup>. It guarantees that the advantages of marine resources are distributed equally and fairly among all nations (Article 14). According to Article 11, signatory nations are not permitted to assert or use their sovereign rights over marine resources in the high seas region. The pact encourages knowledge and information sharing, access to scientific research, capacity building, and technological improvement (Article 41).

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<sup>9</sup> U.N. Division for Ocean Affairs & the Law of the Sea, Status of the BBNJ Agreement, U.N. DOALOS, [https://www.un.org/depts/los/bbnj\\_agreement](https://www.un.org/depts/los/bbnj_agreement).

<sup>10</sup> Agreement Under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, opened for signature Sept. 20, 2023.

<sup>11</sup> Press Information Bureau, *Cabinet Approves India's Signing of Biodiversity Beyond National Jurisdiction (BBNJ) Agreement*, GOV'T OF INDIA (July 2, 2024), <https://pib.gov.in>.

<sup>12</sup> Ministry of External Affairs, *India and the High Seas Treaty (BBNJ Agreement)*, MEA INDIA (July 2024), <https://mea.gov.in>.

Additionally, it encourages the application of both traditional knowledge and the best available scientific information, and it takes an inclusive, integrated, eco-system-centered approach founded on the precautionary principle. Additionally, it will aid in the accomplishment of the Sustainable Development Goals (SDGs), particularly SDG-14, which deals with life below water.<sup>13</sup>

## 2.2 Marine Genetic Resources

Marine-derived biological materials, or MGRs, are extremely useful for use in biotechnology, agriculture, and medicine. The agreement stipulates that benefits from MGRs, such as patents or commercial items, must be equitably dispersed, with a particular focus on developing countries. The deal ensures the groundwork for fair and open access to the utilisation of these resources.<sup>14</sup>

MPA creation in the high seas is made possible by the agreement. Every activity that could have an impact on BBNJ ecosystems must have an EIA. The agreement uses Standardised Procedures to clearly define guidelines for conducting and assessing EIAs. Stakeholder engagement include contributions from scientists, policymakers, and indigenous populations.

It recognises that access to resources and technology varies between wealthy and underdeveloped countries<sup>15</sup>. As a result, funds for training and education programs were created.

transferring technologies and data for maritime research as well. The agreement creates the Conference of the Parties (COP). The governing body is in charge of monitoring and changing policies. It also established Technical and Scientific Committees to make suggestions based on research and observation.

## 2.3 BBNJ Agreement and Concerns of Sustainability

Approximately 60% of the world's ocean lies outside of national borders. These waterways

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<sup>13</sup> U.N. Environment Programme, *Sustainable Ocean Governance and the High Seas*, UNEP (2022), <https://www.unep.org>.

<sup>14</sup> Kristina M. Gjerde et al., *Marine Protected Areas Beyond National Jurisdiction: Some Practical Perspectives for Moving Ahead*, 32 INT'L J. MARINE & COASTAL L. 1, 6–9 (2017).

<sup>15</sup> Tullio Scovazzi, *Marine Genetic Resources and Technology Transfer: The New BBNJ Treaty*, 38 INT'L J. MARINE & COASTAL L. 89, 94–97 (2023).

rank among the world's least known and least protected locations. They provide the world's ecology with essential services.<sup>16</sup> Globally, there is an increase in human activity and interest in the area. Its use has been more common and severe during the last few decades. This puts the resilience and health of the ocean at jeopardy as well as marine biodiversity. Countries can expand their strategic presence outside of their Exclusive Economic Zones (EEZs) according to the BBNJ Agreement. The deal will encourage cooperation and ocean conservation initiatives in addition to the sharing of marine financial benefits. It will open up new avenues for scientific research and development, technology transfer, capacity building, and information access for the benefit of all people.

