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Casting the Net Broadly: Ecosystem-based Management Beyond National Jurisdiction

Arlo H. Hemphill

George Shillinger

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*by Arlo H. Hemphill and George Shillinger**

"EBM looks at all the links among living and nonliving resources, rather than considering single issues in isolation . . . Instead of developing a management plan for one issue . . . EBM focuses on the multiple activities occurring within specific areas that are defined by ecosystem, rather than political, boundaries."

— US Ocean Commission Report, 2004

Introduction

Rapid decline in ocean health has led scientists and policy makers alike to conclude that single-sector and single-species approaches to managing ocean resources and wildlife will not be successful in the long term. Coral bleaching, dead zones, red tides, and fishery collapses are becoming all too common in coastal areas. Meanwhile, we have become increasingly aware that the open ocean and the deep sea, which includes the 64 percent of the ocean beyond national jurisdiction, have not gone unscathed. Recent articles in scientific journals such as *Nature* and *Science* have described global declines of up to 90 percent in populations of large ocean predators (*i.e.*, tunas, billfish, sharks, and sea turtles) during the past 50 years.[1] In this same period, predator diversity has declined by tenfold in all regions of the ocean.[2] At least five species of deep sea fishes (three of which are non-target species exploited only as by-catch) can now be classified as critically endangered under the World Conservation Union ("IUCN") Red List Criteria,[3] while two other species of deep sea fish, orange roughy and oreo dories, are now considered by the United Nations ("UN") Food and Agriculture Organization ("FAO") as overexploited or depleted in all areas where fishing has developed,[4] and deep sea bottom trawling is destroying seamount and coral ecosystems before they can even be studied.[5] In order to protect our marine resources, there must be a move towards an Ecosystem-Based Management ("EBM") approach to oceans and fisheries management.

Fragmented and Inconsistent Approaches to Ocean Management

Current Inefficiencies in Ocean Management with a Bias Towards Fisheries

Beyond national jurisdictions, fragmented and inconsistent management — relying largely on sector-based and single-species approaches — have proven ineffective in ensuring the health and integrity of marine ecosystems. One approach has been the creation of regional fisheries management organizations ("RFMOs"). The majority of RFMOs are limited to single-species or species group fisheries, namely tuna and "tuna-like" species. For example, the Commission for the Conservation of Southern Bluefin Tuna and the Inter-American Tropical Tuna Convention cover huge swathes of ocean, but their mandates are narrow and their track records are poor. Several tuna stocks under their management are now listed as endangered or critically endangered under the IUCN Red List.[6]

Another approach has been protection under the UN Fish Stocks Agreement ("FSA"). The FSA requires the conservation of, not only target species, but also of associated species and the ecosystem as a whole. However, the agreement applies only to fish populations that "straddle" political boundaries or to a limited number of highly migratory species, leaving other highly migratory species and all discrete high seas (*e.g.*, deep sea) fish stocks unprotected.

Obstacles are also created by fragmented legal frameworks. For example, under the UN Convention on the Law of the Sea ("UNCLOS"), the water column beyond national jurisdiction, the high seas, is treated differently than the seabed. Hence, while deep seabed mineral resources are the "common heritage of mankind" to be exploited only pursuant to specific rules for the protection of ecological integrity, the living seabed and associated resources are regarded by some as open access frontiers to be freely exploited and essentially "mined."[7]

A License for Lawlessness

As a result of this smorgasbord of legal approaches, vulnerable ecosystems beyond national jurisdiction remain largely unprotected. The right to free passage and trade inherent in the 17th century concept of freedom of the seas has been translated in the 21st century as a virtual license for lawlessness, under which exploiters can freely impact ocean wildlife and marine resources that are, or at least should be, the common heritage of all humankind, with little or no legal consequence.

Deep sea bottom trawling exemplifies the problems created by this free-for-all approach. In addition to having a disproportionably high impact on targeted species, to the point that many

* *Ario Hemphill and George Shillinger recently left Conservation International, where Hemphill served as a Director of Global Marine Strategies and Shillinger as a Senior Marine Research Fellow, to help establish a new foundation dedicated to the conservation of the deep and high seas. Shillinger is also a Ph.D. Candidate in Marine Biology in the Block Lab of Stanford University.* *This article is based on a position paper originally prepared for the 7th Informal Consultative Process on Oceans and the Law of the Sea ("UNICPOLOS VII") on behalf of Conservation International, Greenpeace International, the Natural Resources Defense Council, the Marine Conservation Biology Institute, and Seas at Risk. The authors wish to acknowledge Kristina Gjerde, Kelly Rigg, and Lisa Speer for their guidance and helpful editing.*

are now considered overexploited or depleted, bottom trawling simultaneously destroys the highly diverse and highly endemic benthic communities upon which the targeted species depend. As noted in a recent report for the FAO, observers monitoring the first year of the orange roughy fishery in the South Tasman Rise, an area straddling Australia's Exclusive Economic Zone and the high seas, recorded 10 tonnes of coral by-catch per tow. This means that for every 4,000 tonnes of orange roughy caught, 10,000 tonnes of coral were brought up in the nets.[8] The report notes further that the by-catch of corals is just one symptom of the larger impact of trawling on deep seabed communities.

