California Current Ecosystem-Based Management (CCEBM) initiative:

Advancing the Science for Ecosystem-Based Management on the U.S. West Coast

January 30-31 2008, Santa Cruz CA

SYNTHESIS FROM BREAKOUT SESSION 2

The goals of second breakout session were to: 1) work through a case study example for a scientifically informed ecosystem service tradeoff analysis (i.e., SIESTA), 2) discuss the state of the science needed to implement ecosystem-based management (EBM) for the case study, and 3) discuss opportunities and challenges associated with applying current knowledge to management and policy, for the case study region and the US West Coast. The case studies, representing real-world management and policy challenges to applying an ecosystem-based management approach, included Puget Sound, WA; Klamath River, CA and OR; and Elkhorn Slough, CA. These examples illustrate the practical tradeoffs among different ecosystem services, such as fisheries, water provisioning, water quality, tourism, wetland preservation and shoreline protection. They also served to ground breakout discussions.

The following represents a compilation of discussions from all nine breakout groups, each asked to consider same set of questions, with three groups assigned to each of the three case studies. This document presents highlights from across the range of opinions raised during the breakout group discussions, and thus it does not constitute a consensus opinion among the attendees.

TOPIC 1: Applying the "Science to Inform Ecosystem Service Tradeoff Analysis" Method to Case Studies

Groups discussed the following questions for the case studies:

(1) What are the key ecosystem services for the case study?
(2) What are some of the key inputs and drivers affecting these services?
(3) What are important management actions affecting these services?
(4) What does the relationship between different combinations of services look like (i.e., the graphical depiction of trade-offs among services)? What are important tradeoffs that need to be taken into consideration?

Please contact Sarah Lester (slester@ucsc.edu) for summary notes addressing these questions for each of the case studies (Puget Sound, Klamath River, and Elkhorn Slough). The following are general comments that emerged from these discussions.

GENERAL COMMENTS: APPLYING SIESTA TO CASE STUDIES

- Selecting axes/ecosystem services when using the Science to Inform Ecosystem Service Trade-off Analysis (SIESTA) approach for explicitly considering trade-offs:
  - SIESTA requires decisions about what services to consider. Does this approach place too much emphasis on the optimal provisioning of services without a thorough examination of whether we are examining and accurately quantifying the right services?
  - The services you consider depend on whether you are examining current services or trying to restore an area to some historical state. Therefore, it is challenging to determine the right balance between ecological state/ecosystem function and current human use.
  - The axes could be measurable ecosystem attributes instead of service values.
  - Appropriate indicators or metrics must be determined for each service (e.g., agriculture could be quantified as total market value, type of agriculture, total yield per capita, cultural value, etc.).
  - Should conservation be considered an ecosystem service?

- Scale issue: When using the SIESTA approach, it is important to consider both the scale of the management decision that leads to the provisioning of the services and the scale over which the services are produced and delivered.

- Dynamics: When applying an EBM approach, the dynamic nature of both management and ecological systems needs to be taken into account.

- Boundary delineation: When examining ecosystem service tradeoffs, it is necessary to define the boundaries of the system (e.g., for Klamath River example: river basin (upland), ocean up to Tillamook and south to Monterey Bay out to the IEZ).

TOPIC 2: Assessing the State of the Science

(1) What are key scientific needs or gaps limiting the effective implementation of EBM or the use of Integrated Ecosystem Assessments (IEA) and SIESTA?

- General scientific needs for EBM:
  - Social science needs:
    - Data collection and development of social metrics to assess human drivers of ecosystem state and the affect of management practices on the social components of the ecosystem: human use/activities, societal preferences, value of ecosystem quality.
    - Improved understanding of the connections between ecological and human systems.
    - Determining how human behavior affects the ecosystem and service provisioning.

- Climate change and oceanographic patterns:
    - Synthesizing what we know under different oceanographic regimes (offshore and nearshore).
    - Separating natural variability from anthropogenic changes.
    - Improved monitoring and prediction of local sea level changes.
    - Making decisions given impacts from climate change (e.g., requires assumptions about how the system will adapt).
- Seafloor and habitat mapping.
- Improved understanding of cumulative impacts (and better information on ecosystem impacts of human activities beyond fisheries).
- Improved understanding of land/sea connections.
- Methods for incorporating uncertainty and risk analysis.
- Indicators: synthesizing large amounts of information into a few robust and quantitative indicators of ecosystem state and management performance.
- Scale issues:
    - Understanding the implications of management actions in one place for other places. For example, if we stop an environmentally destructive activity in one location, it may lead to destructive activities elsewhere (e.g., externalizing socio-economic costs).
    - Matching and understanding connections across ecosystem and governance scales.

