Ecosystem Science and Marine Spatial Planning

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Resolving mismatches in U.S. ocean governance


NCEAS Working Group on EBM and ocean zoning
F. Douvere F. & C. Ehler, eds. (2008)
The role of marine spatial planning in implementing ecosystem-based sea use management

*Marine Policy* 32(5)
MSP Principles

- Primary focus on maintaining ecosystem structure and functioning
- Integration among government agencies and levels of government
- Public Trust Doctrine
- Transparency in decision making processes
- Precautionary approach

Ehler and Douvere 2009
How to start toward MSP?

- Identify need and establish authority
- Obtain financial support
- Pre-planning
- Organize stakeholder participation
- Define/analyze existing conditions
- Define/analyze future conditions
- Prepare/approve spatial management plan
- Implement/enforce spatial management plan
- Monitor/evaluate performance
- Adapt/update the plan

Ehler and Douvere 2009
Marine spatial planning is being done in many countries.
An Instructive Precedent: Great Barrier Reef Marine Park

1) huge area backed by strong national legislation, with strong public support
2) federal-state cooperation
3) conservation has precedence
4) zones increasingly based on sound science modified by public input
5) adaptive management: zones revised on rotating basis to incorporate new information
A few states are creating similar ocean plans.
Establishing a Legal Foundation for Implementing Marine EBM: The Public Trust Doctrine


We have a stewardship responsibility to maintain healthy, resilient, and sustainable oceans, coasts and Great Lakes resources for the benefit of this and future generations.

To succeed in protecting the oceans, coasts and Great Lakes, the U.S. needs to act within a unifying framework under a clear national policy, including a comprehensive, ecosystem-based framework for the long term conservation and use of our resources.
National Ocean Policy - Nine Priority Objectives

How we do business:
1. *Ecosystem-Based Management*
2. *Coastal and Marine Spatial Planning*
3. *Inform Decisions and Improve Understanding*
4. *Coordinate and Support*

Areas of Special Emphasis:
1. *Resiliency and Adaptation to Climate Change and Ocean Acidification*
2. *Regional Ecosystem Protection and Restoration*
3. *Water Quality and Sustainable Practices on Land*
4. *Changing Conditions in the Arctic*
5. *Ocean, Coastal, and Great Lakes Observations and Infrastructure*
Ocean Policy Task Force
Interim CMSP Framework

Definition of CMSP:
A comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas.

The CMSP Process:
Identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives.
Two challenges:

- **Interconnections:** Integrated & interdisciplinary management of people & oceans
- **Time:** Dearth of historic ecological data on coastal & ocean ecosystems
Social-ecological systems (SES)

cross-scale interactions among drivers of change

Institutions
Social networks
Individual beliefs, cultural values

ECOSYSTEM SERVICES

Large Marine Ecosystem
Regional seascape
Local ecosystem

SOCIAL DOMAIN

ECOLOGICAL DOMAIN

McLeod & Leslie 2009
Shackeroff, Hazen, & Crowder 2009
Social-Ecological Systems

- “A complex social-ecological system cannot be captured using a single perspective.” Berkes et al. 2003

- Marine ecosystems occur at various scales and are bounded primarily by physical, biological, and oceanographic features.

- But social, cultural, economic, and political attributes also overlay these places.

- Effective EBM will require an approach that fully integrates natural and social science perspectives to promote sustainable and resilient SESs.
What is an SES?

- Coupled SESs emphasize the connections between human and natural systems.

- Contrary to considering oceans as ‘unpeopled’, or as ecosystems that humans enter only as resource extractors, the SES concept emphasizes more dynamic and multi-faceted relationships.

- Humans both have an impact on and are impacted by the oceans. Humans can have positive and negative effects.

- Improved understanding of SESs can enhance the implementation of Ecosystem-Based Management.
Characterizing Ocean Use Patterns

A framework can help to characterize the diverse spatial patterns of human use and their attributes.

Key considerations: spatial distribution patterns; seasonality, intensity, conflicts with other uses, thresholds, etc.