The Move Towards an Ecosystem-Based Management Approach

Recent global and regional assessments[9] of the marine environment such as the Pew Oceans[10] and U.S. Ocean Commission[11] reports in the United States, the UK Royal Commission's *Turning the Tide* report on the Northeast Atlantic ("OSPAR") region,[12] and the *Defying Ocean's End* Agenda for Action[13] have taken note of these trends. These reports have nearly unanimously recommended an EBM approach to address the full range of ocean uses, inclusive of fisheries. Furthermore, the 2002 World Summit on Sustainable Development ("WSSD") emphasized the crisis of ocean resource exploitation and habitat destruction — mostly from large-scale commercial fishing — and urged implementation of EBM and conservation, including networks of marine protected areas ("MPAs"). The WSSD set a target for the introduction of EBM by 2010.

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These assessments suggest that the tools of spatial planning and zoning that separate and govern human activities on land can also be used in the ocean. Within a framework of marine EBM, these land-based tools have the potential to protect ecosystem services, preserve ecosystem structures, functions, and processes and allow sustainable use of the ocean resources upon which we all depend. Thus, EBM is defined as having the following elements:[14]

- *Sustainability:* ecosystem management does not focus primarily on "deliverables" but rather, regards intergenerational sustainability as a precondition.
- *Goals:* ecosystem management establishes measurable goals that specify future processes and outcomes necessary for sustainability.
- *Sound ecological models and understanding:* ecosystem management relies on research performed at all levels of ecological organization.
- *Complexity and connectedness:* ecosystem management recognizes that biological diversity and structural complexity strengthen ecosystems against disturbance and supply the genetic resources necessary to adapt to long-term change.
- *The dynamic character of ecosystems:* recognizing that change and evolution are inherent in ecosystem sustainability, ecosystem management avoids attempts to "freeze" ecosystems in a particular state or configuration.
- *Context and scale:* ecosystem processes operate over a wide range of spatial and temporal scales, and their behavior at any given location is greatly affected by surrounding systems. Thus, there is no single appropriate scale or time frame for management.
- *Humans as ecosystem components:* ecosystem management values the active role of humans in achieving sustainable management goals.
- *Adaptability and accountability:* ecosystem management acknowledges that current knowledge and paradigms of ecosystem function are provisional, incomplete, and subject to change. Management approaches must be viewed as hypotheses to be tested by research and monitoring programs.

Five Steps Towards the Ecosystem-Based Management Approach

In its strategy for achieving the Millennium Development Goals ("MDG") in the area of environmental sustainability and human well-being, the UN Millennium Project frames its highest level recommendations within an EBM approach.[15] Addressing fisheries and marine resources as a major component under this approach, it recommends the elimination of bottom trawling on the high seas by 2006 to protect seamounts and other ecologically sensitive habitats and as a means to restore depleted fish populations. Such a measure would need to be implemented prior to the introduction of EBM, as bottom trawling's destructive nature on the ecosystem would directly conflict with the management of it.

The Millennium Project highlights the work of the IUCN Commission on Ecosystem Management, which has identified five steps towards achieving implementation of the ecosystem approach. All five of these steps are conspicuously missing from the current ocean governance regime for areas beyond national jurisdiction.

Step One: Stakeholder Analysis Conducted Within the Appropriate Ecosystem Context

The first step involves a stakeholder analysis that must be conducted within the appropriate ecosystem context. Pursuant to the 1970 UN General Assembly ("UNGA") resolution,

resources of the deep seabed are the common heritage of mankind and all nations and their citizens are stakeholders in the use of these marine resources.[16] Unfortunately, individual resource users (*e.g.*, fisheries, bioprospecting, ocean tourism, energy prospecting, and exploitation) have many different and potentially conflicting interests, as some are not fixed to a specific locale, and are free to move on to the next seamount or hydrothermal vent once the resources have been consumed or damaged.

