



MANAGING FOR A HEALTHY GULF OF MEXICO ECOSYSTEM: OBSTACLES, OPPORTUNITIES, AND TOOLS WORKSHOP

**November 1- 2, 2007
Corpus Christi, Texas**

WORKSHOP SUMMARY

The “Managing for a Healthy Gulf of Mexico Ecosystem Workshop” brought together scholars, practitioners, and stakeholders to understand challenges and identify successful approaches to integrating ocean and coastal management decisions across sectors and jurisdictions. The agenda focused on how to make necessary tradeoffs, address cumulative impacts, and achieve conservation and sustainability of ocean and coastal resources in the Gulf of Mexico.

The insights shared at the Workshop informed broader initiatives being conducted by the Environmental Law Institute and the Harte Research Institute on legal and regulatory mechanisms for the ecosystem-based management (EBM) of marine resources. The Workshop was made possible by the National Sea Grant Law Center and the David and Lucile Packard Foundation.

Participants identified some of the major challenges to EBM implementation in the Gulf of Mexico including the following:

- **General EBM Challenges**
 - Complexity at every scale.
 - Lack of agreement on a common set of objectives among stakeholders (need agreement on a set of outcomes).
 - Will always have to make decisions using imperfect information.
 - Need a regional problem to bring people together (some thought that hurricanes would be the organizing principle, but this has not happened in practice).
 - Gulf of Mexico is a large area meaning that large number of stakeholders will need to come together to make decisions. This can make it difficult to move forward. Movement occurs at a snails pace.
 - Funding is often a challenge after plans are in place leading to a lack of implementation.
 - Important decisions must be made in the absence of complete ecosystem information.

- **Adaptive Management Challenges**
 - Permit holders do not like adaptive management, because they do not want to see revisions to their permits.

- Industry wants reliability, and adaptive management may mean too much uncertainty.
- **Gulf of Mexico Challenges:**
 - Population growth
 - Coastal development
 - Freshwater inflows (water quantity)
 - Nutrient over-enrichment
 - Coastal wetlands loss
 - Overfishing, overcapitalization
 - Shifting baselines
 - Lack of mechanisms to work with Mexico and Cuba
 - Need to get commitment for change from voters so that leadership action translates to votes

In addition to noting the challenges, participants made several general EBM observations and recommendations on the key components, steps to EBM, challenges, and the possibility of using an indicator species or issue to drive EBM in the Gulf of Mexico. The following bullet points highlight these overarching comments:

- **Key Components**
 - adaptive management
 - precautionary principle
 - need to look at environment from ecosystem services and put a value on those service
 - integration: need to grapple with science, management and public policy
 - Stakeholder involvement: inclusive and transparent
 - Monitoring programs: ability to track baselines and be able to demonstrate success through indicators.
- **Steps to EBM**
 1. look comprehensively at the problem
 2. bound the problem in size that is tractable
 3. make implementation plan that drills down on key issues with time constraints
 4. look back at the big picture again
- **Potential indicator species or issues** that could serve both as an issue upon which to build support and could indicate basic health of the Gulf over time. (i.e., indicator species plus hook that captures the imagination). Can multiple programs agree on a set of indicators? [Organizing principle to compel collaboration – quantifiable indicators of ecosystem health and others fall into hook. Potential for overlap.]
 - Flower Garden reef

- Other charismatic places that are connected through circulation patterns (could Pacific coral reef monitoring program with standardized protocols be a potential model?)
 - Sperm whales – advantages: charismatic megafauna; endangered species so legal hook; good data (and growing data set) on species.
Disadvantages: pelagic species – may not indicate entire health of the gulf
 - Tarpon – advantages: public support; Disadvantage: they like nasty water
 - Other target fish species – e.g., bluefin tuna, billfish – are a potential indicator.
 - Whale Sharks
 - Manta rays
 - Harmful algal blooms
- **Steps for indicators**
 1. Stakeholders develop indicators
 2. Choose indicators that are already being monitored to build on existing data or programs
 3. Use baseline as indication of success or failure
 4. Adapt
- **Potential Approaches**
 - Small groups and NGOs are often the drivers for change. These processes are a way to start things and then the question is how do you scale up?
 - Estuary programs may be best suited for EBM because they are at a scale that can work.
 - The Gulf of Mexico Alliance approach picked issues that states could agree on to try to get momentum to move forward. It builds upon existing programs and resources and adds tasks that lead to small incremental changes.

