MARINE ECOSYSTEM-BASED MANAGEMENT: LEARNING FROM CASE STUDIES TO ADVANCE DECISION SUPPORT
NOVEMBER 2006

At this workshop a group of 35 practitioners and managers examined case studies where decision support tools have been used to jointly account for objectives in fisheries, coastal hazards, energy, and conservation. These case studies focused on tools, methods and approaches that could advance ecosystem-based management by explicitly accounting for multiple objectives in a decision support framework. The discussions focused on **advice** and **needs** for the use and advancement of tools to inform ecosystem-based management.

The **Aims and Goals** of the workshop were to:
1. Examine case studies that advance ecosystem-based management by using decision support tools to consider multiple objectives in natural resource conservation and management;
2. Identify advice & needs for including multiple objectives in decision support;
3. Identify how these cases and tools can be made more accessible to practitioners & managers.

Case Studies

The case studies illustrated that tools can advance our ability to address multiple objectives and are critical to enhancing partnerships between conservation, management, and industry. The cases focused on the following three situations:
- Meeting biodiversity and fisheries objectives
- Meeting biodiversity and energy facility siting objectives
- Meeting biodiversity and hazard reduction objectives

The tools and approaches reviewed included regional assessments; Ecopath, Ecosim (EwE), and Ecospace; Atlantis; Coastal Vulnerability Assessment Tool (CVAT); and Marxan with case studies from the USA, Indonesia, Venezuela and Colombia. Presenters examined how multiple objectives could be incorporated within existing tools (e.g., fishery objectives within Marxan) and how objectives could be combined by linking approaches and tools (e.g., EwE with regional assessments). The examples illustrated that there are tradeoffs (not just win-win solutions) in accounting for multiple objectives, and that decision-support tools were useful in identifying potential solutions. The case studies showed that decision-support tools can be useful in a wide range of setting including remote and data–poor areas.

Case Studies: Talks and Presenters

"Towards Meeting Joint Objectives: Biodiversity Conservation and Fisheries Sustainability in the Pacific Northwest" Phil Levin, NOAA; Zach Ferdaña, TNC

"Defining the commercial fishing grounds off the central coast of California through the Marine Life Protection Act Initiative" Charles Steinbeck, Ecotrust

"Trophodynamic spatial modeling of Raja Ampat, Indonesia in support of E-BM" Peter Mous, TNC; Cameron Ainsworth University of British Columbia

"Coastal Hazard Mitigation & Ecosystem Conservation in the Northern Gulf of Mexico" Chris Shepard, Univ. of CA Santa Cruz; Mike Beck, Dan Dorfman, Rafa Calderon TNC

"Balancing Energy: The World of Oil and Biodiversity Needs in Venezuela" Juan Carlos Gonzalez, TNC; Eduardo Klein, University of Simón Bolivar, Venezuela

Advice

The discussion focused on the development of general advice and needs across multiple sectors, case studies, and tools. The advice that participants offered was generally in three major areas Goals and Objectives; Data & Inputs to Tools; Communication & Outputs from Tools.

Advice on Goals & Objectives

- Be clear on objectives**.** Objectives & Goals must be clear and transparent. General goals such as "biodiversity conservation", "fisheries sustainability", and "hazard reduction" are not specific enough. Tools can help improve this clarity but are no substitute for transparent goals such as "representation of 25% of all coastal ecosystems in an ecoregion within priority sites". Defining clear fisheries objectives can be complex because there are many different stakeholders.
- First identify objectives, goals, sectors, and audience and then identify the right tools that can contribute towards them. Clear conceptual models can help.
- Recognize that few agencies or organizations have an explicit mandate for E-BM. Even when agencies and organizations are committed to E-BM, they will have primary objectives (e.g., biodiversity conservation or fisheries productivity) and secondary objectives. The order and priority of these objectives matters and must be clearly acknowledged, because it will affect how they perceive and seek to manage natural resources.
- For resource managers the lack of an E-BM mandate operationally means that they may only contribute towards E-BM more broadly when it is clear that they can meet their own mandates—and then other objectives as well (a win:win solution).
- E-BM and tools for E-BM are somewhat new and require development. Their development should be an iterative process. Objectives for E-BM will become clearer as the tools to address these objectives get better and vice versa.
- The incorporation of multiple objectives and sectors in to a management plan can help reduce conflicts with single user groups. When just two sectors are involved (e.g., conservation and fishing) there is often more head to head conflict even when everyone recognizes shortcomings in management.

