

Ecosystem Services Coordinated Case Study: MOBILE BAY, ALABAMA

Background

EPA’s Sustainable and Healthy Communities Research Program is working with five communities across the U.S. to develop and apply research that helps the communities solve sustainability-related environmental challenges and provides decision-support.

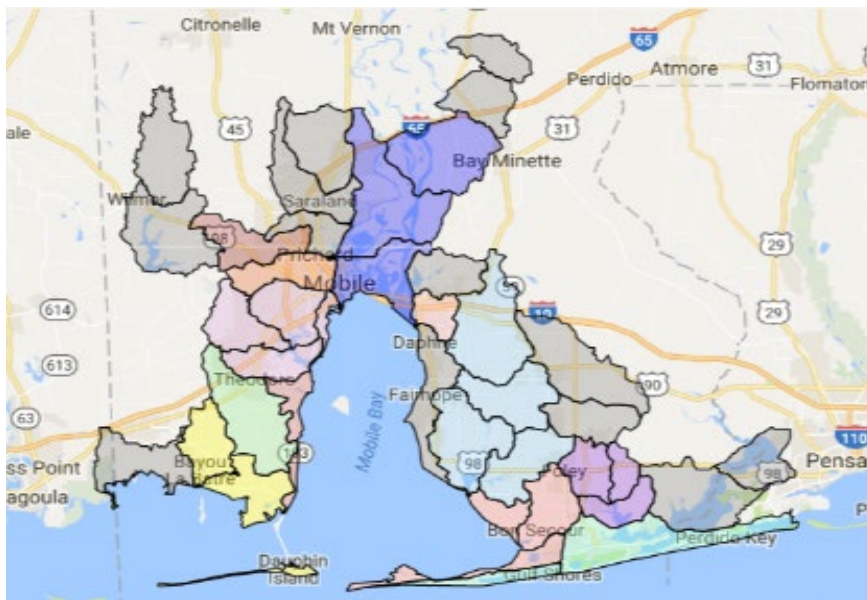
EPA researchers are developing approaches and tools for the communities that integrate ecosystem goods and services (EGS) concepts into community-level decision making, and emphasize *final* EGS since these are “the components of nature, *directly* enjoyed, consumed, or used to yield human well-being.”¹

Results of these five coordinated case studies will offer lessons learned and practical strategies that can be used in other locations and under different conditions.

Research in Mobile Bay, Ala., the setting of one of the case studies, focuses on measuring the EGS provided by coastal restoration.

Issue

Mobile Bay is the drainage point for a 43,000 square mile watershed that covers portions of three states. However, the quality and quantity of services provided by the bay is greatly determined by urbanization



Mobile Bay, Ala. sub-watersheds.

of land in smaller sub-watersheds along its edges. Sub-watershed restoration is a key objective in the management plan for the Mobile Bay National Estuary Program (NEP), including improvements in stream water quality and shoreline health. Unfortunately, these efforts are not currently evaluated with respect to EGS provision or in the context of land use change in the surrounding landscape.

The goal of this case study research is to examine how planned and implemented restoration activities have contributed to EGS production and how that contribution is impacted by changes in land use.

Project Context

Restoration activities are mandated by NEP goals and described in a Comprehensive Conservation and Management Plan (CCMP), which is amended and updated every five years. Overarching goals of restoration are to improve and maintain the quality of natural resources in the Mobile Bay watershed with a focus on human benefit in six target categories: public access, supporting healthy beaches, ensuring fish abundance, preserving heritage and culture, promoting ecosystem resilience, and maintaining water quality. To allow for evaluation of resource investments, CCMP implementation requires that priorities be set and indicators of

desired outcomes be defined. These indicators of success can be defined based on EGS production and tie more outcomes directly to human benefits.

In addition, value of stream and shoreline restoration may be impacted by changes in the surrounding landscape that are driven not by NEP priorities, but by municipal and county strategic planning. Impacts and outcomes of NEP restoration activities should be evaluated in the context of landscape changes to allow for the most realistic measure of restoration impacts.

Project Objectives

EPA scientists are working with Mobile Bay NEP staff and local municipalities to apply models and tools that relate restoration changes to EGS production and delivery at the subwatershed scale. These are largely tools developed in other coastal watersheds (i.e. Tampa Bay, Fla., Pensacola Bay, Fla., and Willamette River, Ore.). A secondary goal of the case study is to evaluate transferability of select tools between ecosystems and between target issues.

The initial process is to work with stakeholders to define broad final ecosystem goods and services (FEGS)-based objectives and measures of success and this process involves the formation of a FEGS working group sponsored by the Mobile Bay NEP. This group is working to match FEGS priorities to the priorities laid out in the current CCMP. EPA scientists are also parameterizing key model-based tools for a target subwatershed to be used as a testbed for model application. Initially, researchers are working in the D'Olive

watershed on the eastern shore of Mobile Bay near Spanish Fort, Ala. This initial work involves the parameterization of two models.

An ecohydrological model (Visualizing Ecosystem Land Management Assessments - VELMA)² will be used to assess the impact of land cover and land use of water quality and fish habitat. Second, an EGS mapping tool (EPA H2O) will be used to directly measure EGS production and delivery to beneficiaries in the subwatershed. Together, VELMA and EPA H2O will be used to assess impacts of restoration activities, as well as the interrelationship between stream restoration and changes in land use/land cover.

The research objectives of the Mobile Bay coordinated case study are:

- Work with community stakeholders to derive transferable measures of community well-being and link them to the production of EGS that directly benefit the community.
- Apply Structured Decision Making (SDM) approaches to assist communities in identifying their fundamental objectives.
- Evaluate transferability of quantitative tools that link delivery of FEGS and community decisions across communities.
- Develop decision support based on these quantitative tools to evaluate specific actions associated with fundamental objectives in multiple communities.
- Examine similarities and differences across communities in available FEGS, community

well-being, and the sustainability of community decisions.

At the heart of this work is sound ecosystem science. EPA scientists will build on past success in this discipline, within EPA and beyond, to ask how research conducted in specific communities translates to other communities with similar issues and resources. This will include quantitative visualization models developed by EPA researchers to evaluate specific scenarios of community change.

Project Impact

This project will directly inform future planning by the Mobile Bay NEP. In addition, this approach is being applied to federal restoration under the National Environmental Protection Act (NEPA) Superfund program as a proof of concept for assessment of EGS in NEPA projects. The intended outcome is a broader suite of success indicators that can be linked to multiple stakeholder objectives.

References

1. Boyd, J.W. and S. Banzhaf. (2007). What are ecosystem services? The need for standardized environmental accounting units. *Ecological Economics* 63:616-626.
2. <https://www.epa.gov/water-research/visualizing-ecosystem-land-management-assessments-velma-model-20>

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