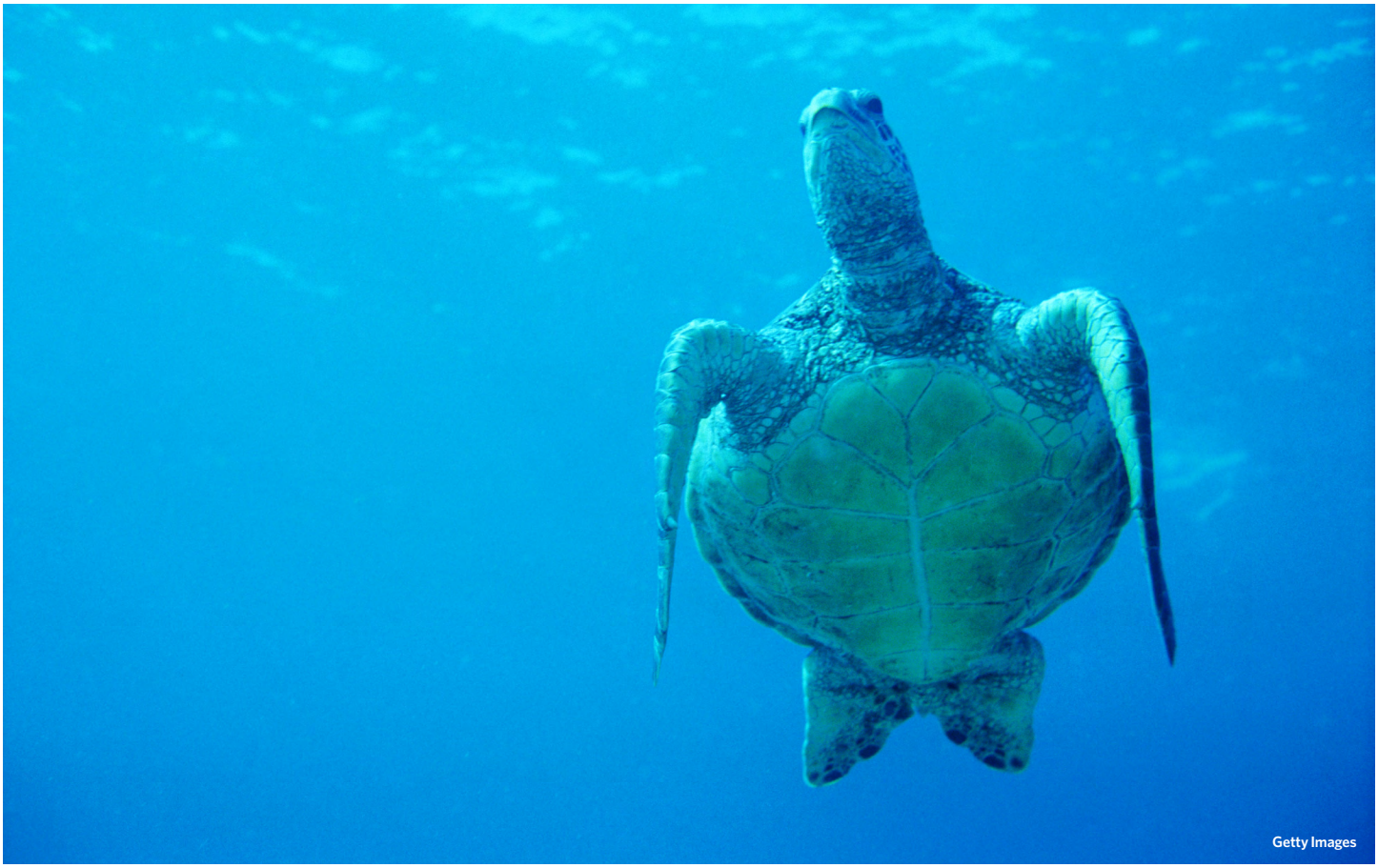

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How MPAs Safeguard the High Seas

Reserves protect biodiversity, build resilience to climate change

Overview

The high seas begin 200 nautical miles from coastal shores, beyond the jurisdiction of any country. Their vast expanse and distance from shore pose challenges for exploration and knowledge gathering. However, scientific expeditions in recent years have revealed that these areas, which make up nearly two-thirds of the world's ocean, harbor an incredible array of species that provide essential services for life on Earth.