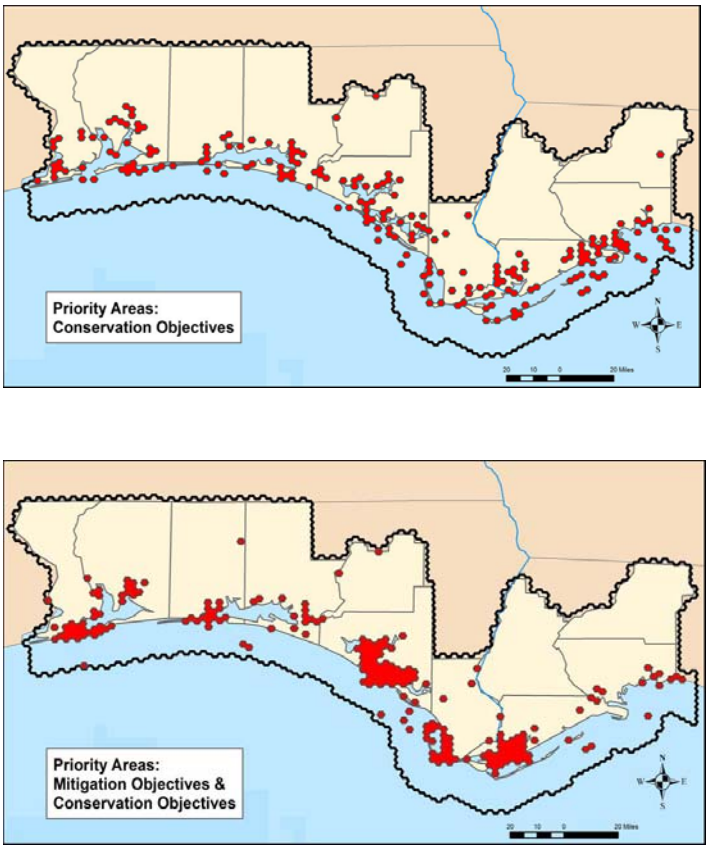

Figure 1. Addressing multiple objectives: examples from case studies. Priority sites selected with Marxan in the Florida panhandle when (a) only biodiversity objectives are considered and (b) when biodiversity objectives are considered jointly with coastal hazard mitigation objectives.

Advice on Data & Inputs

- As with all models and tools—poor input equals poor output.
- Planning approaches and tools are used best when they help stakeholders explore a range of alternatives—not just one answer or solution. That is when the tools can demonstrate flexibility and adaptability.
- Tools can help to make planning and management processes more transparent and repeatable.
- Decisions will be made on incomplete data whether tools are used or not. Present data gaps and uncertainty of existing data up front.
- Seek input from stakeholders before running tools and developing results. Presenting a result and then seeking feedback can be a recipe for disaster.
- E-BM planning can be a partnership strategy in that data collection can be viewed as 'establishing the base,' or developing a common ground of information.
- The unit of analysis for fisheries planning is often much larger than that used or required for conservation planning. We recommend using the smallest planning units that the data will allow and the output can be 'reported out' in to any larger units.

Advice on Communication & Outputs

- Tools can get complex; **simpler is better whenever possible**. If you cannot clearly describe the tools and results to managers and stakeholders, that can be worse than having no tool at all.
- Seek extensive peer review of methods and results as part of the feedback process.
- "Tools" and "E-BM" are not always the best terms. Often more general terms such as decision support" and "natural resource management" may be more appropriate and understandable to stakeholders and managers.
- Many E-BM approaches and tools can currently help in making strategic decisions (e.g., where to place conservation areas when jointly considering fishery and biodiversity objectives), but they are much less help for making tactical decisions such as where to invest funds for restoration or what levels of fish take to allow.
- The greatest 'buy-in' in the use and results from tools is when there is a client or customer (e.g., agency, company) that invests in the use of the tool to inform their actions. Engaging partners and identifying customers early can be time consuming but is essential to developing results that lead to action.