### III. Why Is Marine Biodiversity Protection Important?

Given that the pace of species extinction is higher now than it has ever been, many biologists believe that we are in the midst of a mass extinction. Between 17,000 and 100,000 species are thought to be exterminated annually. Up to one in eight plant species are in danger of going extinct, according to studies. Marine biodiversity is also impacted by this extinction. Each ecosystem performs particular functions that are essential to life. One of the most important functions of marine ecosystems is the production of plant biomass from sunshine and nutrients (primary productivity), which provides the basic food source for all marine species and eventually for humans as well. Due to overfishing, habitat loss, the introduction of alien species, and rapid changes in water temperature, salinity, and nutrient concentrations, the biological diversity of the world's oceans is rapidly declining. The disruptive forces are unquestionably cumulative and will cause additional species to become extinct.<sup>17</sup>

- **Greenhouse Gas Regulation:** The stability of carbon dioxide and oxygen<sup>18</sup> (CO<sub>2</sub>/O<sub>2</sub>) worldwide is significantly regulated by marine ecosystems. Living things on Earth play a major role in controlling the biogeochemical cycle of these gases, with the marine ecosystem being one of the most important. The marine ecosystem is crucial to this process because it controls greenhouse gas emissions. It absorbs about 26 percent of

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<sup>16</sup> Elisa Morgera & Lisa Ann Ritchie, *Benefit-Sharing and Marine Scientific Research in Areas Beyond National Jurisdiction*, 34 EUR. J. INT'L L. 671, 676–79 (2023).

<sup>17</sup> Norman Myers & Andrew H. Knoll, *The Biotic Crisis and the Future of Evolution*, 39 PROC. NAT'L ACAD. SCI. 1, 3–5 (2001).

<sup>18</sup> Carlos M. Duarte et al., *The Role of the Ocean in the Global Carbon Cycle*, 10 BIOGEOSCIENCES 4965, 4968–70 (2013).

the anthropogenic carbon dioxide that is discharged into the atmosphere.<sup>19</sup>

- **Marine Resource:** In addition to providing raw materials for the manufacture of numerous pharmaceuticals, the oceans are home to a variety of creatures.<sup>20</sup> They also provide a range of animal feed, polysaccharides, and building materials. The marine ecology has enormous future promise in this regard.
- **Cultural and Recreational Values:** Marine biodiversity serves as the foundation for many recreational values.<sup>21</sup> These include rock pooling, diving, sports fishing, beach combing, and bird and whale watching. Similarly, the maritime environment is given particular attention in a lot of faiths, folktales, paintings, and cultural and spiritual traditions.

#### IV. Protection Challenges

- **Ocean Warming:** Climate change has already had a major influence on oceans and marine ecosystems.<sup>22</sup> The oceans have absorbed more than 90% of the additional heat in the climate. The temperature of this ocean is rising as a result.<sup>23</sup> Extreme weather events are happening more frequently and with greater intensity as sea levels rise, while ocean warming and acidification have altered the water's chemistry, destroying coral reefs and drastically lowering the variety and number of marine life.<sup>24</sup> The marine food chain is becoming unstable as a result, in addition to changing the habitat of marine life.
- **Marine Pollution:** Oil spills, the disposal of industrial waste, and insufficient waste management systems are the main reasons for the increase in marine pollution.<sup>25</sup> Marine

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<sup>19</sup> Joellen L. Russell & Lynne D. Talley, *Ocean Circulation and Climate Change*, 60 ANN. REV. MARINE SCI. 113, 118–21 (2020).

<sup>20</sup> Ricardo A. Latorre et al., *Marine Biodiversity as a Source of New Pharmaceuticals*, 12 MARINE DRUGS 1, 4–6 (2014).

<sup>21</sup> Geoffrey Wall & Christine Mathieson, *TOURISM: CHANGE, IMPACTS AND OPPORTUNITIES* 201–05 (1st ed. 2006).

<sup>22</sup> Intergovernmental Panel on Climate Change, *CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS* 91–94 (2021).

