

Ecosystem-Based Management for the Oceans: The Role of Zoning

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Short title: Ocean Ecosystem Management

Ecosystem-Based Management for the Oceans:

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Summary

The proposed working group on Ocean Ecosystem Management will explore the role of place-based systems in achieving ecosystem-based ocean management. The U.S. Commission on Ocean Policy (2004) and the Pew Oceans Commission (2003) both recommend ecosystem-based management of the 4.4 million square miles of ocean within the jurisdiction of the United States. The Pew Oceans Commission Report, as well as numerous scientists, managers, and advocacy organizations, has called for development of ocean zoning as a key component of ecosystem-based management. Ocean zoning is the authoritative regulation and allocation of access and use to specific marine geographic areas. Zoning systems aim to separate competing uses, reduce conflict, increase certainty among users, and protect sensitive marine resources. Fisheries management has increasingly used spatial regulation to determine access, protect nursing and spawning areas, reduce gear impacts, etc. More recently, place-based marine management is growing through the establishment of marine protected areas (MPAs), including fully protected no-take reserves and areas offering protection from a limited set of uses. This working group will bring together ecologists and social scientists to explore the concept, practice, and opportunities for ocean zoning in a unique political and social climate primed for change. We will focus particularly on the question of whether or not and how zoning systems can be used to implement ecosystem-based management of oceans within the jurisdiction of the United States.

The working group goals are to: (1) compile and synthesize information on existing systems of ocean zoning and their ecological and social impacts, (2) compile and synthesize available ecological and social data necessary to design and develop effective zoning systems, (3) develop the concept of ocean zoning within the context of ecosystem based management, and (4) design a set of principles and policies for creation of sustainable and resilient ecosystem-based ocean zoning systems.

We have identified a group of leading thinkers engaged in developing an understanding of the complex ecological and social dynamics of ocean systems. The resources of NCEAS will enable us to bring these experts together to advance our understanding of marine ecosystems and our ability to implement scientifically based and effective ecosystem management.

Problem Statement

Since the 1990s, marine scientists have documented ubiquitous and profound changes in the oceans including sharp declines in abundance of higher trophic level species (Myers and Worm 2003; Pauly et al. 1998; Steneck and Carlton 2001), serial depletion of fisheries (Fogarty and Murawski 1998; Orensanz et al. 1998), extensive elimination of structure-forming species (Roberts and Hirshfield 2004; Watling and Norse 1998), proliferation and spread of weedy unusable or nonnative species such as jellyfishes (Brodeur et al. 1999) and starfishes (Buttermore et al. 1994); and dramatic changes in biogeochemical functioning (Jackson et al. 2001; Peterson and Estes 2001).

The Pew Oceans Commission (2003) and the Preliminary Report of the U.S. Commission on Ocean Policy (2004) document a pervasive pattern of overexploitation of marine resources. Each year, fishery regulations impose catch and size limits and gear and seasonal restrictions within a complex spatial context. In spite of these regulations, approximately thirty percent of fish stocks in U.S. waters whose status is known are overexploited, while the status of a much larger number of commercially fished stocks is unknown (National Marine Fisheries Service 2004). With advances in technology, commercial fishing has moved farther offshore, into deeper waters, and has targeted species further down the food chain (Pauly et al. 2003). Other ocean uses, including aquaculture and wind energy production, are also expanding. Hubbs-SeaWorld Research Institute has proposed a one-mile-square experimental mariculture project on and around Platform Grace in the Santa Barbara Channel; it would be the first such facility for raising fin fish on the west coast (Green 2004). Liquefied natural gas (LNG) producers have proposed numerous LNG port and processing facilities in coastal waters and offshore. The global container ship industry anticipates dramatic growth in cargo volumes (Field et al. 2002). Tanker traffic in U.S. waters is expected to double over 15 years as dependency on imported oil grows (Swing 2003). These purposes often come into conflict where one activity precludes another. Currently, regulatory zones for fisheries, aquaculture, wind energy production, mining, transportation, and other uses are often implemented piecemeal as restrictions are needed. This complicated set of regulations has not effectively protected intact ocean ecosystems and an integrated approach to ocean zoning is needed to reverse the current patterns of degradation and decline of marine resources (Norse 2003, 2005; Pew Oceans Commission 2003, Orbach 2002, Brax 2002).

Existing management legislation, including the U.S. Magnuson-Stevens Sustainable Fisheries Management Act and the Convention on Conservation of Antarctic Marine Living Resources (CCAMLR), include implicit or explicit goals for ecosystem-based management (EBFM). However, these systems traditionally have focused on sustaining or restoring target species and policy makers are only beginning to consider options for ocean ecosystem management. Both the Pew Oceans Commission (2003) and the Commission on Ocean Policy (2004) strongly urge a shift in ocean policy from piecemeal and reactive (or “crisis”) management strategies to ecosystem-based planning and management. Ecosystem management “looks at all the links among living the nonliving resources, rather than considering single issues in isolation” (U.S. Commission on Ocean Policy 2004). In the July 2004 issue of *Science*, Pikitch et al. state (p. 346), “...ocean zoning, in which type and level of allowable human activity are specified spatially and temporally, will be a critical element of EBFM.”