DISCUSSION SECTION SUMMARY

The following sections on Water Quality, Wetlands and Hypoxia, Living Marine Resources, and Ocean Industries summarize panel-led discussions with all participants. In some instances the information reflects the thinking of several participants, and in other instances it reflects an individual's idea or comment.

Water Quality, Wetlands and Hypoxia

Key Discussion Questions:

1. What are the key issues related to conservation and sustainability of healthy water quality in the Gulf of Mexico?
2. What collaborative approaches help address water quality?
3. What are the success stories and pitfalls for collaborative management?

Panelists:

Doug Daigle, Coastal Restoration and Enhancement Through Science and Technology Program at Louisiana State University & the Lower Mississippi River Sub-Basin Committee on Hypoxia

Paul Montagna, Harte Research Institute, Texas A&M University, Corpus Christi
Don Parrish, American Farm Bureau Federation

Moderator:

Jay Austin, Environmental Law Institute

The participants discussed the management and regulation of freshwater and land-use activities that impact the Gulf of Mexico environment. The following summarizes the discussion of sources of water quality impacts, management challenges and needs, and success stories and opportunities. Because the challenges and success stories provided here do not reflect a comprehensive analysis, it is likely that many opportunities and obstacles have been overlooked.

Participants identified the following water quality impediments:

- Erosion
- Wetlands loss
- Flow alteration
- Floods
- Land-use change
- Water quantity
- Hypoxia

Participants identified and discussed the following management challenges and needs:

- Lack of a streamlined approach to permitting
- Hypoxia and nutrient input into the Gulf of Mexico
 - The federal Hypoxia Action Plan was developed and provides the framework for action. However, it has not been funded as it was envisioned. Due to a lack of funding, the plan has not been implemented.
 - While agriculture is a major contributor to hypoxia, one participant noted that hypoxia is a complex problem that arguably is not just an agricultural issue. Contributors to hypoxia also include urban runoff, loss of filtering from wetlands and estuaries, coastal development, and atmospheric deposition. Solutions to the Gulf of Mexico hypoxia problem should address all of these challenges.
 - One participant recommended that in order to garner support for action by the agricultural community, science should obtain baseline data on an individual farm basis.
 - Participants noted that biofuel development has the potential to dramatically increase agricultural production, which could complicate efforts to reduce nutrient input into the Gulf of Mexico.
- Cumulative impacts
 - Participants discussed the challenge of trying to account for cumulative impacts using water quantity decisions as an example. Participants noted that while there may be sufficient information about a single impact in a basin, there is a lack of information about the cumulative effect of multiple permitting decisions within the basin.
- Conduct adaptive management
 - Participants discussed the importance of adaptive management in the context of water quality and more broadly as an important approach to manage ecosystems.
 - It was also noted that the existing regulatory framework and the desire for regulatory certainty are barriers adaptive management implementation. For example, there is reluctance to adopt adaptive management approaches to water-rights permitting when applicants pressure permitting agencies to make final decisions that will allocate rights with certainty. One participant commented that the oil and gas industry does not like the idea of adaptive management, because millions or possibly billions are at stake in regulatory decisions. Because of this, the industry wants regulatory reliability, and the concept of adaptive management makes final decisions seem less certain.
 - Some participants noted that regulatory actions and decisions may reflect fear of lawsuits as a major driver of decision-making rather than good science.

With adaptive management comes additional decisions that could be targets for litigation.

- Need an achievable goal
 - Participants discussed the need to develop realistic and achievable goals as a way to demonstrate success and to build support. One example of a possible achievable goal is the removal of dikes in the Mississippi River Basin.