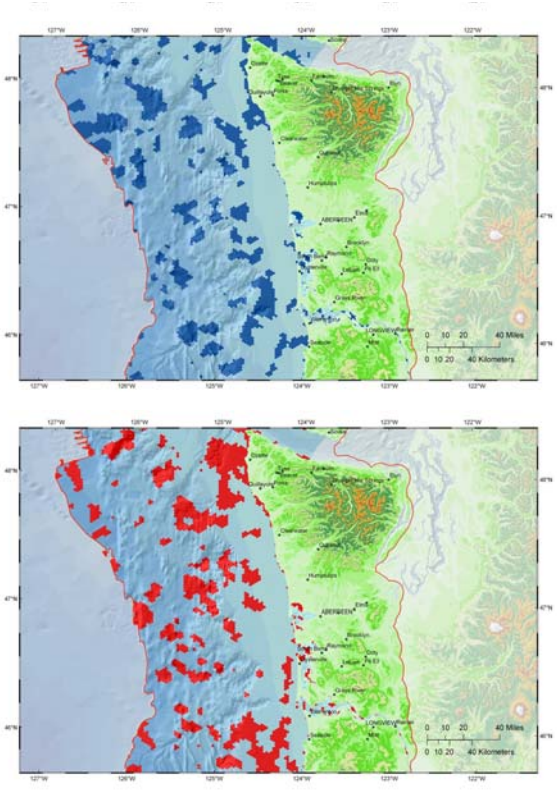

Figure 2. Addressing multiple objectives: examples from case studies. Priority sites selected with Marxan along the US Pacific Northwest coast when (a) only biodiversity objectives are considered and (b) biodiversity objectives are considered jointly with fishery objectives. There is a 70% change in selected sites when the objectives are changed; note for example the substantial change in selection of sites off the Olympic peninsula (top, center of each figure).

Needs and Gaps in Data, Science and Communication

Gaps in Data

- There are some important data gaps that must be filled to inform ecosystem-based management. For example, we need a map of marine ecosystems (e.g., seagrass, kelp, offshore hard bottom) of the USA and many other countries. Marine ecosystems cannot be managed if we don't know where they occur. These maps of habitats and ecosystems were available terrestrially over 20+ years ago to inform management.
- Unfortunately a lot of the current data collected in fisheries, for example, does not always fit the existing models well. International case studies demonstrated that it is possible to identify the most useful types of data and to collect them. Identifying and presenting data gaps up front in a planning process helps gain credibility with multiple stakeholder groups.

Gaps in Science

- There needs to be a better understanding of the relationship between fisheries and biodiversity objectives, i.e., the shape of these curves/tradeoffs. We need to understand this relationship better to be able to minimize costs to both fisheries and biodiversity and maximize benefits.
- There need to be better sensitivity analyses in general. That is examinations of how much outputs change as inputs are altered. These analyses can help identify if there are crucial points where minor changes in input parameters have a major change in outputs.
- It may be possible to jointly meet biodiversity and hazard reduction objectives by conserving/restoring wetlands; this requires better information on the link between coastal wetlands and their potential to reduce hazards from storms, waves, and flooding.
- Conservation organizations have yet to fully utilize fisheries data that is largely non-spatial but provides information on trends, use patterns, and species-habitat relationships.

Gaps in Communication

- There needs to be better communication on the use and results from tools so that they can be more easily understood and adopted by managers and practitioners as appropriate.
- There need to be better user interfaces that allow for easier access to the tools, or at least some opportunity for users (particularly novice users) to alter inputs and examine outputs (to better understand how the tools work). It will also help if decision support is web-enabled including the data and the tools into more comprehensive functional web sites for managers/decision makers.
- There needs to be better connections between tools. Better links between tools should improve their interoperability and maximize the strengths from each tool. The caution is that processes can get more complex and difficult to understand as new approaches and tools are added. The need for clear communication becomes increasingly more important as we add tools and the relationships between them.
- There need to be clear case study demonstrations of win:win solutions in addressing multiple objectives and sectors. It will be most useful to consider those objectives and geographies where early success and demonstrations is most possible (and given the conflicts between fisheries and conservation these may not be the best objectives). Once the power of these approaches can be demonstrated, it will make it easier to address more difficult objectives. For example, coastal wetlands have important ties to fishery, hazards, watery quality, biodiversity, and recreational objectives. Better planning for these wetlands with multiple objectives in mind could yield early action-oriented results.
- Need more comprehensive and interactive training on the use of tools at major meetings.

For Further Information Contact us at: marine@tnc.org