

## Healthy Coastal Ecosystems Focus Team: Ideas for new directions

### (1) Linking social science to natural science in ecosystem based approaches to management

Two of Sea Grant's three strategic plan Healthy Coastal Ecosystem goals relate not directly to natural ecosystems, but rather to human ecosystem managers. As stated in the Large Marine Ecosystem Governance Handbook (2006),

Efforts to manage resources and the environment in the context of ecosystems are really about managing human behavior and encouraging and inducing behavioral patterns that take into account the operation of the natural world... Ecosystem-based management is not simply about science; successfully effectuating such management requires a very significant shift in human mindsets and behavior ... Management of LMEs [large marine ecosystems] requires not only knowledge of the changing pattern of human use of ecosystems and their ecological impacts but also the effects of change on the availability of socioeconomic benefits to be derived from LMEs.

Sea Grant could and should play a significant role in producing and disseminating the social science necessary to increase understanding of the market and nonmarket value of ecosystem services, improve the effectiveness of the tools used by resource managers to receive, interpret and share societal and environmental information related to ecosystem management, and improve the decision making capacity of all whose behaviors have an effect on the environment.

Some examples of areas where a targeted infusion of social science support could help improve ecosystem management:

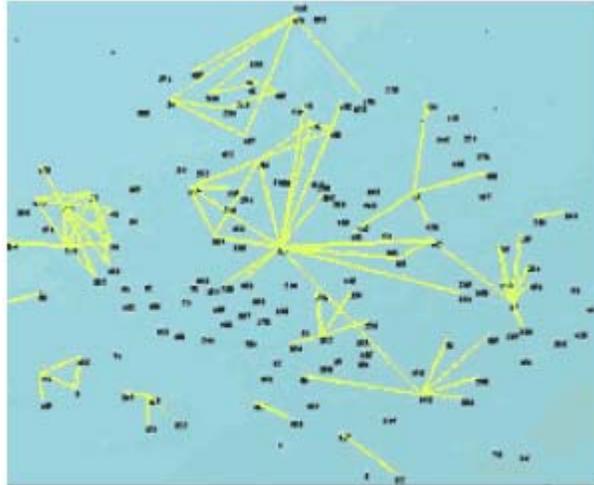
- Valuate ecosystem services. Few would argue that many ecosystem services are being used or degraded in ways that will result in the significant reduction or complete loss of those services in the near future. Commercial fish stocks, accessible fresh water and the temperature-regulating properties of the atmosphere are examples. Sometimes actions to increase one ecosystem service (eg, aquaculture and agriculture to increase the food supply) put other ecosystem services at risk (eg, through overfertilization of land or water or reductions in biodiversity). One reason that such practices are undertaken anyway is that resource management decisions are typically most strongly influenced by ecosystem services entering markets, so that non-marketed benefits, which are often high and sometimes more valuable than the marketed ones, are often underconsidered or lost entirely (Millennium Assessment, "Ecosystems and Human Well-being", 2005). Relevant resource valuation research, properly transitioned, could help assure that ecosystem management decisions and tradeoffs are more likely to result in an overall enhancement of ecosystem benefit.
- Optimize communication networks. Resource managers can make suboptimal decisions simply because they don't have access to the right information or the right stakeholder or partner input when they needed it. A recent NHSG project analyzed the communication networks for projects undertaken by the Atlantic Marine Fisheries Commission, using interviews and surveys to measure communication patterns among individuals within these entities and projects. The frequency and directional flow of information within and between the key individuals, such as project coordinators, scientists and decision-makers, were then represented in a visual network (figure). Analysis could show, and the visual network could help communicate, areas of efficient communication and areas where vital communication was misdirected or vulnerable to disruption. Quantitative measures of communication efficiency could be produced and strategies for improvement could be more effectively planned.

In addition to helping assure resource managers are communicating effectively, this type of communication research could help Sea Grant decide internally how to marshal its own communication resources to most effectively achieve its healthy coastal ecosystem (or any other) goals.

- Improve ecosystem governance models.

Ecosystem governance models are being developed which place considerably more emphasis on constituencies, commitment and infrastructure than have been considered in the past. One such model is described as the "Four Orders of Outcomes" (see Olsen, "Frameworks and indicators for assessing progress in integrated coastal management initiatives", Ocean & Coastal Management, 2003). These models

have as their ultimate goals a societal behavior change resulting in self-sustaining ecosystem management, not just the achievement or restoration of a specific ecosystem service. Continued development of models like these by Sea Grant and transition of their use to coastal managers would allow for broader buy-in of ecosystem management initiatives, a clearer identification of the resource commitment necessary to achieve sustainable results, a recognition of the long-term nature of such an enterprise, and, ultimately, an improved chance of success at achieving a sustainable healthy coastal ecosystem.