This migratory pattern of deep seabed use may undermine the notion that those with a direct relationship to the resource are its best stewards.[17] Conservation, which represents the broader and long-term interests of humankind and the planet, is rarely given as much weight as individual industrial users. Stakeholders operating within ecosystems outside of national jurisdictions must be encouraged to establish a better balance between long-term, global-scale interests versus short-term, sector-based economic benefits. These methods must simultaneously encourage full accountability, transparency, and participation.

Step Two: Characterizing Ecosystem Structure and Function to Manage and Monitor

The second step involves characterizing ecosystem structure and function and establishing appropriate mechanisms to manage and monitor them. Little is known about deep sea habitats and their vulnerability or resilience to human impacts. Biogeographic classification workshops could be a first step in defining these ecosystems, but more work needs to be done in order to adequately characterize the structure and function of these ecosystems and to develop ongoing mechanisms to monitor them. Their management must begin with broad protection via a moratorium on destructive activities, or an equivalent measure, to sustain their survival while the science is underway.

Step Three: Identifying Key Economic Issues Affecting the Ecosystem and Its Inhabitants

Once the baseline data on ecosystem structure and function has been acquired, the next necessary step is to identify key economic issues affecting the ecosystem and its inhabitants. Every stakeholder has a unique set of economic checks and balances, and each stakeholder carries differing degrees of fiscal risk and reward.

For example, the single most significant and immediate threat to deep sea ecosystems beyond national jurisdictions as well as to the legal continental shelves of states, when these extend beyond 200 nautical miles ("nm"), is high seas bottom trawling. Yet, high seas bottom trawling accounts for only 0.5 percent of the estimated value of the annual global marine catch. This fishery, as a whole, provides work for approximately 100 to 200 vessels, significantly fewer than the 3.1 million vessels worldwide engaged in other fishing activities.[18] The economic impact of closing this fishery is low, with potentially high economic returns gained by protecting seamounts, cold water coral beds, and other deep sea ecosystems. These efforts will insure the opportunity to pursue alternative methods of exploitation for purposes such as medicine, tourism, or less destructive fisheries.

Step Four: Understanding the Impacts and Interconnectedness of Ecosystems

Within the highly dynamic and interconnected oceanic realm, understanding how one ecosystem can influence functionality within surrounding ecosystems is imperative. For instance, there is increasing evidence for connectivity between the deep sea bed and coastal ecosystems, as well as the surface layers of the pelagic water column.[19] Examples include daily migration of fish and invertebrates from the deep sea to surface, the use of mid-ocean seamounts as spawning grounds for American, Asian, and European eels,[20] and the use of benthic habitats as nursery and breeding grounds for the very fish that bottom trawl fisheries target and subsequently annihilate. However, the inadequacy of current knowledge on ecosystem connectivity beyond national jurisdiction and the long-lasting and potentially irreversible nature of the harm caused by deep sea bottom trawling underscore the need for the precautionary principle, defined as: "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."[21]

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Step Five: Determining Long-term Goals and Requisite Approaches

The fifth step, determining long-term goals and requisite approaches for ecosystem-based management, is essential. The international community has repeatedly expressed the need to protect vulnerable deep sea biodiversity, particularly along seamounts, cold water corals, and hydrothermal vents, and to introduce EBM in the marine realm. However, very few ideas or measures for reaching these goals have been expressed.

For example, one major tool of EBM is the use of protected areas. Thus far, an adequate governance framework does not exist for extending a globally representative network of MPAs

into waters beyond national jurisdiction. The European Union has recently introduced a proposal for a new UNCLOS implementing agreement for biodiversity management and conservation beyond national jurisdiction that would include such a framework. In the interim, without a comprehensive assessment on the extent of impacts from current activities, or even where the most vulnerable areas are located, the precautionary principle must be evoked, particularly on activities that leave no room for doubt as to their destructive and wide-spread nature.

Conclusion

In consideration of current ocean governance regimes and threats to marine biodiversity beyond national jurisdiction, the authors recommend a series of steps for promptly moving EBM forward. First, for reasons outlined above, an immediate moratorium on all deep sea bottom trawling on the high seas is required as a first stage measure. This should occur through a UN General Assembly resolution and would voluntarily be enforced by Flag States. Second, agreed upon methodologies and on-going strategies should be established for defining biogeographic provinces and ecosystem structure beyond national jurisdiction. Third, a mechanism needs to be established, potentially a new UNCLOS implementing agreement, for permanent protection for critical, unique, and vulnerable habitats on the high seas and in the Area, specifically through the establishment of a globally representative network of MPAs. Finally, a World Ocean Public Trust that unites governance of the high seas and the Area into one regime under an EBM framework should be established throughout the world's oceans in areas beyond national jurisdiction. Such a Trust would treat the world ocean as the common heritage of humankind, with governments of the world responsible for safeguarding biodiversity as well as ecosystem structure, function, and processes for the benefit of present and future generations. The Trust would operate on the principle of a precautionary approach to all uses of high seas marine life, biogenetic and other living resources, habitats, and ecosystems, in order to conserve and protect the world ocean,[22] while ensuring long-term sustainable and equitable use for all. Existing regulations, regimes, programs, and objectives would be harmonized as necessary to ensure consistency with these goals.

