



Exploring Applications of Ecosystem Services Conceptual Models for Coastal Habitats

Overview

In recent years, the National Estuarine Research Reserve System and its partners have become increasingly interested in applying an ecosystem services approach to coastal management. This approach, which considers the benefits that flow from nature to people, has been incorporated into the reserve system's 2017 to 2022 Strategic Plan, and the federal government is considering ways to incorporate ecosystem services into decision making. However, there is currently no standardized way to integrate ecosystem services into coastal management and decision-making processes.

Researchers at Duke University have been working with the National Oceanic and Atmospheric Administration and the reserve system to find streamlined ways to incorporate ecosystem services into coastal decision making, management, and research. Their first year of work resulted in the creation of a generalized Ecosystem Services Conceptual Model (ESCM) for salt marsh ecosystems, which displays how salt marsh restoration interventions result in ecosystem services and other human welfare impacts. These models represent a promising entry point for incorporating ecosystem service considerations into a program or a project.

This project is expanding on that modeling approach by improving the existing salt marsh model and developing new models for other estuarine habitats. The project team is developing site-specific ecosystem conceptual models at a salt marsh and oyster reef site at the North Carolina Reserve, and at a mangrove site at the Rookery Bay Reserve. These site-specific models will be used to improve and/or develop generalized ecosystem services models for each habitat type. This project is linked to a related project, Gulf of Mexico Ecosystem Service Logic Models and Socio-Economic Indicators (GEMS), which is using a similar approach by creating Ecosystem Services Conceptual Models to develop socio-economic indicators for restoration projects in the Gulf of Mexico. Feedback and integration between these two projects can enhance the outputs and findings of both. These efforts can ultimately assist in the development of a standardized approach for consideration of ecosystem services within NOAA and the research reserve system.

Anticipated Benefits

- Easier identification and enhanced understanding of ecosystem service-related outcomes of a management intervention.
- Streamlined consideration of ecosystem services in decision making in the reserve system.

Project Location

North Carolina National Estuarine Research Reserve
Rookery Bay National Estuarine Research Reserve, Florida

Project Duration

September 1, 2018 to August 31, 2019

Project Lead

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Project Type

Catalyst – Targeted investment for advancing collaborative science

Project Collaborators

- Duke University
- North Carolina National Estuarine Research Reserve, North Carolina
- Rookery Bay National Estuarine Research Reserve, Florida

- Increased consistency in the way the reserve system approaches ecosystem services projects, monitoring, and outreach.
- Enhanced ability to compare ecosystem service outcomes across sites, projects, and habitats through the development of common socio-economic indicators.
- Improved communications and increased collaboration with outside partners on ecosystem services projects.

Project Approach

Through collaborative workshops, the project team is bringing together stakeholder groups with expertise in salt marsh, oyster reef, and mangrove habitats and guiding them in the development of site-specific Ecosystem Services Conceptual Models. These workshops are also contributing to the creation of a list of site-specific Benefit Relevant (socio-economic) Indicators for each of the models, which will be key resources to feed into the development of a wider regional or national socio-economic monitoring system that NOAA is currently exploring. The site-specific models will then be used to create generalized models and a list of common socio-economic indicators for oyster reefs and mangroves, which can be augmented by similar ongoing work in the GEMS project. The team will also conduct an assessment to determine the feasibility of collecting data that would inform the indicators chosen during the workshops. Finally, the team will create a report detailing the models, metrics, and methods used to create the ecosystem services models, and develop outreach and communications materials that will include a facilitation guide to enable others to host workshops similar to the ones led by the project team.

Targeted End Users and Anticipated Products

- Site-specific Ecosystem Services Conceptual Models will be generated for a salt marsh and oyster reef site in North Carolina and a mangrove site in Florida. Targeted end users for these models include staff at the Rookery Bay and North Carolina reserves and their partners. These models will enable consideration of the many potential outcomes of restoring or maintaining salt marshes, oyster reefs, or mangroves at a specific site; can help identify research needs; and be used as outreach materials to facilitate understanding of the services that these ecosystems provide.
- Generalized Ecosystem Services Conceptual Models will be created for oyster reef and mangrove systems and have a potentially much larger end user base because they can be adapted and applied to any site within that habitat. These generalized models could be used as a tool to help plan for ecosystem services-related outcomes of management or research projects around the country, as well as serve as a platform for streamlining collaboration with partners outside of the National Estuarine Research Reserve System, such as National Estuary Programs.
- Ecosystem service metrics will be identified for each site-specific model and are likely to be useful to the entire reserve system by feeding into efforts to incorporate socio-economic monitoring into the reserves' System-Wide Monitoring Program.
- A report detailing the project outputs and explaining the model creation process will be developed with a facilitation guide to help end users develop their own Ecosystem Services Conceptual Models or apply those developed during this project.
- Ecosystem service outreach materials targeted for use in Coastal Training Programs at reserves nationwide will be created to educate and train others about ecosystem services, ecosystem assessments, and associated monitoring.

About the Science Collaborative

The National Estuarine Research Reserve System's Science Collaborative supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is managed by the University of Michigan's Water Center through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA). Funding for the research reserves and this program comes from NOAA. Learn more at coast.noaa.gov/nerrs or graham.umich.edu/water/nerrs.