We propose a working group at NCEAS to explore the role of place-based systems in achieving ecosystem-based ocean management. Place-based systems integrate ecological and

social information to manage multiple purposes within the local or regional context. In the ocean, zoning may be used to allocate access and use of specific marine geographic areas (NOAA Marine Fisheries Advisory Committee). Like zoning of land, ocean zoning employs spatial planning tools to separate competing uses, reduce conflict, increase certainty among users, and protect sensitive marine resources (Norse 2003).

Fisheries management has increasingly used spatial regulation to determine access, protect nursing and spawning areas, reduce gear impacts, etc. More recently, place-based marine management is growing through the establishment of marine protected areas (MPAs), including no-take marine reserves. The largest MPA in the world, the Great Barrier Reef Marine Park (GBRMP), encompasses 345,000 km², an area almost the size of California (Day 2002). Since 1981, the GBRMP has applied zoning to allow for reasonable use while protecting sensitive resources. In the USA, various MPAs have been established in state and federal waters, including National Marine Sanctuaries and National Estuarine Research Reserves, but these have not provided sufficient protection to prevent degradation of habitats and decline of species within their borders. Recently, no-take marine reserves were established in the Florida Keys National Marine Sanctuary (2000) and the Channel Islands National Marine Sanctuary (2003) to improve ocean ecosystem management. Other processes to establish MPAs, such as the Marine Life Protection Act (Assembly Bill 993) in California, propose expanding the network of reserves to protect habitats and species.

Zoning (and particularly establishment of MPAs) will not eliminate or fully replace conventional tools of fisheries or ocean management, many of which already rely on geographic regulation. Zoning places these existing tools within a more comprehensive spatial framework based on ecological and social knowledge. To be effective for ecosystem management, existing restrictions on gear, catch levels, timing (openings, closings, and seasons) must be tailored to particular ecological areas. Such approaches are being discussed by fishery biologists and fishers for managing Atlantic cod off the coast of Maine (from Resilience Alliance meeting 2004). Dedicated access privileges (individual and community quotas, ITQs, IFQs, CDQs, etc.) may still be employed as ways to limit the number of entrants competing for resources, increase safety, and reduce bycatch.

The proposed working group will explore prospects for improving current management of oceans within US jurisdiction with increased use of place-based planning and regulatory tools that use existing knowledge of social-ecological systems. The working group will develop a framework for comprehensive ocean zoning for ecosystem management based on scientific (ecological and social) data and consider ways to integrate the highly fragmented regulatory authorities to achieve strong and cohesive ocean ecosystem management.

The goals of the working group are to: (1) compile and synthesize information on existing systems of ocean zoning and their ecological and social impacts, (2) compile and synthesize available ecological and social data necessary to design and develop effective zoning systems, (3) develop the concept of ocean zoning within the context of ecosystem-based management, and (4) design a set of principles and policies for creation of sustainable and resilient ecosystem-based ocean zoning systems.

While a fundamental change in domestic ocean governance set in motion by the Pew and US Ocean Commission reports may happen quickly or may take more than a decade, this working group could make a seminal contribution to the national conversation on ocean zoning.

Proposed Participants

Ecologists (with expertise in marine ecology and fisheries science) and social scientists (with expertise in human behavior, law and economics) will work together to achieve the working group goals. A wide mix of disciplinary expertise is necessary to shape a system that will be ecologically based, politically acceptable, possible to implement, able to achieve high levels of compliance, and likely to succeed. Participants will be drawn from institutions, agencies, and organizations that have worked to implement place-based management for ocean ecosystems (e.g., Channel Islands National Marine Sanctuary and Great Barrier Reef Marine Park Authority). The working group will build on this experience and use the unique opportunity for political and social change inspired by the US and Pew Oceans Commissions' reports.

We will select a core working group of approximately ten individuals. In addition to these core working group members, we will invite five other experts to each meeting. Recognizing the commitment of time and energy expected of core group members, we hope to expand the knowledge base by inviting others on a rotating basis to share their ideas on the problems and pitfalls as well as the successes in developing zoning systems both on land and in the ocean. We also anticipate inviting one or more science journalists to participate in the meetings of the working group in order to gain insights on how to reach a wider audience.

