



Ecosystems and Biodiversity in Deep Waters and High Seas

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A report prepared by Kristina M. Gjerde

Foreword

The United Nations Environment Programme (UNEP) and the World Conservation Union (IUCN) have a long and successful history in working with states and stakeholders on marine and ocean issues. The missions of our respective organisations are “to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations” (UNEP) and “to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable” (IUCN). In the light of this complementarity, we have joined efforts to summarise facts and options for the conservation and sustainable use of marine habitats and life forms in deep waters and the open ocean, with a special focus on areas beyond national jurisdiction. We hope that this report will inspire policy and decision makers, and guide a way forward to taking urgent action to apply the spirit of our mission statements also to the unique, important and vulnerable ecosystems and biodiversity in the deep waters and high seas.



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Executive Summary

We live in an age of ocean discovery. Advances in science and technology are unveiling secrets and shattering myths about the oceans that are changing the way we view life on Earth. There is an urgent need to apply these new insights to manage human activities to protect, restore and maintain ocean life in all its variety so that life on Earth can continue to prosper.

Not long ago, deep seabed environments were thought to be empty expanses hostile to life. Today, these environments are considered to have been the very cradle for life on Earth and the largest reservoir of biodiversity on the planet. The great variety of deep seabed habitats, which includes hydrothermal vents and cold seeps, seamounts and submarine canyons, abyssal plains and oceanic trenches, and recently discovered asphalt volcanoes, hosts an amazing array of unique ecosystems and species found nowhere else. New surprises are frequent. Overturning traditional notions of deep sea ecology and coral biology, ancient coral reefs dating back to the dawn of civilization have been discovered in just the past five years in dark and frigid waters spanning from Alaska to Antarctica, from Norway to New Zealand.

The oceans provide many essential services with substantial socio-economic benefits that are often taken for granted. Recent studies have revealed that oceans are the very fabric of life: they provide oxygen, modulate weather, drive planetary temperatures and chemistry, and absorb substantial amounts of CO₂. Oceans also harbor most of the water and biological diversity on Earth. The variety and abundance of marine life is essential to the health and resilience of the oceans, for balanced ecosystems are better able to respond to changing conditions, both natural and human wrought.

Much of our current understanding of the open ocean and deep seabed stems from explorations carried out in the last five to ten years. International research projects and global cooperative efforts, such as the Census of Marine Life, are helping to assess and explain the changes in past and present diversity, distribution and abundance of marine species, and to project future ocean life. They have showed us where many large marine animals spend much of their time and enable us to monitor these habitats. Hotspots and key migratory pathways can thus be protected to give vulnerable open ocean species a chance to recover. Historic records compared with current data also tell us that these hotspots are decreasing in size and diversity, highlighting the need for rapid response. On the deep seabed, scientists continue to discover new and unique species on every cruise, and sometimes even new ecosystems and kingdoms of life. But too often scientists have found that other humans, such as fishermen, have been there first, leaving trails of broken corals and flattened sponge reefs in their wake.

The same advances in technology that enable us to peer into the ocean's murky depths have also enhanced our ability to exploit open ocean and deep seabed resources. While pollution, shipping, military activities and climate change also threaten marine biodiversity and ecosystems, fishing currently presents the greatest threat. Our ability to exploit has outpaced by far our limited understanding of what is necessary for sustainable use. We have reduced many populations of large open ocean fish stocks to 10% or less of their pre-industrial levels and have driven some species to the brink of extinction.

The special life history characteristics of deep sea organisms including slow growth, long life - over 200 years in some cases - and a low reproductive

rate were discovered only after several significant deep sea fisheries had collapsed from overfishing. Without cautious management and effective regulation, deep sea fish stocks are quickly depleted and their associated seabed habitats and ecosystems destroyed, forcing fishermen to venture to new stocks and new grounds. The benefits of such 'boom and bust' operations are short-lived at best, and are disproportionate to the threats and destruction they cause for ecosystems and species that may occur no place else on Earth. These large-scale fisheries operations further undermine the hopes that oceanic resources can make a substantial contribution to human food security and poverty alleviation, as most of these resources are currently destined for markets in developed countries, and will soon be extinguished.

As human activities such as fishing and oil, gas and mineral exploration and exploitation move into deeper waters both within and beyond national jurisdiction, the relative lack of data on deep seabed ecosystems and biodiversity makes it difficult to predict and control their impacts. Still greater efforts are required to compile and review existing knowledge and to employ modern technologies for the discovery, quantification and understanding of deep sea life.

What has become clear is that the evolution of the legal system governing these areas has not kept pace with scientific and technological advances and man's expanding footprint on the oceans. The 1982 United Nations Convention on the Law of the Sea (UNCLOS) commits countries to protect and preserve the marine environment, and to conserve and wisely use marine resources – regardless of whether these are within or beyond national jurisdiction. While countries are concentrating on ecosystem-based management and networks of marine protected areas in their coastal waters and exclusive economic zones, areas beyond national jurisdiction - representing approximately 64% of the ocean's surface - lack the institutions, rules and

enforcement mechanisms to ensure that similar considerations and precautionary approaches are applied.

Governments and civil society are now faced with a major challenge of developing and delivering management systems for the deep seabed and open oceans before it is too late and human demands exceed their capacity to give, absorb and support. Especially in marine areas beyond national jurisdictions, current systems need to be updated to:

- reflect ecological boundaries not just political boundaries;
- incorporate modern ecosystem-based and precautionary approaches;
- address the full range and cumulative effect of potential human activities and impacts;
- ensure a higher level of protection for vulnerable species as well as for biologically and ecologically significant areas;
- make possible a precautionary system of marine protected areas on a representative, biogeographic basis for a suite of reasons including as insurance to protect libraries of yet unknown or poorly understood biological diversity;
- provide effective mechanisms to secure compliance and enforcement; and
- enable sustainable use today and thus respect the rights of future generations to enjoy and prosper from the same ocean bounty.

The conservation and sustainable use of the vulnerable ecosystems and biodiversity in deep waters and high seas are among the most critical oceans issues and environmental challenges today. Immediate impacts and threats, such as those posed by fishing, have to be reduced urgently. Activities that generate long-lasting pollution, alter climate, disrupt oceanic circulation regimes and acidify ocean waters have to be addressed, while we still can.

1 Introduction



Soft coral (Paragorgia sp.) with brisingid sea star. Photo courtesy of Deep Atlantic Stepping Stones Science Team/IFE/URI/NOAA.

Recent advances in science and technology are changing the way we view life in the oceans. What was regarded as featureless, unchanging and inexhaustible is now known to be complex, dynamic and finite.

These same advances in technology are also increasing man's impact on our remote, deep and little known waters. Once limited largely to shipping and open ocean fishing, commercial activities at sea are expanding rapidly and plunging ever

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) is regarded by many as the 'Constitution' for the world's oceans. It establishes the basic jurisdictional zones and fundamental rights and duties of states throughout the ocean realm. Under UNCLOS, coastal states have exclusive rights to the resources of their 200nm exclusive economic zones (EEZs) and on their legal continental shelf (the submerged prolongation of the land mass to the outer edge of the continental margin, including the physical

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