In addition to identifying challenges, participants identified success stories and opportunities for collaborative management that could or does lead toward ecosystem approaches. These include specific projects or programs, new laws or regulations, and innovative approaches to achieve EBM through collaboration as follows:

- **Projects and programs**
 - The Nueces River Project in South Texas addresses water quantity. It includes a stakeholder group tasked with implementing special conditions contained in permits based on drought management plan. The Project is authorized by Texas state law to develop dependable water for the City of Corpus Christi and surrounding region.
 - The Gulf of Mexico Hypoxia Action Plan could be implemented with additional funding. The new Water Resources Development Act may provide funding for the hypoxia plan.
 - Lightering¹ in the Gulf of Mexico was a stakeholder process that worked.
- **Laws and regulations**
 - Texas Senate Bill 3 is a new water quantity law that mandates the consideration of environmental flows with regard to water rights permits including establishing environmental set-asides.
- **Innovative approaches**
 - Panelists commented that the agricultural community values the work of land-grant universities and works with them to undertake environmental protection. Recommendations from land-grant University research often results in application by farmers.
 - To address agricultural runoff, treatment wetlands are an innovative practice. However, it was noted that multiple permitting hurdles (e.g., ESA, cultural requirements) make them less appealing.
 - Gulf of Mexico Hypoxia Action Plan could be implemented with additional funding. The new Water Resources Development Act may provide funding for the hypoxia plan.
 - Insurance industry is an unexploited toolbox. There is a need for a user-pay system.

¹ Lightering is the transferring of oil cargo between vessels of different sizes and is undertaken as many port facilities cannot accommodate extremely large ocean tankers.

- Education for legislators and judiciary.

Living Marine Resources

Key Discussion Questions:

1. What are the key issues related to conservation and sustainability of living marine resources in the Gulf of Mexico?
2. What collaborative approaches help address living marine resources?
3. What are the success stories and pitfalls for collaborative management?

Panelists:

Larry McKinney, Texas Parks and Wildlife Department

Bonnie Ponwith, National Marine Fisheries Service

GP Schmahl, National Marine Sanctuaries Program

William Kiene, National Marine Sanctuaries Program

Moderator:

Kathryn Mengerink, Environmental Law Institute

Participants identified the following challenges facing management of living marine resources including fisheries, protected species, marine mammals, and biodiversity more broadly, which can be divided into three categories—impacts, regulatory and management challenges, and information needs:

- **Impacts**
 - National Marine Sanctuary challenges:
 - Fishery impacts
 - Pollutant discharge
 - Wildlife impacts
 - Regional water quality
 - Invasive species
 - Increasing visitor usage
 - Coral bleaching and disease
 - Habitat connectivity
- **Regulatory and Management Challenges**
 - Some participants felt that it was the role of federal agencies to provide the framework for ecosystem-based management in the Gulf of Mexico.
 - Management paralysis on the federal level, especially with the Gulf of Mexico Fisheries Management Council, has made it difficult to manage fisheries.
 - As with water quality, fear of lawsuits, rather than only sound science, drives rulemaking.
 - There has been a loss of environmental support from fishing industry. There is a concern that this voice will be lost with the decline of the industry.

- Enforcement is another National Marine Sanctuary challenge.
- **Information Needs**
 - Participants noted that there is lack of basic information upon which to make decisions on a Gulf-wide scale.