<sup>23</sup> Sabine C. Le Quéré et al., *Global Carbon Budget and Ocean Heat Uptake*, 11 EARTH SYST. SCI. DATA 1783, 1789–92 (2018).

<sup>24</sup> Ove Hoegh-Guldberg et al., *Coral Reefs Under Rapid Climate Change and Ocean Acidification*, 318 SCI. 1737, 1738–40 (2007).

<sup>25</sup> Alan J. Southward et al., *Long-Term Ocean Pollution and Its Biological Effects*, 46 MARINE POLLUTION BULL. 1, 4–6 (2005).

pollution affects all levels of marine life, from microplankton to enormous marine species.<sup>26</sup>

- Plastic pollution is a major threat to marine and coastal ecosystems and has a negative impact on human health, marine food chains, aquatic species growth and development, and the global carbon cycle. Plastic pollution impacts more than 800 marine and coastal species by ingestion, entanglement, and the adsorption of dangerous, bioaccumulative substances into polymers. It is estimated that between 75 and 199 million tonnes of plastic are found in the water.<sup>27</sup> The use, production, and disposal of plastics caused by humans clearly need to alter. At the fifth session of the United Nations Environment Assembly (UNEA-5) in 2022, 175 nations announced a historic commitment to end plastic pollution and establish a legally binding worldwide agreement by 2024. Addressing the entire life cycle of plastic, including its design, production, and disposal, is the aim of this resolution.
- Overuse of Resources: The majority of human needs are currently satisfied by resources found in the sea. Under these conditions, the unsustainable exploitation of marine biodiversity is increasing. For example, illicit, unreported, and unregulated (IUU) fishing is causing the extinction of some marine fish species<sup>28</sup>. Laws pertaining to endangered species, such as the US's Endangered Species Act, are essential for safeguarding imperilled species. Management programs that support the recovery or reconstruction of deficient populations adhere to these laws, which forbid additional harm to the species.
- Mining Activities: For more than 50 years, deep sea mining has garnered a lot of attention globally due to the potential of deep sea minerals such as polymetallic nodules, cobalt-rich crust, and polymetallic sulphides that exist on the deep seabed and are believed to be an alternate supply of strategic metals. The consequences of sea mining are altering the marine ecology.<sup>29</sup> Mining impacts pelagic species and has a long-term effect on biological productivity because it decreases the quantity of sunlight

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<sup>26</sup> Carlos M. Duarte et al., *Marine Pollution and Its Impacts on Marine Biodiversity*, 15 FRONTIERS IN MARINE SCI. 1, 3–5 (2018).

<sup>27</sup> UNITED NATIONS ENV'T PROGRAMME, *FROM POLLUTION TO SOLUTION: A GLOBAL ASSESSMENT OF MARINE LITTER AND PLASTIC POLLUTION* 17–21 (2021).

<sup>28</sup> David J. Agnew et al., *Estimating the Worldwide Extent of Illegal Fishing*, 4 PLOS ONE 1, 3–6 (2009).

<sup>29</sup> Chelsea M. Rochman et al., *The Ecological Impacts of Marine Debris: Unraveling the Demonstrated Evidence from What Is Perceived*, 39 ECOLOGY 1, 4–7 (2016).

available for photosynthesis and increases water turbidity. There is a considerable chance that deep-sea animals will be killed by direct contact with massive mining equipment positioned on the seabed. Because mining operations create excessive noise and light pollution in an otherwise peaceful and gloomy habitat, they may hinder the capacity of deep-sea organisms to feed and reproduce.