Seamounts—underwater mountains—are home to creatures found nowhere else in the world; hydrothermal vents cradle some of the oldest organisms on the planet; and critical migration routes help sustain species, which in turn support ecosystems and the communities that depend upon them.

However, these marine areas are under pressure from fishing and other extractive sectors, problems compounded by pollution, increased shipping, invasive species, and the impacts of climate change.[1]

Scientific expeditions in recent years have revealed that the high seas, 200 nautical miles from coastal shores, harbor an incredible array of species that provide essential services for life on Earth.

The organizations charged with managing these extractive activities have not always included conservation of marine life as part of their mandate; even when they have, these organizations have not always successfully met their objectives. These factors have contributed to degradation of the marine environment. Fisheries management has proved to be particularly challenging. The latest report by the U.N. Food and Agriculture Organization, published in 2018, concluded that the world's fisheries have continued to decline, with 33 percent of fish stocks overfished.[2]

Marine protected areas (MPAs) are critically important tools for repairing and safeguarding marine ecosystems. But the current governance system lacks a mechanism to establish and effectively implement MPAs in most areas of the high seas.

What are MPAs?

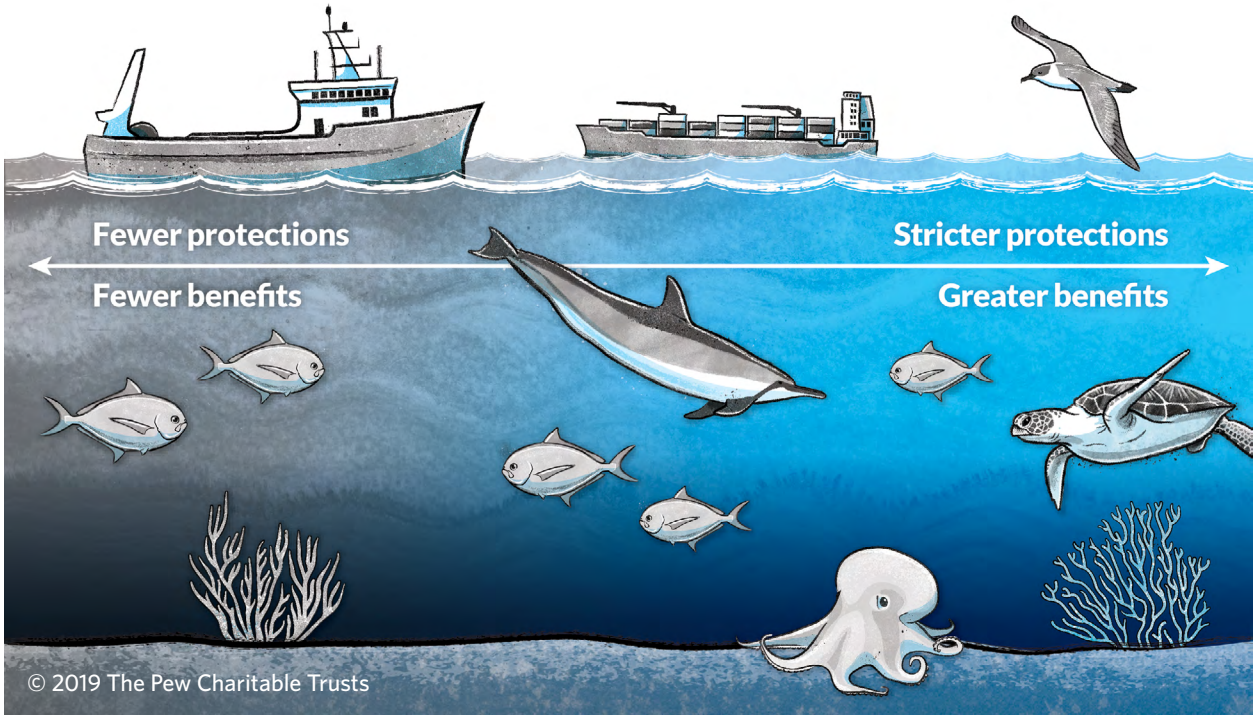
The International Union for Conservation of Nature defines a protected area as "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values."[3]

MPAs range from multiple-use areas, in which certain types of activities—such as fishing—are allowed, to no-take areas where all extractive activities are banned.