NAME	FIELD	INSTITUTIONAL AFFILIATION
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CORE WORKING GROUP PARTICIPANTS

Satie Airame	ecology	Univ. of Calif., Santa Barbara, PISCO
Larry Crowder	ecology	Duke U., Nicholas School of Environment
Jon Day	resource management	Great Barrier Reef Marine Park Authority
Elliott Norse	conservation biology	Marine Conservation Biology Institute
John Ogden	oceanography	Florida Institute of Oceanography
Gail Osherenko	law and policy	UCSB, Marine Science Institute
Robbin Peach	planning	Massachusetts Environmental Trust
Andy Rosenberg	fisheries biology	University of New Hampshire
Oran Young	political science	UCSB, Bren School of Env. Sci & Mgmt.
Jim Wilson	economics	University of Maine, Orono

OTHER PROSPECTIVE PARTICIPANTS

Bud Ehler	urban planning	NOAA Office of International Activities Steve
Gaines	ecology	UCSB
Susan Hanna	fisheries economics	Oregon State University
Burr Heneman	policy	Commonweal, Bolinas, CA
Bonnie McKay	anthropology	Rutgers University
Michael Orbach	anthropology	Duke U., Coastal Environ. Mgmt. Prog.
Steve Palumbi	ecology/genetics	Stanford University
Linwood Pendleton	economics	UCLA, School of Public Health
Ellen Pikitch	fisheries science	Pew Institute for Ocean Science, RSMAS
Hugh Possingham	ecology	University of Queensland
Beth Babcock	fisheries science	Pew Institute for Ocean Science, RSMAS
Liana Talaue-McManus	oceanography	University of Miami
Jim Wilen	economist	Univ. of California, Davis

Rationale for NCEAS support:

NCEAS is uniquely equipped to provide a base for development of this new approach to marine management. The working group will advance our state of ecological knowledge by identifying general patterns and principles necessary to design effective place-based zonal systems. NCEAS is an ideal host for a working group that aims to organize and synthesize ecological and social research to improve our fundamental understanding of ocean ecosystems and develop more effective management strategies. The project will demonstrate the benefits of synthetic research and collaboration among academic and non-academic ecologists, fisheries biologists, and social scientists.

Proposed Activities and Timetable

February 2005 meeting: We will prepare two or more white papers and a briefing book of legal and policy documents and key articles relevant to ocean zoning to be distributed to participants in advance of the first meeting. The white papers will summarize research results to date (including information about existing systems of zoning) and will identify significant questions for research. At the first meeting, participants will consider and compare information on existing approaches to ocean zoning and their ecological and social impacts. Participants will explore the effects of various types of zones including multiple use, limited use, no-take, and no-entry zones. At the first meeting, we will fully develop the research questions and a research agenda for the working group. The core participants will be assigned tasks to complete before the next meeting.

October 2005 meeting: Core participants will be expected to bring substantial memoranda to this meeting in order to jointly develop the concept of ocean zoning within the context of ecosystem-based management. This will require evaluation of the effectiveness of current approaches and discussion of new approaches to ecosystem-based management. During this process, the working group will identify gaps in the existing management framework and develop possible solutions to fill those gaps. We will engage identified experts to share their ideas and experience. The core group will be expected to take on writing assignments so that the final meeting will be able to focus on production of the deliverables.

February 2006 meeting: At the final meeting, the core participants will review solid drafts of papers and reports resulting from the project. Additional participants will be selected for their ability and willingness to review and comment on these drafts. At this meeting we expect to draw insights gained from our evaluation of zoning to improve our understanding of sustainable and resilient social-ecological ocean systems and to develop policies aimed at building the capacity of the social-ecological system to cope with, adapt to, or direct change. During this process, we will identify opportunities to mitigate damage from destructive or unsustainable practices that occur in oceans. The synthesis of information on the ecological and social impacts of ocean zoning will be the first step toward ecosystem-based management of our oceans.

Anticipated Results and Beneficiaries

The working group will prepare individual articles or an edited volume of articles to be published in peer reviewed journals such as *Nature*, *Science*, *Science Policy Forum*, *Nature and Society*, *Marine Policy*, and *Ecological Applications*. Since this route for release of scholarly work can be slow and seldom reaches a wide audience, we will produce a smaller booklet similar in structure to the 22-page PISCO report, "The Science of Marine Reserves," published in 2002. The educational booklet could include a summary of existing ocean zoning and the application of concepts from ocean zoning to advance ecosystem-based management. The target audience for the booklet will include policy makers, fishery and ocean managers, fishers, educators, non-governmental organizations, and students. The booklet will be available in print and on the web. Printing and distribution will be possible through support from our partner institutions and agencies. We will present the results at the summer 2006 annual meeting of the Society for Conservation Biology, and working group members will give briefings to key government, corporate and non-profit officials and groups.

Budget

	<i>Year 1</i> Feb. & Oct. 2005 <i>(15 people)</i>	<i>Year 2</i> Feb. 2006 <i>(15 people)</i>	<i>Total</i>
US Travel – 10 people	13,000	6,500	19,500
Foreign Travel – 1 person (Australia)	3,200	1,600	4,800
Per Diem :	(10 days)	(5 days)	
4 local @ \$46/day	1,840	920	2,760
11 visitors @ \$140/day	15,400	7,700	23,100
TOTAL	33,440	16,720	50,160

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