Trawl fleet fishing grounds, Gulf of Maine
Stakeholder Perspectives on MSP

Duke University’s Nicholas Institute for Environmental Policy Solutions and the Meridian Institute hosted 7 full-day meetings with ocean industries (and later with the ENGO folks as well):

Aquaculture, Boating, Commercial Fishing, Recreational Fishing, Oil and Gas, Renewable Energy, Undersea Cables, Shipping, and Tourism
Guiding Principles

- Meet national economic, social, and environmental goals
- Forward-looking
- Facilitate compatible uses
- Open, transparent, and participatory
- Allow for regional flexibility in planning
- Increase ocean investors' confidence in future regulations
- Accommodate change and promote innovation
- Not add to regulatory burden
Design Elements

- Recognize heterogeneity of ocean space
- Identify user conflicts upfront
- Clear plans to obtain, centralize, and make available spatial data
- Use regional bodies and multiregional partnerships
- Implement through existing authorities, regulations and legal framework
Create a **concise set** of measures to track marine ecosystem health for EBM

- If we could only measure 10 things, what would they be?

**Many audiences** - intended to shape design and implementation of policy

- Managers, policymakers, and public

**Transferability** across range of contexts

- Different geographies, spatial scales, social and biophysical contexts, data availability

**Human well-being** - focus on natural **AND** social components (coupled systems)
A healthy marine ecosystem is one that can sustainably deliver a range of societal benefits both now and in the future.
Benefits from a Healthy Ocean

1. Seafood
2. Artisanal fishing
3. Natural products
4. Carbon storage
5. Coastal protection
6. Sense of place
7. Livelihoods
8. Tourism and recreation
9. Clean waters
10. Biodiversity
Implementing Marine EBM

- Need a Strong Legal Foundation—The Public Trust Doctrine and Governance
- Implementation via Marine Spatial Planning, other regulatory structures
- Fully Integrate the Human Dimension with the Biophysical Dimension
- Remember the Goal is Integrated Cross-Sectoral Spatial Management—NOT JUST PLANNING!
- Monitor performance measures!
Don’t let the perfect be the enemy of the good!

Ecosystem... just the sound of it, gives me the willies.
Why CMSP Is Important

“Coastal and marine spatial planning may sound like the stuff of policy wonks, but it is actually vital to anyone who works or plays on the oceans. In fact, coastal and marine spatial planning is an essential tool for anyone who depends on the oceans for sustainable jobs, healthy seafood, clean energy, recreation or vibrant coastal communities.”

- Dr. Jane Lubchenco, NOAA Administrator and member of the Interagency Ocean Policy Task Force December 14, 2009
Public goals

- A healthy ocean is one that sustainably delivers a range of benefits to people, now and in the future. These benefits include:
  
  - **SEAFOOD PROVISION**: Maximize the amount and sustainability of seafood harvested from wild-caught and cultured stocks.
  - **SUBSISTENCE**: Minimize the loss of opportunities for sustainable subsistence fishing.
  - **NATURAL PRODUCTS**: Maximize the amount and sustainability of harvest of natural products (excluding food), such as wood, shells, pharmaceuticals, and the aquarium trade.
  - **CARBON STORAGE**: Minimize the loss of carbon storing habitats, including mangroves, salt marshes, seagrass beds, and wetlands.
  - **COASTAL PROTECTION**: Minimize the loss of biogenic habitats that protect coastal areas from inundation and erosion.
  - **SENSE OF PLACE**: Minimize the loss of species and habitats that hold special importance and/or cultural values for people.
  - **LIVELIHOODS**: Minimize the loss of coastal and ocean-dependent livelihoods (jobs & wages) and economies (revenue).
  - **TOURISM AND RECREATION**: Maximize sustainable tourism and recreational opportunities.
  - **CLEAN WATERS**: Minimize the pollution of estuarine, coastal and marine waters to maintain aesthetic values and avoid detrimental effects to human health or wildlife.
  - **BIODIVERSITY**: Minimize the loss of species and habitat degradation.
Key design criteria

1. Change in consistent, interpretable way across systems
2. Sensitive to changes in ecosystem status
3. Functions across scales
4. More than one method for calculation / derivation
5. Responsive to management actions – which are the indicators for which we’d make very different decisions if one changed?
How to consider multiple goals?

- People place different values on different goals
- Inherent tradeoffs among goals, and implicit tradeoffs do not benefit ecosystems OR people
- Designing differential weights among indicators according to 3 value sets (preservation, sustainable use, and non-extractive use values)