Participants identified success stories and opportunities for collaboration in the Gulf of Mexico. Overall, participants felt that collaborative governance is a more effective approach rather than management that does not work with the regulated community and other interested parties. The following success stories and opportunities relate to public participation and interagency collaboration:

- **Public Participation**
 - Collaborative rulemaking builds trust. This worked for rulemaking in Texas regarding aquatic vegetation, shrimp disease and offshore aquaculture. Throughout the process, there was open recognition that mistakes would be made. Importantly, there was a willingness on the part of regulators to change rules in the future to correct mistakes, if necessary.
 - Flower Garden Banks National Marine Sanctuary engaged in a public process to expand the Sanctuary. This process has support from the public and the oil and gas industry.
- **Interagency Collaboration**
 - National Marine Sanctuaries Program is working with NOAA Fisheries to achieve Sanctuary goals
 - The Gulf of Mexico U.S. states are working with Mexico and Cuba to manage Kemp's Ridley sea turtles
 - The Gulf States Marine Fisheries Commission and the Gulf of Mexico Fishery Management Council provide mechanisms for collaboration among states and federal government
- **Tools and Approaches**
 - Limited access privileges for commercial fisheries are valuable tools that put management into the hands of stakeholders.
 - Gulf of Mexico Large Marine Ecosystem is a potential program in Gulf under review by UN
 - NGOs can operate as catalysts for bringing people together.
 - Natural phenomena and economics may solve ecosystem challenges (*e.g.*, Hurricanes and foreign shrimp imports and price of fuel has led to a decrease in shrimping)
 - Texas Commercial Fishing License Buyback Program
 - Texas Parks and Wildlife administers commercial fishing license buyback programs for shrimp, crab, and finfish. "Funds generated from a surcharge on these commercial licenses and on the Saltwater Fishing Stamp Endorsement are used for purchasing and

retiring commercial crab, finfish, bait shrimp, and bay shrimp licenses. The goal of the program is to reduce the number of license holders and fishing effort in each of those fisheries.” See <http://www.tpwd.state.tx.us/fishboat/fish/commercial/buyback.phtml>

Ocean Industries

Key Discussion Questions:

1. What are the key issues related to conservation and sustainability as they pertain to ocean industries in the Gulf of Mexico?
2. What collaborative industry approaches help address conservation and sustainability?
3. What are the success stories and pitfalls for collaborative management?

Panelists:

Paul Carangelo, Port of Corpus Christi Authority

Paul Kelly, Joint Ocean Commission Initiative

Carol Roden, Minerals Management Service

Richard McLaughlin, Harte Research Institute, TAMU-CC

Moderator:

Kathryn Mengerink, Environmental Law Institute

This broad category covered the topics of ports and shipping, wind power development, and oil and gas production in the Gulf of Mexico. Participants discussed key challenges and opportunities for collaborative governance to achieve a healthy Gulf of Mexico.

Participants identified the following key challenges for ports, oil and gas, shipping and wind power industries:

- **Ports**
 - Participants recognized the importance of Ports in a discussion about a healthy Gulf of Mexico. One participant noted that the Gulf region is home to the 1st, 2nd, 4th, 5th and 6th largest ports in the US.
 - Participants noted that ports have unique social, environmental, and economic issues, so a universal framework for EBM must consider and allow for variability from port to port.
- **Oil and Gas**
 - Participants noted that there is increased demand for production and increasing offshore development in the Gulf of Mexico.
 - One driver for expanding oil and gas development is the rapid technology development that is allowing the oil and gas industry to move into deeper waters. Participants noted that:

- Technological advancement outpaces research on its environmental impacts; and
 - MMS must respond to changing oil and gas industry with quick regulatory changes.
- **Shipping**
 - Participants understood that an increase in trade is expected and that this means an increase in shipping. The increase in shipping will lead to increase in noise in the ocean and potential for a greater number of ship strikes of whales.
- **Wind power**
 - Participants noted that the reason that offshore wind is an attractive alternative energy is because it blows more strongly and is more consistent off the coast in comparison to the terrestrial environment.
 - Texas has leased large areas for wind power development.
 - Wind power may not be economically feasible at this time.
 - Another issue for Texas coast is development of onshore (coastal) wind farms, which is developing more rapidly than offshore wind.
- **Overarching needs**
 - One participant commented that ecosystem-based management approaches must recognize the needs of industry and to make EBM palatable for all, managers should focus on the win-win solutions that are economically feasible.
 - Participants discussed that there is a need for a vision of what the future will look like and a need to identify the ecological scenario that stakeholders want.
 - Participants noted the need to leverage economic activities to achieve environmental goals.
 - Participants recognized that cooperative approaches are needed to manage the myriad ocean industries to avoid potential conflict (*e.g.*, potentially conflicting ocean uses among fishing, oil and gas, and alternative energy industries).