Figure 1

MPAs Range From Multiuse Areas to No-Take Reserves

Science shows that the stricter the protection, the greater its benefits



Science and benefits of MPAs

Effectively managed MPAs are a critical tool for protecting ocean life. Scientists have found that no-take marine reserves yield the greatest conservation benefits when they are large, highly protected, isolated, well-enforced, and long-standing. The benefits increase exponentially when all five features are in place.[4] MPAs serve to:

- **Safeguard biodiversity.** Scientists have found that no-take marine reserves are effective tools for restoring and preserving biodiversity. A recent analysis found that the average biomass of fish within a marine reserve is 670 percent greater than in adjacent unprotected areas and 343 percent more than in partially protected MPAs.[5] Well-designed marine reserves can also result in larger fish populations beyond the boundaries of the protected area, either from "spillover"—the migration of adult fish from the MPA—or the dispersal of larvae spawned within it.[6]
- **Protect top predators and maintain ecosystem balance.** Protecting top predators helps to maintain naturally functioning food webs and their associated ecosystem services. For example, sea urchins can transform thriving kelp forests into barren deserts if their populations are unchecked. Studies have found that MPAs that protected predators of the sea urchin, such as lobsters and certain species of fish, had fewer sea urchins, helping return the ecosystem to a more balanced state.[7]

- **Build resilience to climate change.** The ocean plays a critical role in building resilience to the impacts of climate change. It stores more carbon than anywhere else on Earth—about 16 times more than plants and soil store on land.[8] At the same time, higher levels of carbon dioxide in the atmosphere are causing the ocean to become warmer and more acidic, which leads to additional problems such as coral bleaching and deoxygenation. Reserves can make marine ecosystems, including those on the high seas, more resilient to these impacts.[9] This benefit may be critically important in systems stressed by climate change.[10] For example, coral reefs that experience bleaching are able to rapidly and even completely recover within marine reserve areas.[11]

Protecting high seas areas

High seas habitats are not as well-understood as those along the coast, but scientists have documented that the organisms that reside in and travel through the high seas are critical in shaping and defining their habitats.[12] Highly migratory marine species, such as tunas, sharks, seabirds, turtles, and whales, are of great economic, cultural, and ecosystem value, and the loss of these species can harm the broader environment. For example, studies have shown that commercial whaling caused not only the decline of whales themselves but also habitat loss, fewer nutrients, and a change in food web structures for the broader ecosystem. On the high seas, protecting marine organisms is critical to conserving habitat.[13]

MPAs that protect both the water column and the seafloor will conserve the marine environment most effectively[14] because of the critical role that species that live in the column play in their ecosystem—and the reverse link between features on the seafloor and species that live above it.

Mesopelagic fish embody this vertical link through the water column. Each day, they travel from the deepest parts of the ocean still penetrated by light all the way to the surface. As they do, they provide an important source of food for tunas and other commercially important species—and bring organic carbon to the deep, thus playing an important role in mitigating climate change.[15] Many seafloor organisms depend on food from the water column sinking to the bottom. Conversely, seamounts at the bottom of the ocean can create upwellings, where deeper nutrient-rich water is driven upward, and other processes that enhance productivity at the surface.

In addition to ensuring that protections on the surface are linked to those on the seafloor, it will be vital for networks of MPAs to create meaningful links across different habitats. For highly migratory species such as whales and turtles, for example, a well-connected MPA network can protect important places along their travels, such as feeding or breeding grounds.[16] The more time highly migratory species spend in protected areas, the greater the benefits. Therefore, well-designed, well-connected networks of representative MPAs are especially important for protecting these species.[17]

