

Ecosystem Services Coordinated Case Study: GREAT LAKES AREA OF CONCERN

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.

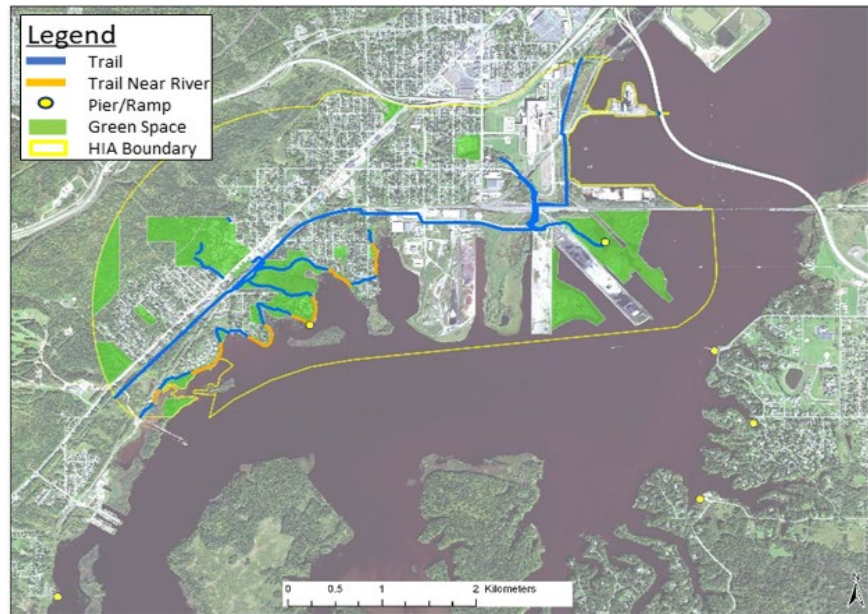
EPA researchers are developing approaches and tools for the communities that integrate ecosystem goods and services (EGS) concepts into community-level decision making, and emphasize *final* EGS since these are "the components of nature, directly enjoyed, consumed, or used to yield human well-being."¹

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.

Great Lakes Areas of Concern

One of the case studies, located in the Great Lakes Areas of Concern (AOC), aims to expand existing AOC processes to include broad consideration of EGS into decision making and engage larger and different groups of stakeholders.

An AOC is "a geographic area that fails to meet the general or specific objectives of the agreement where



Map of Great Lakes Area of Concern in the St. Louis river watershed.

such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life."² In total, 43 AOCs have been identified in Canada and the U.S. Today, 27 AOCs remain on the U.S. side of the Great Lakes.

EPA's AOC program began in the late 1970s and is an early example of an ecosystem-based approach founded on the maintenance of ecosystem integrity and recognition of human use of, and benefits from, nature. The governance structure of the AOC program is comprised of federal, tribal or First Nation, state, and local agencies working with local stakeholders through a public or citizen advisory

committee. This research project aims to incorporate EGS into decision making by providing information about how AOC decisions affect EGS, all while preserving current programmatic targets agreed to through the AOC

Project Context

The Great Lakes coastal ecosystems provide beneficial uses for humans such as drinking water, clean sediment, and food.

The ultimate goal for the Great Lakes AOC is to restore the beneficial uses of the aquatic ecosystems that have been impaired in the most degraded sites within the Great Lakes,

particularly industrial and population centers along the Great Lakes shoreline.

Beneficial Use Impairments

Beneficial use impairments (BUIs) are changes in the chemical, physical or biological integrity of the Great Lakes system that have caused significant environmental degradation. In total, 14 BUIs have been established for environmental problems such as beach closures, fish consumption advisories, dredging restrictions, and excess nutrients and sediment.

These BUIs were identified by stakeholders within Great Lakes coastal communities and are comparable to EGS. All BUIs that have been designated for an AOC, must be removed for the AOC to be considered restored.

BUI Removal

The goal of an AOC is to remove identified BUIs through sediment remediation, water quality improvements, and aquatic habitat restoration. An AOC is responsible for identifying the management actions that are needed to remove BUIs (e.g. establish goals for combined sewage overflow reductions). Once all the identified actions to achieve removal of BUIs are finished, the AOC is recognized as having management actions complete.

In the last step, after the AOC determines that BUIs have been successfully removed (which may take multiple years), the AOC petitions EPA for de-listing. Once an AOC is delisted, the AOC is considered restored to Great Lakes background levels and no

additional work will be conducted under the AOC program.

The AOC program requires that each step (BUI identification, developing and completing management actions, removing BUIs, and AOC de-listing) requires stakeholder input and participation.

Project Objectives

This case study's objectives are to:

1. Preserve the current, previously existing programmatic targets agreed to through the AOC governance structure, and to expand an explicit consideration of EGS.
2. Provide a forum for stakeholders to discuss direct and indirect connections between remediation/restoration activities and EGS.
3. Conduct participatory mapping and co-development of spatially-explicit ecological production functions (models to estimate the ecological processes to produce EGS) to demonstrate how removal of BUIs can improve EGS.
4. Provide analysis results to stakeholders who provide comments on various trade-offs to decision makers.
5. Moving forward, better understand how spatial provisioning of EGS can affect trade-offs.

Project Impact

This project will use decision-support methods such as Health Impact Analysis (HIA) to evaluate management actions in terms of both EGS and impacts to community health and wellbeing.

Incorporating metrics to represent relative value can help improve both ecological and human wellbeing outcomes. The open-ended nature of the analysis allows researchers to capture a breadth of values, including community connections and sense of place.

Mapping the area provided by certain services can help understand spatial trade-offs in EGS, which may be important with respect to access and use of restored sites, as well as to consider impacts on vulnerable communities in adjacent neighborhoods.

References

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3. Angradi, T.R. et al. (2016). Mapping ecosystem service indicators in a Great Lakes estuarine Area of Concern. *Journal of Great Lakes Research* 42:717-727.
4. Williams, K.C., and J.C. Hoffman. (2020) Remediation to restoration to revitalization: engaging communities to support ecosystem-based management and improve human wellbeing at clean-up sites, pp. 543-560 In T.G. O'Higgins, M. Lago, and T.H. DeWitt (eds.), *Ecosystem-Based Management, Ecosystem Services and Aquatic Biodiversity: Theory, Tools and Applications*. Springer, New York.

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