- **Ocean Acidification:** The absorption of excess carbon dioxide from the atmosphere has led to the development of ocean acidification. Seawater's significant carbon dioxide content lowers its pH level. Acidification has a detrimental effect on marine animal dispersal and reproductive development. This makes it harder for calcifying creatures to form their own calcium carbonate structure, such as corals, shellfish, and plankton. They are known as the sea's rainforests.<sup>30</sup> This has an effect on species diversity and ecological connections. Over 60% of coral reefs are thought to be at risk from man-made processes such as ocean warming and acidification.
- **Invasive Species:** It is widely accepted that marine biodiversity is seriously threatened by invasive species. When introduced into the maritime environment, invasive species have a detrimental effect on local biodiversity, ecological function, and economic activity. The most harmful of these invaders change fundamental processes like sedimentation and nutrient cycling, displacing native species and changing food webs and community structure. Alien invasive species have hurt economies by diminishing fisheries, polluting ship hulls, and obstructing intake pipes. Some can even make people sick, which directly affects their health.

## V. MEASURES TAKEN

Many conservation programs are currently in place to support the promotion of the preservation of marine biodiversity; however, the effectiveness of these initiatives depends on the strategy and context in which they are implemented. One of the best conservation strategies implemented to date is the establishment of marine protected areas, or MPAs. In order to preserve the local ecosystems and wildlife, human activities like as mining and fishing are either prohibited or severely limited within maritime protected zones. MPAs are allowed to

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<sup>30</sup> Ken Caldeira & Michael E. Wickett, *Ocean Model Predictions of Chemistry Changes from Carbon Dioxide Emissions to the Atmosphere and Ocean*, 425 NATURE 365, 366–68 (2003).

operate in international waters according to UNCLOS.<sup>31</sup>

According to research, establishing MPAs to safeguard marine ecosystems and habitats contributes to biodiversity preservation. The size, location, and enforcement of MPAs are some of the variables that could make them ineffectual. If MPAs are either small or too remote from human activity, they may not be able to protect the ecosystems or species they contain, and lax enforcement may encourage people to carry on with their activities inside protected areas. An excellent conservation tactic is to use sustainable fishing methods, such as catch limits and selective gear, to prevent overfishing and save species that aren't the main target of the fishing effort.<sup>32</sup> Two instances of international agreements that regulate the conservationist efforts of ocean fishes are the agreement.

The extent to which regulations are followed and enforced may have an impact on whether or not sustainable fishing methods are effective in reducing the loss of biodiversity on the high seas.<sup>33</sup> However, other factors might also affect how effective such techniques are. The continuation of illicit, clandestine, and IUU fishing indicates a serious danger to marine biodiversity preservation and fisheries management. Initiatives are being put in place to promote the sustainable use of marine genetic resources in accordance with the UNCLOS. To support these initiatives, a legally binding international agreement is being drafted.

High seas conservation initiatives have the potential to save species globally, but their success hinges on a number of variables, including the rigorous application of current laws and rules. Two such actions are the creation of marine reserves and the use of ecologically friendly fishing methods. To ensure the ocean's biodiversity and wealth for future generations, more work is required to strengthen marine conservation initiatives.

To address marine pollution on the high seas, additional measures have been put in place in addition to the ones already mentioned. Oil spills, plastic waste, and other forms of pollution are major threats to the biodiversity and ecosystems of the high seas<sup>34</sup>. A strategy for lowering marine pollution in the world's oceans and seas is outlined in the London Convention and its

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<sup>31</sup> JAMES G. KELLEHER, *GUIDELINES FOR MARINE PROTECTED AREAS* 1–5 (IUCN, 1999).

<sup>32</sup> Elizabeth M. De Santo, *Missing Marine Protected Area (MPA) Targets: How the Push for Quantity Over Quality Undermines Sustainability and Social Justice*, 152 *MARINE POL'Y* 104384, 104386–88 (2023).

<sup>33</sup> UNITED NATIONS OFFICE ON DRUGS & CRIME, *FISHERIES CRIME IN THE HIGH SEAS* 9–13 (2016).

<sup>34</sup> Alan J. Southward et al., *Long-Term Changes in Marine Pollution and Ecosystem Health*, 46 *MARINE POLLUTION BULL.* 1, 4–7 (2005).

follow-up Protocol.