Daily communication network map involving herring management, a large regional fisheries case. Approximately eight subgroups or clusters of individuals speak daily, principally organized around stakeholder groups/agencies. Credit: Troy Hartley

Research and outreach of these or other types of social science issues could be in the form of targeted national competitions for individual projects that link social and ecosystem sciences in a way that objectively improves ecosystem management decisions.

It could also take the form of funding directly to Programs, to regional centers of excellence, or to a newly established Sea Grant national center for advancement and use of social science to improve coastal ecosystem management, to develop and execute a long term social science strategy.

Like other initiatives suggested by the HCE focus team, this initiative could easily be modified to advance the goals of the other focus areas as well.

## (2) National Sea Grant Initiative on Economic Development

The opening line on the National Sea Grant's website under the section **About Us** reads: "Environmental stewardship, long-term economic development and responsible use of America's coastal, ocean and Great Lakes resources are at the heart of Sea Grant's mission". Clearly a cornerstone of all Sea Grant programs includes economic development, yet a perusal of the grant-funded and extension activities of most state-based Sea Grant programs gives less emphasis to this important facet or "leg" of the Sea Grant platform. During these economic times, a responsible action by Sea Grant would

be to re-invigorate the economic development aspects of its programs through initiatives in both research orientation and outreach. A National Sea Grant Initiative that focuses on economic sustainability and development, especially in the form of job creation, as well as improving transferability of information to improve and relieve current economic conditions would go far with the public, state and federal legislatures as well as the new administration.

This issue could be addressed specifically as it relates to Healthy Coastal Ecosystems, or more broadly. If focused on the HCE area, it could examine how the economic downturn is affecting the ability of coastal communities, businesses and individuals to conduct their livelihoods in environmentally sustainable ways. When times are tough, one of first things to go may be the layers of environmental protection that have been overlaid on industries already operating on narrow margins. As the poor are also particularly vulnerable to effects of losses in ecosystem services, ecosystem degradation is often one of the factors trapping people in cycles of poverty (Millenium Assessment, "Ecosystems and Human Well-being", 2005). With appropriate research, extension and outreach, SG can develop and share ways for public, commercial and private entities to "hunker down" without compromising ecosystem stewardship, and help coastal residents whose livelihoods are threatened by the combination of ecosystem degradation and economic recession to find ways to adapt. In addition, jobs and activities whose primary purpose is to protect the environment may be at risk in a downturn. Commercial recycling concerns and alternative energy startups, for example, are facing financial hardships due to the slowdown.

While easily included under the auspices the Healthy Coastal Ecosystems focus area, a more pragmatic and effective approach would be to re-emphasize the economic development feature of Sea Grant in each of the focus areas by all Sea Grant programs. By combining efforts under each of the focus areas as a way of addressing our national economic crisis, Sea Grant would demonstrate to everyone how an example of federal, state, and citizen partnerships can conscientiously respond in times of national stress. If Sea Grant is to be at the forefront of leadership in the role that cooperative interactions can convene to help solve pressing economic and environmental issues, a highly effective and well publicized effort to combine the efforts between focus areas among all state programs will go far with the public and a new administration that is looking for solutions.

To affect this Initiative, representatives for each Sea Grant program (practically through the pre-existing structure afforded by the focus group organization), in conjunction with the National Sea Grant Office, should meet to determine the quickest and most efficient short-term actions that can be taken by Sea Grant to address the economic issues for which it has expertise. Many of these actions could be in the form of re-orienting current emphases in research and outreach. A second, long-term plan would also be developed that would involve a redirection of activities on a regional basis to address economic development issues. Resources would be needed to help plan and implement the short-term (1-3 year plans) while the long-term plans would be incorporated into the strategic

plans of the national and state programs. The newly adopted National Strategic Plan is sufficiently broad and flexible that it can readily include such an initiative.