High seas MPA networks could also benefit coastal areas—and species that depend on access to shore. Leatherback turtles, for example, spend most of the year on the high seas but travel to coastal areas to lay their nests. Despite efforts to conserve this endangered species, populations of Pacific leatherback turtles have fallen by more than 95 percent, a decline scientists attribute to pelagic longline fishing.[18] While protecting nesting areas on coastal beaches is vital to leatherback turtles' recovery, it is equally critical that these creatures be protected from harmful fishing practices on the high seas.[19]

The health of the high seas also affects that of national waters, especially regarding fisheries. Overfishing key species on the high seas can have devastating consequences for coastal nations, particularly those least-developed countries where livelihoods depend upon healthy coastal resources.[20]

Antarctic killer whales travel thousands of miles between the Antarctic high latitudes and subtropical regions, crossing through the high seas.

Role of a high seas treaty in establishing MPAs

Globally, a patchwork of international bodies and treaties manage ocean resources and human activity in areas beyond any state's national jurisdiction. These governance bodies vary greatly in terms of their mandate, which determines their geographic scope, objective, the legally binding nature of decisions they adopt, and whether they regulate one or several activities. Their jurisdictions often overlap, but virtually no mechanisms exist to coordinate across geographic areas and sectors.[21] Too often, this piecemeal approach to governance leads to the degradation of the environment and its resources, and makes deploying management and conservation tools such as environmental impact assessments and MPAs, including marine reserves, challenging both legally and logistically.[22]

Against this backdrop, international bodies have created only a handful of high seas MPAs, collectively covering about 1 percent of the high seas.[23] The vast majority of this 1 percent is within the nearly 800,000-square-mile (2.06 million-square-kilometer) Ross Sea MPA—the world's largest when it took effect in December 2017. The Commission for the Conservation of Antarctic Marine Living Resources, which established this MPA, is unique among international bodies in its ability to create these areas. Even so, it took five years of negotiations to achieve.

U.N. negotiations for a treaty to protect marine biodiversity on the high seas could help create more effective governance of these areas beyond national jurisdiction. It is critically important that the treaty provide a legal framework through which States can establish high seas MPAs with meaningful conservation objectives and enforceable management measures. Leaving MPA implementation to existing sectoral bodies would be ineffective because most of them lack a mandate to protect biodiversity. High seas MPAs created with concrete objectives, management plans, and enforcement protocols are more likely to become real tools for biodiversity protection than "paper parks" established without such parameters.

Highly migratory marine species such as sharks are of great economic, cultural, and ecosystem value.

Conclusion

A network of high seas MPAs is critical for protecting the rich biodiversity of the world's oceans and building resilience to the changing climate. Such a network would not only protect species in areas beyond national jurisdiction but would also help conserve the broader high seas ecosystem.

A comprehensive high seas MPA network is not feasible under the current ocean governance structure, but a U.N. high seas treaty offers an opportunity to address this gap. To achieve the treaty's objectives and to make a meaningful impact for the oceans and the people who depend upon them, negotiators must ensure that the agreement includes a mechanism that can readily create well-designed, well-connected protected areas on the high seas.

Endnotes

1 S. Diaz et al., "Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services" (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019), https://www.ipbes.net/system/tdf/ipbes_7_10_add-1-_advance_0.pdf?file=1&type=node&id=35245.

2 U.N. Food and Agriculture Organization, "The State of World Fisheries and Aquaculture 2018: Meeting the Sustainable Development Goals" (2018), http://www.fao.org/state-of-fisheries-aquaculture.

3 J. Day et al., "Guidelines for Applying the IUCN Protected Area Management Categories to Marine Protected Areas" (International Union for Conservation of Nature, 2012), https://www.iucn.org/sites/dev/files/import/downloads/uicn_categoriesamp_eng.pdf.

4 G.J. Edgar et al., "Global Conservation Outcomes Depend on Marine Protected Areas With Five Key Features," *Nature* 506 (2014): 216, http://dx.doi.org/10.1038/nature13022.

5 E. Sala and S. Giakoumi, "No-Take Marine Reserves Are the Most Effective Protected Areas in the Ocean," *ICES Journal of Marine Science* 75, no. 3 (2018): 1166-68, https://doi.org/10.1093/icesjms/fsx059.