• <u>Scientific needs for applying IEA and SIESTA</u>:
- Improved methods for valuing cultural ecosystem services.
- Factoring in the cost/benefit of changes to the system resulting from management options (e.g., sediment impacts resulting from dam removal).
- Incorporating uncertainty.
- Incorporating cumulative impacts.
- Identifying thresholds.
- Accounting for climate change impacts.
- Data fragmentation: need for better data synthesis.

(2) How would you recommend filling these gaps? (e.g., may include new syntheses, collaborations, novel research, etc.)

• Scale issues:
- Approach as nested issue (e.g., look at large scale forcing factors, “problem space,” and then scale down to smaller “solution spaces”).
- Apply what we know about scale issues from ecology and identify the greatest scale mismatches between the ecological and management systems.

• Bridge cultural gaps within science (e.g., terrestrial versus coastal versus marine; marine ecologists versus fisheries biologists).
• Develop tactical models in addition to strategic models like SIESTA.
• Develop an integrated database (“one-stop shopping” for data).

(3) What are the key messages about the state of the science needed for EBM, assessing both what we know scientifically and gaps in our scientific knowledge or information?

• Much of the science probably is in place to implement EBM (through SIESTA, IEA, and other approaches) without developing new mechanisms.
• Management, societal and governance impediments are greater than the scientific hurdles.
• We have lots of information – the main need is for data synthesis and integration.

TOPIC 3: Management/Policy Opportunities and Challenges

(1) What are the key management and policy opportunities for applying SIESTA or implementing EBM now along the west coast?

• Reauthorization of Coastal Zone Management Act (CZMA):
  - Opportunity to promote regional decision-making, integrate science into decision-making, and develop science-based planning and mapping.
  - Potential for amending the CZMA for states to work together with their federal counterparts to go through the IEA process.
  - Caveat: might be too focused on land use.
• West Coast Governor's Agreement (WCGA) on Ocean Health:
  - Opportunity to do a California Current wide IEA and then connect to the necessary institutions.
  - Opportunity for regional EBM and establishing CCLME-wide partnerships.
• Regional fishery councils and Pacific Coast Ocean Observing System (PaCOOS) as potential unifying bodies.

(2) How best can science be used to facilitate effective implementation?

• Develop a report card that illustrates multiple management scenarios: create a matrix of services, policy actions, and tradeoffs as a straightforward approach for identifying important interactions without being limited to pair wise comparisons.
• Develop a scientific process to guide management prioritization ("biggest bang for your buck").
• SIESTA:
  - The process of assessing services and relationships among services can identify major negotiation points. There are some trade-offs and ranges of services combinations that are non-negotiable, especially those with strong environmental thresholds (e.g., minimum flow requirements for salmon).
  - Use SIESTA to assess different management options and avoid bad management decisions.
  - Use SIESTA to spur conversation and organize discussion.
• IEA: tool for providing a picture for managers of things you care about, what affects those things, and what happens if we take various actions.

(3) What are the key management and policy challenges for applying IEA or SIESTA or implementing EBM?

- Applying IEA and SIESTA:
  - Strategic communication of the complexities of SIESTA to decision makers and stakeholders.
  - Refine the underlying science of these approaches (e.g., incorporating uncertainty and dynamics into SIESTA).
  - Test with some hypothetical case studies.
  - Consider constraining the management options under consideration because it may be too difficult to consider a large number of options.
- Agency coordination:
  - Federal and state agencies need to more effectively work together.
  - Form connections among local EBM pilot projects so that we are not just doing EBM on a bay by bay basis.
  - Incentives resulting in improved integration across sectors.
- Strategies for developing cross-boundary institutions or institutional mechanisms that have the potential for regional coordination of coastal zones across states.
- Legal framework:
  - Mechanisms for inserting EBM into existing laws, regulation and programs.
  - Need for a new mandate and/or new governance structures (e.g., retrofitting the National Environmental Policy Act [NEPA]).
- Training and education of management community:
  - New technical expertise, either through new collaborations or training.
  - Facilitation of exchange of ideas between scientists and practitioners.

(4) How can these challenges be addressed in the near-term (1-2 yrs) vs. in the longer-term?

- Near-term:
  - Develop short, synthetic guide to implementation for managers.
  - Develop informational booklet for managers (like *Science of Marine Reserves,* www.piscoweb.org/outreach/pubs/reserves) about ecosystem services and tradeoffs among services.
  - Develop manager's toolkit for accounting for cumulative impacts (e.g., IEA-like process that provides a baseline for all NEPA assessments in a geographic region).
  - Target upper-level management for training on EBM and new tools for doing EBM (e.g., NOAA Coastal Services Center trainings).
  - Develop near-term success stories.
  - Insert EBM principles into current policy.
  - Use models like Atlantis to look at how small-scale EBM efforts fit into the bigger picture of the California Current.

- Longer-term:
  - Create a regional data clearing house and data repository or build from existing (e.g., Ocean Observing Systems) data integration efforts.
  - Develop a new federal mandate for EBM.
  - Create a process that changes incentive structures.