### **(3) Redefining ecosystem restoration**

An interesting paper was published last year in *Estuaries and Coasts*: "Return to Neverland: Shifting Baselines Affect Eutrophication Restoration Targets" Some lines from the abstract by Carlos Duarte and his team: "The implicit assumption of many scientific and regulatory frameworks that ecosystems impacted by human pressures may be reverted to their original condition by suppressing the pressure was tested using coastal eutrophication. The response to nutrient abatement of four thoroughly studied coastal ecosystems that received increased nutrient inputs between the 1970s and the 1980s showed that the trajectories of these ecosystems were not directly reversible.... Understanding ecosystem response to multiple shifting baselines is essential to set reliable targets for restoration efforts."

Following up on this beginning research would be quite interesting and helpful to those involved in restoring coastal ecosystems. Many local management programs continue to assume that we can return to past conditions of ecosystem "health" by simply reversing trends/inputs.

A national initiative involving ecosystem research into what restoration is possible, social research into the relative benefits and costs of restoration, and outreach to effectively share this information with managers and users of ecosystems would improve the chances of success of ecosystem restoration.

### **(4) Inland-coastal collaboration on water quality-related research and extension**

The country, and Sea Grant, need to better coordinate the management of ecosystems that affect both inland and coastal areas. Develop a partnership with USDA-Land Grant to work on Water Quality issues on a large-watershed scale, including states inland from the Coast with no current Sea Grant presence. This idea was well received by Mike O'Neill, the national program leader for the CREES Water Resources program, and some of his regional leads. The initiative could take the form of using a current successful collaboration (e.g., in a successful NEMO program) as a model for a more extensive effort. Low level planning is already underway; a possible target is for a collaboration event to occur (or to be planned at, or to be reported at, depending on timing) the February 2010 National Water Conference.

### **(5) Coastal/offshore energy**

At the last SGA meeting, it was discussed that the new administration and Congress are very focused on the Economy, the Environment and Education and that Sea Grant is the 'right tool' to effectively contribute in all three areas. We also discussed a 4th E -- Energy -- an area where there is not as great an investment of Sea Grant resources. With the many options for harnessing energy with coastal or offshore options (wind,

hydrodynamic, oil and gas), Sea Grant could play a major role in assessing potential benefits and impacts for coastal communities and natural ecosystems, because all of those options now on the table have a need for coastal infrastructure and the potential for environmental impacts, as well as jobs and energy production.

#### **(6) What is ecosystem-based management?**

There's lots of talk these days about "ecosystem-based management" and Judy Weis is hosting a Sea Grant discussion section on this topic at the May 2009 International Marine Conservation Congress at George Mason University. After polling the Sea Grant network for suggested participants and topics for the session, it was apparent from the great variety of suggestions that came in that we don't have a common understanding what "ecosystem-based management" actually is! It would be worth having a NSI on this topic so that it could be fleshed out and clarified.

#### **(7) Ecosystem effects of climate change**

The HRCC focus team's concept of a Center for Coastal Climate Change Engagement included a suggestion for research to "Determine linkages between human actions (e.g., physical alterations to coasts, groundwater depletion) and natural systems that can either increase or compromise ecological integrity and community resiliency to storm events and climate change." This has a clear ecosystem component to it, and the HCE focus team endorses and could participate in this approach.

#### **(8) Involving "citizen-scientists" in HCE research and outreach.**

One way to increase the "reach" and expanse of research activities is to involve "citizen-scientists" in research projects. Interested citizens can be involved with collecting samples, making observations, or "spreading the word". Involving citizen-scientists can be a cost effective way of increasing the expanse of field work activity and provides an avenue for outreach and education.

Examples of activities that could be undertaken under this heading may include expanding and/or nationalizing stewardship programs for youth like Coastal Roots, Bay Grasses in Classes and Bayou Side Classroom (water quality) to develop connectivity both regionally and nationally. Sea Grant has historically promoted stewardship and these kinds of activities can make a difference for the long term. They can also expand into citizen scientist and community projects.

#### **(9) Indicators of Ecosystem Health**

We need to continue to establish good definitions and aims for what constitutes "ecosystem health" locally, regionally and nationally and get the word out through a variety of outreach and educational programs ranging from the classroom and teacher training to public forums to citizen training so that everyone is on the same page for a suite of variables. Partnering with agencies and universities within each state and region

to establish criteria for ecosystem health, determine indicators, standardize methods, measurement and assessment protocol would be valuable for the long term.

**(10) Innovative restoration science and tools**

Partner to support comprehensive/multidisciplinary research projects to support research on the ecological success and evolution of functional value of large restoration projects and for innovative restoration techniques. In Louisiana, spray dredging and pipeline slurry are ways to enhance wetlands and for building new wetlands however, the breadth of research documenting functionality of the newly created projects has been limited.