INDICATORS, METRICS AND TOOLS FOR PRESENTING THE SCIENCE AND VISION OF GULF COAST ECOSYSTEM RESTORATION

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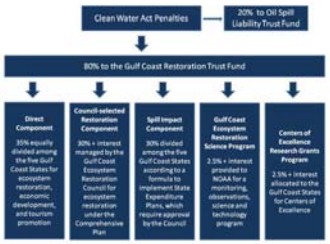
Abstract

The Gulf Coast Ecosystem Restoration Council has oversight on restoration efforts under the recently passed RESTORE Act in response to the historic Deep Water Horizon oil spill in the Gulf of Mexico. The Council will develop a Comprehensive Restoration Plan using best available science to restore and protect the natural resources, ecosystem, habitats and economy of the Gulf Coast. The Council's Plan, based on a strategy previously developed by the Gulf Coast Ecosystem Restoration Task Force (GCERTF), will include both restoration science and issues of economic recovery associated with restoring vital gulf communities. In this poster, we examine the linkages between the GCERTF's Strategy, Council Plans and recent scientific advances conducted by the U.S. Environmental Protection Agency's Office of Research and Development which include indicators, metrics and tools that may be useful for measuring restoration performance. The natural resources of the Gulf's coastal and marine habitats and the services they provide are essential to the regional economy and provide 17% of the Nation's gross domestic product (GDP). Restoration of these natural resources, goods and services will be pivotal to recovery of this ecosystem and the regional economy.

The Strategy

The Gulf Coast Ecosystem Restoration Task Force released its Ecosystem Restoration Strategy in December, 2011. Source: http://www.epa.gov/gcertf/

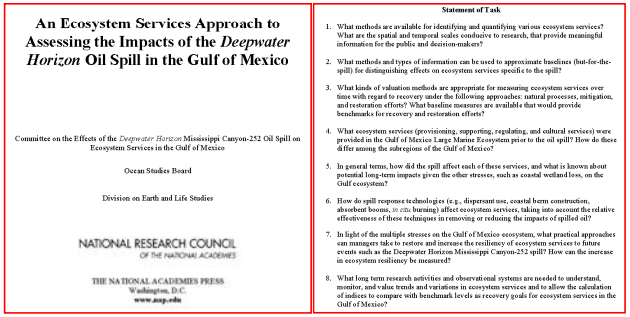
RESTORE Structure



The current restoration structure of the RESTORE Act. For more information see http://www.restorethegulf.gov

National Academy of Science 2013 Report

A July 2013 report by the NRC's Committee of the Effects of the *Deepwater Horizon* Mississippi Canyon-252 Oil Spill highlights the importance of Ecosystem Goods and Services (EGS).



An Ecosystem Services Approach to Assessing the Impacts of the *Deepwater Horizon* Oil Spill in the Gulf of Mexico

Committee on the Effects of the *Deepwater Horizon* Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico

Ocean Studies Board

Division on Earth and Life Studies

NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES

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Statement of Task

1. What methods are available for identifying and quantifying various ecosystem services? What are the spatial and temporal scales conducive to research, that provide meaningful information for the public and decision-makers?
2. What methods and types of information can be used to approximate baselines (but-for-the-spill) for distinguishing effects on ecosystem services specific to the spill?
3. What kinds of valuation methods are appropriate for measuring ecosystem services over time with regard to recovery under the following approaches: natural processes, mitigation, and restoration efforts? What baseline measures are available that would provide benchmarks for recovery and restoration efforts?
4. What ecosystem services (provisioning, supporting, regulating, and cultural services) were provided in the Gulf of Mexico Large Marine Ecosystem prior to the oil spill? How do these differ among the subregions of the Gulf of Mexico?
5. In general terms, how did the spill affect each of these services, and what is known about potential long-term impacts given the other stresses, such as coastal wetland loss, on the Gulf ecosystem?
6. How do spill response technologies (e.g., dispersant use, coastal berm construction, absorbent booms, *in situ* burning) affect ecosystem services, taking into account the relative effectiveness of these techniques in removing or reducing the impacts of spilled oil?
7. In light of the multiple stresses on the Gulf of Mexico ecosystem, what practical approaches can managers take to restore and increase the resiliency of ecosystem services to future events such as the Deepwater Horizon Mississippi Canyon-252 spill? How can the increase in ecosystem resiliency be measured?
8. What long term research activities and observational systems are needed to understand, monitor, and value trends and variations in ecosystem services and to allow the calculation of indices to compare with benchmark levels as recovery goals for ecosystem services in the Gulf of Mexico?