Participants discussed success stories and opportunities as they relate to ports and oil and gas:

- **Ports**
 - The Port of Corpus Christi has developed its own definition of sustainability. This includes eco-efficiency, current development, environmental protection, and economic and social development.
 - Port may be willing to take environmental action, but does not want to be later constrained by earlier voluntary environmental measures (for example, if a port performs voluntary wetland restoration on a particular

site, the Port does not want to be prohibited from later developing that site).

- Industry likes carrots, not sticks.

- **Oil and Gas**

- Sound from seismic exploration and the presence of endangered species (sperm whales) in the Gulf has led to cooperative approaches to addressing potential harm to marine mammals. For example, the oil and gas industry powers down when marine mammals are nearby and powers up slowly after the marine mammals have left the area.
- Before installing rigs, oil and gas companies must conduct biological and archeological surveys. The oil and gas industry conducts numerous such studies on the Gulf of Mexico and has compiled a tremendous body of information. Some information is proprietary, but not all. EBM efforts in the Gulf should take advantage of this body of information.

Making Tradeoffs and Managing Cumulative Impacts across Sectors

Key Discussion Questions:

1. How do we create linkages among the foregoing topics?
2. From an ecosystem-based perspective, we should be integrating management across the sectors. To do this, there has to be some ability to make tradeoffs among all the various sectors and plans. How?
3. Assuming that we agree that some form of collaboration across sectors is the goal, what legal change, cultural change within agencies, or maybe common sense do we need in order to reach that goal?

Moderators: Kathryn Mengerink and Jay Austin, Environmental Law Institute

Participants discussed the following challenges to making tradeoffs and managing cumulative impacts across sectors, considering both geographical challenges as well as cross-sectoral challenges:

- **Geographical Challenges**

- Inter-state cooperation requires states to perceive mutual benefits. In the absence of a perceived benefit, states will not participate. While some issues may cumulatively impact the Gulf, e.g., coastal land use, they are not considered to be inter-state challenges per se. On the other hand, some issues such as the Gulf of Mexico hypoxic zone require an inter-state solution.
- Gulf of Mexico regional problems include:
 - Hypoxia

- Harmful Algal Blooms
- Fisheries
- **Cross Sectoral Challenges**
 - Different stakeholders have different objectives, making collaborative, cross-sectoral approaches challenging. For example, oil and gas companies have one objective – make money for their shareholders. This is a very different outlook than other ecosystem stakeholders.
 - Texas has a law prohibiting special area management plans (otherwise this could be a mechanism to promote small-scale EBM)

Participants identified potential approaches and opportunities including the following:

- Corpus Christi Bay National Estuary Program (CCBNEP)
 - CCBNEP is a nonprofit organization with no regulatory authority. It is tasked with managing water quality, habitat, and living resources and conducting education and outreach. The CCBNEP conducts habitat protection through acquisition and restoration of habitat. They would be willing to contribute resources for new data gathering efforts. Also, because they already have established relationships within the community, they have the ability to bring the right people to the table to talk on an ecosystem scale.
- Conduct pilot projects in a few localities before trying to tackle the entire Gulf of Mexico ecosystem.
 - Coordinate at the small scale before scaling up and adding additional complexity.
 - Could use Corpus Christi Bay as a pilot for EBM implementation in the Gulf of Mexico.

Ecosystem-Based Management of the Corpus Christi Bay

One theme to emerge from the meeting was that conducting EBM at a large scale has many challenges related to jurisdiction, scale of the issues, and effective public participation and cooperative governance at such a large scale. A few participants commented that EBM should be piloted on a smaller scale, recommending Corpus Christi Bay as a potential site. Participants and meeting organizers agreed that it would be a useful exercise to explore the development of an EBM program for Corpus Christi Bay.