Limiting land-based activities that contribute to ocean pollution is one way to do this. It's also important to note that technological developments could support marine conservation initiatives by making it simpler to monitor protected areas and enforce regulations against violators. Examples of this type of technology are satellite surveillance and DNA barcoding. One method for identifying organisms in the open ocean and obtaining a broad sense of its biodiversity is DNA barcoding. One potential beneficial tool for detecting illegal fishing is the use of satellite surveillance.

The abundance of marine life in the open ocean must be preserved because there are still many challenges to be solved. Because individual states lack authority over the high seas, major problems include ineffective national governance and cooperation. This results in conflicting agendas among various parties interested in the subject, as well as gaps in management and protection.

Furthermore, it is necessary to address the root causes of the marine life reduction. Among these causes are the growing effects of climate change and the pervasiveness of unsustainable consumption patterns. The United Nations' 2030 Agenda's SDG<sup>35</sup> is just one of several global programs whose main objective is to solve this underlying issue and enhance sustainable development globally, particularly in maritime contexts. These core arguments also form the basis of numerous additional international initiatives.<sup>36</sup>

Diverse species may be able to survive thanks to current high seas conservation initiatives like the establishment of MPA, the use of ecologically friendly fishing methods, and pollution control. Furthermore, attention should be paid to the underlying causes hastening the demise of marine life. Among these causes are the increasing consequences of environmental change and the unavoidable prevalence of wasteful consumption habits. Addressing this fundamental motivator and working toward acceptable development worldwide, especially in oceanic environments, is the overarching goal of several global initiatives, including the United Nations' 2030 Plan for Feasible Advancement. These core supports are also the center of many other global endeavours. Estimates of momentum preservation in the high oceans, such as the

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<sup>35</sup> UNITED NATIONS, TRANSFORMING OUR WORLD: *THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT*, G.A. Res. 70/1, 31–32, U.N. Doc. A/RES/70/1 (Sept. 25, 2015).

<sup>36</sup> U.N. Sustainable Development Goal 13, Climate Action, U.N. (2015).

establishment of marine protected areas, the use of environmentally benign fishing techniques, and the prevention of pollution, may help to ensure the survival of many species. But more work is required to boost monitoring and enforcement, address the underlying causes of biodiversity loss, and enhance governance and cooperation. Every one of these locations has to be improved right now.<sup>37</sup>

## VI. POTENTIAL SOLUTIONS

To enhance high seas conservation and accomplish sustainable management of ocean resources, a number of possible methods can be put into practice:

Effective conservation has been hampered by the absence of a clear legal framework for managing biodiversity in the high seas. We can guarantee the effective and sustainable maintenance of the high seas' biodiversity by enhancing governance and coordination among governments and stakeholders, including the business, civil, and scientific communities.<sup>38</sup>

Enhancements in Procedures and Enforcement Conservation measures like marine protected zones and fishery quotas have proven difficult to adopt and enforce in some places. By implementing and upholding current conservation policies, we can better safeguard biodiversity in the high seas.<sup>39</sup>

Reduce biodiversity loss by addressing its underlying causes In order to manage ocean resources sustainably, it is necessary to address underlying processes such as ocean acidification and climate change. We can mitigate the effects of these variables on biodiversity in the high seas by promoting sustainable land use, reducing greenhouse gas emissions, and strengthening the resilience of marine ecosystems.

Increasing stakeholder participation and openness is crucial for more sustainable management of maritime resources. All parties involved in the issue must participate for conservation efforts to be successful, equitable, and long-lasting.

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<sup>37</sup> Elisa Morgera, *Climate Change and Marine Biodiversity Governance*, 31 INT'L J. MARINE & COASTAL L. 531, 536–39 (2016).