RESTORE's 5 Overarching Goals

Restore, Enhance and Protect Habitats

- Prioritize ecosystem restoration in river management decisions
- Improve sediment management practices
- Preserve natural river processes
- Expand conservation areas to ensure ecosystem services
- Restore and conserve coastal and near-shore habitats

Restore, Improve and Protect Water Quality

- Decrease and manage excess nutrient levels
- Focus restoration actions in priority watersheds
- Reduce pollutants and pathogens
- Improve quantity and quality of freshwater flow into priority estuaries
- Coordinate and expand existing water quality monitoring efforts
- Collaborate with Mexico to assess and reduce emissions from oceangoing vessels

Protect and Restore Living Coastal and Marine Resources

- Restore depleted populations
- Conserve and protect offshore environments pathogens
- Restore and protect oyster and coral reefs
- Coordinate and expand existing monitoring efforts to track sentinel species and sites
- Minimize or eliminate invasive species

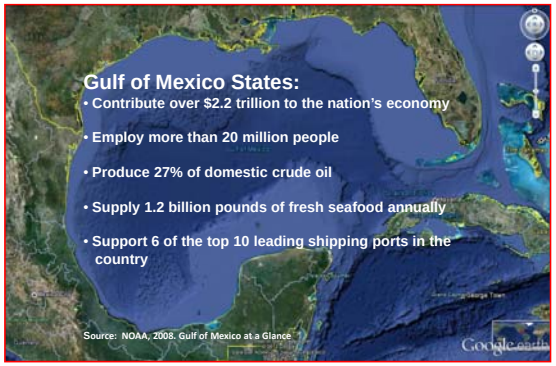
Promote Gulf Coast Community Resilience

- Develop stakeholder-informed coastal improvement programs
- Provide analytical support tools to enhance community planning and reduce risk
- Enhance environmental education and outreach
- Minimize or eliminate invasive species

Restore and Revitalize the Gulf Economy

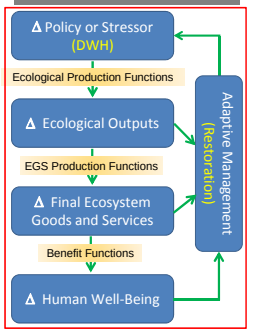
- Create opportunities for new and existing businesses, especially those that depend on natural resources
- Enhance the ability to withstand, prevent and quickly recover from future natural or man-made disruptions
- Promote natural storm buffers to reduce economic losses from storm surge flooding
- Provide people with desirable places to live, work and play

Role of the Gulf

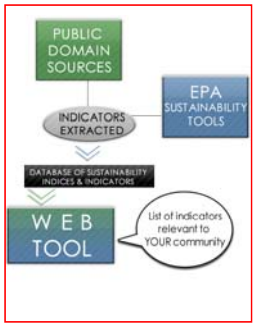


Examples of USEPA/ORD Tools

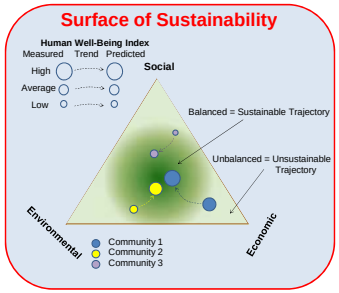
Framework for Utilizing Ecosystem Services



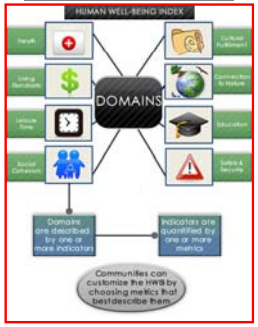
Develop a Database of EGS Tools



Community Visualization Tool



Human Well-Being



Take Home Messages

Relevance to Gulf Coast Ecosystem Restoration

The USEPA Office of Research and Development's Science Portfolio contains a number of tools that may help address some of the overarching goals of the RESTORE effort. Three of the Gulf of Mexico Research Plan's research priorities highlighted in the National Academy of Science's report align well with the work underway at USEPA:

- **Develop socio-economic assessments and models to evaluate the impact of multiple human uses on ecosystems (ORPP RP 15)**
- **Develop appropriate indicators and metrics for sustainable use and effective management of GoM marine resources and ecosystems (ORPP RP16)**
- **Understand human use patterns that may influence resource stability and sustainability (ORPP RP3)**

Relevance to NCER/SER → CEER 2014 Conference

With the merging of NCER/SER and the next conference scheduled for July 2014 in New Orleans, ongoing efforts in Gulf of Mexico Restoration will have a notable presence in this forum. The USEPA Gulf of Mexico Program (http://www.epa.gov/gmpo/) and Office of Research and Development are positioned to contribute science to the 2014 Conference on Ecological and Ecosystem Restoration. (http://www.conference.ifas.ufl.edu/CEER2014/)

GULF OF MEXICO PROGRAM