Participants discussed how to use existing programs to develop an EBM program including the Corpus Christi Bay National Estuary Program and the local National Estuarine Research Reserve. The group discussed the possibility of obtaining funding for

a pilot project under the Coastal Zone Enhancement Grant (Section 309 of the Coastal Zone Management Act). One participant from the Texas General Land Office agreed that such a proposal could fit within the criteria of Section 309.

Workshop participants delineated a small working group (comprising selected Workshop participants) to draft a proposal for the establishment of a Corpus Christi Bay EBM Program for submission under §309 of the Coastal Zone Management Act. It was agreed that the proposal must state the outcome of the program, and focus on pragmatic issues. Participants agreed that it would be helpful to solicit expert guidance during the drafting process, and Dr. Richard McLaughlin said that the Harte Research Institute would be willing lead the search for such a person. One participant suggested that the working group seek the involvement of Steve Murawski, Director of Scientific Programs and Chief Science Advisor for NOAA Fisheries.

Tools to Enhance Cooperative Ecosystem-Based Management

Moderator: Wyndilyn von Zharen (Texas A&M University)

Presentation topics:

1. Utilization and expansion upon existing ocean policy information systems such as the NOAA Coastal Services Center Legal Atlas or the PHIN with special focus on enhancement of the GoM database. *Rhonda Cummins and Dave Hoggatt (Texas A&M University, Galveston)*
2. A review of secondary literature considering issues associated with ecosystem-based collaborative management. *Mikell Smith (Texas A&M University, Corpus Christi)*
3. Description of a Coastal Community Planning Atlas for the Texas Coast. *Walt Peacock (Texas A&M University)*
4. Hypoxia Modeling in Corpus Christi Bay as a Pilot Project. *Kevin Nelson (Texas A&M University, Corpus Christi)*
5. PHINS. *Rebecca Alley (Gulf Services Center)*

Tools to Enhance Cooperative Ecosystem-Based Management

Existing information provided by available tools is not in an easily accessible form for policy makers or stakeholders. Participants discussed the need for tools or information sources that are accessible to as many stakeholders as possible. Tools such as the Legislative Atlas and the Coastal Community Planning Atlas, both of which deal with law and policy could be integrated with the others.

EBM Workshop Questionnaire

Prior to the Workshop, a questionnaire was distributed to participants. In this session, Wyndylyn von Zharen gave a presentation discussing the participants' responses. The questions and responses are outlined below.

Water Quality/Quantity: What effective collaborative approaches are you aware of in areas outside of the Gulf of Mexico?

- Chesapeake Bay Foundation
- Gulf of Maine Council on the Marine Environment
- Great Lakes Commission
- West Coast Governors' Agreement on Ocean Health
- Jacques Cousteau National Estuarine Research Reserve has a watershed management plan. The Reserve's coastal training program has been very successful in implementing EBM approaches to watershed management. However, I don't think it can work in the Gulf. EBM is much more applicable at a small-scale. There are no regulatory agencies that are mandated to assure the health of the entire Gulf of Mexico.
- Chesapeake Bay Program is an excellent example of a multi-state program that could work in the Gulf of Mexico region. However, the Chesapeake Bay is a more tightly knit community, and its partners are much closer spatially. The CBP's volunteer water sampling program is an example of a tool for education and outreach.
- Southeast Aquatic Resources Partnership is composed of 13 SE States. This Partnership recognizes the importance of states, federal resource agencies, universities and other resource entities working together to leverage available resources
- NOAA has formed eight regional collaboration teams encompassing all geographic areas for which NOAA has responsibility.

Ocean Industrial Activities: What industrial activities taking place in the Gulf of Mexico have the most impact on the Gulf of Mexico ecosystem?

- Shipping (LNG noted)
- Oil and gas industry
- Aquaculture/farming operations
- Urban non-point source pollution
- Cumulative and petrochemical & refining industrial impacts
- Urban growth / Population Growth

What effect, if any, could these impacts have on the process of implementing an effective, adaptive ecosystem based management strategy?