Endnotes: Casting the Net Broadly

[1] *See* Ransom A. Myers & Boris Worm, *Rapid Worldwide Depletion of Predatory Fish Communities*, 423 Nature 280, 280-83 (2003); *see also* James R. Spotila et al., *Pacific Leatherback Turtles Face Extinction*, 405 Nature 529, 529-30.

[2] *See* Boris Worm et al., *Global Patterns of Predator Diversity in the Open Oceans,* 309 Science 1365, at 1365-69 (2005).

[3] Jennifer A. Devine, *Fisheries: Deep-sea Fishes Qualify as Endangered*, 439 Nature 29 (2006).

[4] *See* Jean J. Maguire et al., The State of World Highly Migratory, Straddling and Other High Seas Fishery Resources and Associated Species, FAO Fisheries Technical Paper, 495 (FAO 2006).

[5] *See* Henry Nicholls, *Marine Conservation: Sink or Swim*, 432 Nature 12, 12-14 (2004).

[6] 2006 IUCN Red List of Threatened Species, IUCN website, http://www.iucnredlist.org (last visited Oct. 6, 2006).

[7] *See* Fikret Berkes et al., *Globalization, Roving Bandits, and Marine Resources*, 311 Science 1557, 1557-58 (2003).

[8] *See* Maguire, *supra* note 4; *see also* Owen F. & Malcolm R. Clark *Analysis of the Bycatch in the Fishery for Orange Roughy, Hoplostethus antlanticus, on the South Tasman Rise*, 54 Marine and Freshwater Research, 643 (2005).

[9] *See* Pew Oceans Commission, America's Living Oceans: Charting a Course for Sea Change (May 2003), *available at* http://www.pewtrusts.org/pdf/env_ pew_oceans_final_report.pdf (last visited Oct. 6, 2006); *see* U.S. Commission on Ocean Policy, An Ocean Blueprint for the 21st Century, (2004), *available at* http://www.oceancommission.gov/documents/full_color_rpt/000_ocean_full_report.pdf (last visited Oct. 6, 2006); *see* Royal Commission on Environmental Pollution, Turning the Tide: Addressing the Impact of Fisheries on the Marine Environment, (2004), *available at* http://www.rcep.org.uk/fisheries/Turningthetide.pdf (last visited Oct. 6, 2006).

[10] *See* Pew Oceans Commission, *supra* note 9.

[11] *See* U.S. Commission on Ocean Policy, *supra* note 9.

[12] *See* Royal Commission on Environmental Pollution, *supra* note 9.

[13] *See* Defying Ocean's End: An Agenda for Action (Linda K. Glover & Sylvia A. Earle eds., Island Press 2004).

[14] *See generally* Norman L. Christensen et al., *The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*, 3 Ecol. Apps. 665 (1996).

[15] UN Millennium Project, *Environment and Human Well-being: A Practical Strategy* (2005).

[16] G.A. Res. 2749 (XXV), Dec. 17, 1970.

[17] *See* Berkes et. al, *supra* note 7.

[18] *See* Matthew Gianni, *High Seas Bottom Trawl Fisheries and their Impacts on the Biodiversity of Vulnerable Deep-Sea Ecosystems: Options for International Action* (World Conservation Union 2004).

[19] *See* William R. Crawford et al., Impact of Haida Eddies on Chlorophyll Distribution in the Eastern Gulf of Alaska Deep-Sea Research II 975-89 (Elseviar 2005).

[20] Katsumi Tsukamoto, *Spawning of Eels Near a Seamount*, 439 Nature, 929, (2006).

[21] Nordic Council's International Conference on Pollution of the Seas: Final Document Agreed to Oct. 18, 1989, in Nordic Action Plan on Pollution of the Seas, 99 app. V (1990).

[22] Montserrat Gorina-Ysern et al., *Ocean Governance: a New Ethos Through a World Ocean Public Trust*, *in* Defying Ocean's End: An Agenda for Action, (Linda K. Glover & Sylvia A. Earle eds., Island Press 2004).