<sup>38</sup> Robin Warner, *Oceans Beyond National Jurisdiction: Coordinated Governance and the Role of Stakeholders*, 27 INT'L J. MARINE & COASTAL L. 1, 9–12 (2012).

<sup>39</sup> U.N. Division for Ocean Affairs & the Law of the Sea, *STRENGTHENING MONITORING, CONTROL AND SURVEILLANCE IN AREAS BEYOND NATIONAL JURISDICTION* 6–9 (2020).

Increase resources and fortify capacities. Effective management of maritime resources requires sufficient funding and capacity building. Increasing funding for conservation initiatives and fortifying capacity-building initiatives will help governments and stakeholders better manage high seas biodiversity.

Blue bonds, a cutting-edge finance instrument, can be used to promote high seas conservation and ecologically conscious ocean resource management. Governments and nonprofit organisations can issue "blue bonds" to fund conservation and ocean sustainability initiatives.

Encourage ethical behaviour from fishermen: Reducing bycatch and supporting sustainable fishing methods can help conserve marine life at sea. Additionally, encouraging traceability in seafood supply chains can help lessen the negative impacts of illicit fishing on marine ecosystems.

Promote ecotourism, which could help safeguard marine life and strengthen the economy. Sustainable tourism practices boost local economy and aid in the preservation of natural resources.<sup>40</sup>

Increase scientific research and observational efforts: Monitoring and scientific research are necessary to comprehend how human activity impacts the high seas' biodiversity and to put effective conservation initiatives into place. Increasing financing for scientific research and monitoring initiatives would help us better understand the conservation issues in the high seas and provide fact-based solutions.<sup>41</sup>

Make and carry out international treaties The creation and use of international agreements such as the UNCLOS and the CBD<sup>42</sup> can support the conservation of ocean resources and the appropriate management of ocean flora and fauna. Governments and stakeholders can achieve better conservation results by adhering to and working together with these agreements.<sup>43</sup>

We may manage ocean resources sustainably and protect biodiversity in the high seas by integrating governance, enforcement, sustainable practices, research, and community

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<sup>40</sup> Martha Honey, *ECOTOURISM AND SUSTAINABLE DEVELOPMENT: WHO OWNS PARADISE?* 28–32 (2d ed. 2008).

<sup>41</sup> Kristina M. Gjerde et al., *Scientific Knowledge and the Conservation of Marine Biodiversity Beyond National Jurisdiction*, 27 INT'L J. MARINE & COASTAL L. 245, 248–51 (2012).

<sup>42</sup> PHILIPPE SANDS & JACQUELINE PEEL, *PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW* 569–73 (4th ed. 2018).

<sup>43</sup> R.R. CHURCHILL & A.V. LOWE, *THE LAW OF THE SEA* 345–49 (3d ed. 1999).

involvement.

## VII. CONCLUSION

Promoting biodiversity in areas outside state borders and safeguarding the high seas are challenging problems that call for a multifaceted strategy. There are still numerous challenges to overcome even if some of the existing conservation initiatives, such as pollution prevention, marine protected areas, and sustainable fishing practices, have been successful in encouraging biodiversity conservation. These include the underlying causes of biodiversity decline, conflicting stakeholder interests, and governance and coordination concerns.<sup>44</sup> A number of solutions must be put into place in order to achieve sustainable management of ocean resources and enhance high seas conservation. These include better governance and coordination, better enforcement and implementation of current conservation measures, addressing the underlying causes of biodiversity loss, encouraging transparency and stakeholder participation, and increasing funding and capacity. Global cooperation, teamwork, and a dedication to promoting sustainable development on land, at sea, and elsewhere are necessary for these answers. The implementation of sustainable management of ocean resources and the promotion of biodiversity conservation in the high seas will ultimately determine the long-term viability of the planet's ecosystems and the well-being of future generations.

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<sup>44</sup> Intergovernmental Panel on Climate Change, *SPECIAL REPORT ON THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE* 87–92 (2019).

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