



Reference SON: *Strategic Research HQ Initiative*

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Ecosystem Goods and Services (EGS) Framework, Tool Development and Methods Refinement¹

Research Need

Many federal agencies are beginning to formally recognize and consider in their decision-making processes services yielded by ecosystems that benefit humans. USACE currently lacks a structured approach to adequately consider appropriate ecosystem services in a manner scalable to its disclosure and decision-making contexts. The general purpose of this project is to improve our understanding and ability to incorporate consideration of ecological goods and services (EGS) in Corps planning, including the development of new tools that would make the implementation of EGS assessment in Corps planning easier and more consistent.

Project Objectives & Plan

We used the expertise of Corps Planners and academics working in the EGS field to test, develop example applications, and refined the Proposed Framework developed in Phase I. We also provided Districts with tools to more consistently address elements of non-use services that address societal preferences - without attempting to monetize the benefits of those services - using the best available science in a systematic and repeatable way. Efforts included:

- Multiple case studies testing the Proposed Framework in different types of projects and different parts of the country, and a write up of each as a chapter in a technical report.
- Two integrated EGS tools (Connectivity and Scarcity/Restorability) in a technical note on each.

Payoff

This project will advance the Corps' capabilities to capture the full range of relevant benefits and losses resulting from Corps projects via EGS assessment. The tests of the Proposed Framework will provide planners with examples of EGS assessment in several settings and project types, in the

event that future planning policy enables the use of EGS assessment in Corps planning. The tools being developed will also promote eventual EGS assessment but may also be used under existing planning procedures in budget justification.

Products

Journal Articles (JAs)

Wainger, L.A., Murray, E.O., Theiling, C.H., McMurray, A.M., Cushing, J.A., Komlos, S.B. and Cofrancesco, A.F. (2023). Broadening benefits and anticipating tradeoffs with a proposed ecosystem service analysis framework for the US Army Corps of Engineers. *Environmental Management* 71, 901–920. <https://doi.org/10.1007/s00267-022-01777-7>

Technical Reports (TRs)

Cushing, J.A., Komlos, S.B., Barnes, T.K., Theiling, C.H. and Murray, E.O. (2025). Incorporating ecosystem goods and services into USACE project planning: a retrospective analysis (ERDC/EL SR-25-1), Special Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. <http://dx.doi.org/10.21079/11681/49519>

Hychka, K., Wainger, L.A., Murray, E.O. and Price, E.W. (In review). Using connectivity to improve non-monetary benefit relevant indicators of non-use ecosystem service values from restoration, Technical Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Murray, E.O., Theiling, C.H. and Wainger, L.A. (2025). Developing an ecosystem goods and services assessment framework: Products and Resources (ERDC/TN EMRRP-EBA-28), Technical Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. <https://dx.doi.org/10.21079/11681/49786>

Reid, D., Martin, L. and Murray, E.O. (In review). Using scarcity and reliability data to value ecosystem services: assessment of currently available resources and metric aggregation methods, Technical Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Tazik, D. J., J. Cushing, E. O. Murray, and L. Wainger. (2013). Incorporating Ecosystem Goods and Services in Environmental Planning – A Literature Review of Definitions, Classification, and Operational Approaches. ERDC/EL TR-13-17. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. <https://hdl.handle.net/11681/7189>

Wainger, L.A., Filoso, S., Gazenski, K., Theiling, C.H. and Murray, E.O. (2025). Applying the ecosystem goods and services (EGS) framework: Meramec case study (ERDC/EL TR-25-1), Technical Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. <http://dx.doi.org/10.21079/11681/49520>

Wainger, L.A., Filoso, S., Murray, E.O., Weber, M.A., Price, E.W., Flemming, T.H. and Hychka, K. (In editing) Assessing relative wetland flood risk management benefits using COPE: An exploration of Capacity, Opportunity, Payoff and Equity (ERDC/ EL TR-25-XXX), Technical Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

Wainger, L.A., McMurray, A., Griscom, H.R., Murray, E.O., Cushing, J.A., Theiling, C.H. and Komlos, S.B. (2020). A proposed ecosystem services analysis framework for the U.S. Army Corps of Engineers (ERDC/EL SR-20-2), Special Report. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. <http://dx.doi.org/10.21079/11681/37741>

Technical Notes (TNs)

Murray, E.O., Cushing, J.A., Wainger, L.A. and Tazki, D.J. (2013). Incorporating ecosystem goods and services in environmental planning: definitions, classification and operational approaches (ERDC TN-EMRRP-ER-18), Technical Note. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. <https://hdl.handle.net/11681/7189>

Other Publications

Reed, D., Martin L. and Cushing J.A. (2013). Using information on ecosystem goods and services in Corps planning: an examination on authorities, policies, guidance, and practices (2013-R-07), Institute for Water Resources Report. U.S. Army Corps of Engineers Institute for Water Resources, Alexandria, Virginia.

Conference Presentations/Webinars/Workshops

Gazenski, K., Wainger, L.A. and Murray, E.O. (2016). Using scarcity data to value ecosystem services: assessment of currently available resources, Poster. A Community for Ecosystem Services (ACES), Jacksonville, Florida.

Murray, E.O. (2016). Framing climate change science and adaptation in the context of ecosystem services: moving the ball forward, Panelist. A Community for Ecosystem Services (ACES), Jacksonville, Florida.

Murray, E.O. (2016). What's next for ecosystem services in decision making? Priorities and pathways, Panelist. A Community for Ecosystem Services (ACES), Jacksonville, Florida.

Project Activities

Coordinate with HQ on integration of multiple planning initiatives, including EGS, into Corps planning.

Attend HQ Meetings on developing policy guidance on EGS application.

¹**Project Alias – Work Unit Documentation Title:** *Ecosystem Goods and Services Tools Development and Methods Refinement (Incorporating EGS into Corps Planning, Phase II)*