Industry Impacts:

- Oil and Gas
 - Impact virtually all areas and habitats
 - They are reluctant to incorporate adaptive management
 - Produced water from offshore installation

- Shipping
 - Produces noise, water, and air pollution.
 - Noise pollution leaves to the disturbance/alteration of behavior of species that utilize acoustics for feeding, social interaction, etc.
 - Garbage from vessels (*e.g.*, plastics, grey water, black water)
 - Cruise ships release human waste. There are regulations on dumping but it floats to shores
- Commercial fishing
 - Gear/plastics
 - Lack of adherence to regulations where regulations are in place
 - Extreme difficulty – including high costs - of enforcing regulations
 - Air pollution
 - Water pollution
 - Too many fishers catching too many fish
 - By-catch
- Shipping for activities outside the coastal zone: greatly affect EBM but there is no governance and process in place.
- Coastal industry: freshwater inflow quality, quantity
- Too many people!
- All interests need to be part of the solution, buy into the process, and feel that they will benefit/suffer equally.
- Industry money drives policy!

Aquatic Species: What methods would you suggest to engage the public/users in eliminating or reducing the spread of aquatic invasive species? In other words, what are some strategies for changing users' awareness, behavior, and practices to eliminate or reduce the spread of these species?

- Environmental signage
- Organize volunteer restoration activities
- Educate public/users on the consequences of their activities through targeted scoping meetings
- Create state/federal regulatory framework
- Develop eradication/control programs
- Texas Parks and Wildlife Department should develop [has developed?] educational programs, public announcements, websites, and postings near waterways
- States' resource agencies have banded together to form the Texas Invasive Species Council. The Council meets on regular basis
- Keep commercial enterprises such as plant nurseries and aquarium businesses informed and educated
- Address ballast water, one of the biggest threats in the marine environment.
- General public:
 - Case studies are highly effective. Behavior may be changed by a well crafted story on how an introduction of an invasive species brought about negative consequences for the target audience.
- Restrict commercial trade

Developing a Critical Mass: Is it important to develop a critical mass of coastal marine law and policy expertise in the Gulf of Mexico in support of EBM; why or why not? What steps could we take to develop this critical mass?

- It is important to develop a critical mass. Period.
- Join regulatory participation (*e.g.* between Mexico and Cuba)
- Educate state and federal legislators
- Hold public scoping and education meetings/workshops
- Steps have already been taken in the Gulf of Mexico (*e.g.*, Gulf of Mexico program, Gulf States Governor's Accord, Gulf of Mexico Alliance, and Gulf of Mexico Foundation all share common goal: sustaining health and vitality of Gulf of Mexico)
- Monitoring and preparation of follow up actions for the Gulf of Mexico Governors' Action Plan. Implementation of this plan is underway and oversight of process is essential
- Improve delivery system that currently exists in our extension infrastructure (but which is little used in land use issues)
- Expertise in science, policy, and management and associated regulatory constraints is needed to affect change
- Policy and management expertise is needed along with communication and outreach expertise to help frame questions that technological models can begin to provide insightful answers to
- Identify regulations/laws that affect the target issue or area
- Get regulatory agencies involved
- Include policy personnel that are knowledgeable about the identified regulations
- Conduct student training
- Assemble experts for conferences and workshops
- Disseminate information
- Visualization
- Federal agency and probably most state governments and environmental NGOs have resident expertise in law and policy. Get these folks to collaborate to resolve obstacles to EBM.
- Short on economists' and social scientists' skill set
 - Need to know what constituents want
 - Need to obtain that information in a way that is clear and as free of bias as possible.
 - Each of the levels of government and NGOs has fewer economists and social scientists than they need to meet their goals.
- Need experts who are able to help translate ecosystem services into a unit of measure that is comparable with human activities and services provided by the Gulf of Mexico (*e.g.*, commercial and recreational fishing, marine transportation, oil and gas production, ecotourism)

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