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Ecosystem Services Coordinated Case Study: SAN JUAN, PUERTO RICO

Background

EPA's Sustainable and Healthy Communities Research Program has been 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 offer lessons learned and practical strategies that can be used in other locations and under different conditions.

Research in San Juan, Puerto Rico, the setting of one of the case studies, characterizes the impacts of watershed management decisions on the condition of estuarine and near-coastal ecosystems and associated EGS, with a focus on connections to benefits for human health and well-being.

San Jose Lagoon in San Juan, Puerto Rico

Issue

The San Juan Bay Estuary watershed is a predominately urban watershed comprising a number of freshwater, estuarine, and coastal ecosystems. The estuary program, government, and community groups are coordinating to implement actions (e.g. dredging canals, restoration of mangrove buffers, and sewage discharge interventions) to target significant pressures (e.g. urbanization, aquatic debris, habitat loss, stormwater runoff, sewage discharges, and flooding) that affect the condition of the estuary, as well as associated terrestrial and coastal ecosystems.

Project Context

This case study develops tools and approaches to investigate the potential impacts of alternative watershed management decisions on EGS and resulting social and economic benefits to the greater San Juan community. EPA researchers are investigating potential impacts on vulnerable populations along with ongoing economic issues and population decline throughout Puerto Rico.

Project Objectives

Objectives of this case study are to develop information and tools to assist communities in the San Juan Bay estuary watershed making decisions to best support ecological integrity, social well-being, economic prosperity, and environmental stewardship. The case study emphasizes and evaluates collaborative development of information and approaches between EPA, Puerto Rico agencies, and community groups.

Document reviews and stakeholder engagement are being used to: a) identify key stakeholder and beneficiary groups; b) identify key economic, social, health, and

environmental concerns of stakeholders; c) develop conceptual frameworks linking decisions to ecosystems to benefits; and d) identify key areas where research is needed.

The case study emphasizes characterizing the potential shared benefits or tradeoffs to human health and well-being as watershed management actions are implemented. Research leverages available frameworks such as the Eco-Health Relationship Browser[2] (to identify linkages between ecological condition, ecosystem services, and health outcomes) and the Human Well-Being Index[3] (to evaluate the influence of ecosystem service flows on multiple components of economic and social well-being).

EGS identified as most relevant to stakeholders in the case study include flood mitigation, aesthetic and recreational opportunities, temperature regulation, water quality regulation, and carbon sequestration. Researchers have been collecting field data to characterize carbon storage[4] and anthropogenic nitrogen flow through the estuarine system.[5,6] Researchers have been collecting field data and implementing modeling approaches to link flooding and water quality to impacts on asthma,[7] gastrointestinal,[8] and vector-borne illnesses.[9,10]

EPA researchers are integrating case study information into modeling frameworks to investigate the impacts of alternative scenarios on priority EGS[11] and associated benefits to human health and well-being.[12]

Project Impact

This case study enhances understanding of relationships between estuarine watershed management and benefits toward economically, socially, and environmentally sustainable communities. Coordination with other case studies allows exploration and identification of approaches for integrating EGS into community decision making that are scalable and transferable to other communities.

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