6 R.A. Abesamis and G.R. Russ, "Density-Dependent Spillover From a Marine Reserve: Long-Term Evidence," *Ecological Applications* 15, no. 5 (2005): 1798-812, https://esajournals.onlinelibrary.wiley.com/doi/10.1890/05-0174; H.B. Harrison et al., "Larval Export From Marine Reserves and the Recruitment Benefit for Fish and Fisheries," *Current Biology* 22, no. 11 (2012): 1023-28, https://www.ncbi.nlm.nih.gov/pubmed/22633811.

7 K.D. Nichols, L. Segui, and K.A. Hovel, "Effects of Predators on Sea Urchin Density and Habitat Use in a Southern California Kelp Forest," *Marine Biology* 162, no. 6 (2015): 1227-37, https://link.springer.com/article/10.1007/s00227-015-2664-2; S. Giakoumi et al., "Ecological Effects of Full and Partial Protection in the Crowded Mediterranean Sea: A Regional Meta-Analysis," *Scientific Reports* 7, no. 1 (2017): 8940, https://www.ncbi.nlm.nih.gov/pubmed/28827603.

8 M. Bollmann et al., "World Ocean Review: Living With the Oceans" (maribus gGmbH, 2010), 28, http://aquaticcommons.org/15582/1/WOR1_english.pdf.

9 Sala and Giakoumi, "No-Take Marine Reserves Are the Most Effective Protected Areas in the Ocean."

10 C.M. Roberts et al., "Marine Reserves Can Mitigate and Promote Adaptation to Climate Change," *Proceedings of the National Academy of Sciences* 114, no. 24 (2017): 6167-75, http://www.pnas.org/content/pnas/114/24/6167.full.pdf.

11 Ibid.; C.T. Perry et al., "Remote Coral Reefs Can Sustain High Growth Potential and May Match Future Sea-Level Trends," *Scientific Reports* 5 (2015): 18289, https://www.ncbi.nlm.nih.gov/pubmed/26669758.

12 B.C. O'Leary and C.M. Roberts, "The Structuring Role of Marine Life in Open Ocean Habitat: Importance to International Policy," *Frontiers in Marine Science* 4, no. 268 (2017), https://doi.org/10.3389/fmars.2017.00268.

13 Ibid.

14 Ibid.

15 Ibid.

16 K.M. Gjerde and A. Rulska-Domino, "Marine Protected Areas Beyond National Jurisdiction: Some Practical Perspectives for Moving Ahead," *International Journal of Marine and Coastal Law* 27, no. 2 (2012): 351-73, https://doi.org/10.1163/157180812X633636.

17 Ibid.

18 G. Ortuño Crespo and D.C. Dunn, "A Review of the Impacts of Fisheries on Open-Ocean Ecosystems," *ICES Journal of Marine Science* 74, no. 9 (2017): 2283-97, https://doi.org/10.1093/icesjms/fsx084; J.R. Spotila et al., "Pacific Leatherback Turtles Face Extinction," *Nature* 405, no. 6786 (2000): 529-30, https://doi.org/10.1038/35014729.

19 Spotila et al., "Pacific Leatherback Turtles Face Extinction."

20 E. Popova et al., "Ecological Connectivity Between the Areas Beyond National Jurisdiction and Coastal Waters: Safeguarding Interests of Coastal Communities in Developing Countries," *Marine Policy* 104 (2019): 90-102, https://doi.org/10.1016/j.marpol.2019.02.050.

21 J. Rochette et al., "The Regional Approach to the Conservation and Sustainable Use of Marine Biodiversity in Areas Beyond National Jurisdiction," *Marine Policy* 49 (2014): 109-17, http://www.sciencedirect.com/science/article/pii/S0308597X14000438.

22 N.C. Ban et al., "Systematic Conservation Planning: A Better Recipe for Managing the High Seas for Biodiversity Conservation and Sustainable Use," *Conservation Letters* 7, no. 1 (2014): 41-54, https://doi.org/10.1111/conl.12010.

23 Marine Conservation Institute, "Atlas of Marine Protection: Global MPAs," accessed May 14, 2019, http://www.mpatlas.org/map/mpas.

For further information, please visit:

pewtrusts.org/en/projects/protecting-ocean-life-on-the-high-seas

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