Collaborative Research Proposal
"Modeling community benefits of environmental restoration for coastal communities"

Mentor: Joel C. Hoffman, PhD. Research Biologist, U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Division, Duluth, MN.

The U.S. Environmental Protection Agency, Office of Research and Development, Mid-Continent Ecology Division (Duluth, MN) is seeking a Post-Doctoral Research Associate with expertise in social or economic valuation to join Dr. Joel Hoffman in an ongoing research project to model community benefits from sediment remediation and ecological restoration projects (www.epa.gov/med/tasks/task2-1-4-4.htm). The project is part of the EPA's national research program on Sustainable and Healthy Communities (www2.epa.gov/aboutepa/about-sustainable-and-healthy-communities-research-program).

The candidate is expected to work with a diverse team of natural scientists (expertise in aquatic ecology, biogeochemistry, ecotoxicology, landscape ecology, GIS analysis) to develop valuation approaches for the ecosystem goods and services associated with coastal habitat restoration. As part of this effort, we wish to develop methods to predict both biophysical change and community-related outcomes from a potential restoration project, and to apply the method to one or more restoration projects proposed for Great Lakes coastal communities. The collaborative research entails geospatial modeling of the biophysical change from a proposed restoration project, evaluating the corresponding change in ecosystem goods and services (e.g., carbon sequestration, flood protection, recreational activity, fishing), and subsequently valuing those goods and services. Specific research responsibilities include leading the valuation aspect of the project to further develop this ongoing research program, and developing a framework that can enable decision-makers to use the projections and valuation in a real-world context. The research project can accommodate a variety of valuation approaches. The candidate is expected to participate in a case-study in the Great Lakes region that will provide the opportunity to model and evaluate various restoration scenarios, as well as to work with community and agency decision-makers to apply and test the framework. The abilities to work independently and collaborate are important. We seek an individual who welcomes the opportunity to use diverse geospatial data (social, economic, ecologic) to develop a broad perspective on the rationale, effects, and benefits of ecological restoration.

Relevant questions include (but are not necessarily limited to):

- How do we best measure ecosystem goods and services to estimate benefits?
- How could we measure restoration success for communities?
- What geospatial and community data are needed to assess community benefits from ecosystem goods and services?
- How does the objective of stimulating community benefits change the structure and focus of remediation and restoration efforts?
- To what extent does the kind of remediation and restoration undertaken determine community benefits?

Expectations
We are seeking a Postdoctoral Research Associate who would welcome the opportunity to join a team-oriented, collaborative research environment, and who is interested in working at the nexus of natural and social sciences. The candidate is expected to perform as a team-member, independently leading the valuation portion of the project. An interest and ability to work directly with decision-makers is preferred. Strong communication skills are important.

The project will focus on Great Lakes coastal communities, though we do not perceive the need to be physically located at the Duluth lab. Weekly research team conferences and video calls will allow the candidate to regularly interact with the research team, as well as access GIS and other data resources. The candidate will also participate in quarterly exchanges between College Park and Duluth. The candidate will have the opportunity to give an EPA seminar on the research project, interact with a broad range of EPA scientists and resources, and interact with EPA staff in Chicago and Washington, DC.

The candidate is expected to represent the team at national or international research conferences, as well as to publish the research in high-quality, peer-reviewed journals.

Collaborators at the Duluth lab are internationally recognized for their research in aquatic ecology, landscape ecology, and ecotoxicology. To date, the project has achieved the ability to map over 40 different ecosystem goods and services associated with ecological restoration. We expect that the candidate will participate in a case study of the St. Louis River restoration. The Duluth lab has compiled extensive geospatial data on the St. Louis River, one of the largest restoration sites in the Great Lakes region (targeting ca. 2,000 acres), including census, property, political, land use, land cover, amenities, and biophysical data. The St. Louis River is home to the largest freshwater estuary in the Great Lakes. The newest NOAA national estuarine research reserve (NERR), the Lake Superior NERR, is located in the St Louis River estuary. Goals of the restoration include improving habitat and water quality, reducing exposure to legacy contaminants, and recovery of species of concern (http://www.epa.gov/grtlakes/aoc/stlouis/index.html). Collaborators at the Duluth lab are able to provide access to federal, tribal, state, and municipal decision-makers involved in restoration planning. We seek a candidate who can engage in research questions surrounding the valuation of ecosystem goods and services (not necessarily a monetary valuation), and who has an interest in developing decision-making tools to aid sediment remediation and environmental restoration.

The U.S. EPA Office of Research and Development embraces a strong mentor-mentee relationship. It has been consistently ranked among the Top 25 Places to Work for Postdoctoral Research Associates by The Scientist Magazine. Postdoctoral Research Associates are treated as professional colleagues, and we anticipate that the candidate will continue on to a full-time research career. As a mentor, Dr. Hoffman will provide professional advice, networking, support and encouragement for career development.

Biographical Sketch

Joel C. Hoffman, Ph.D.
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Education

B.S. with Honors, Resource Ecology and Management, University of Michigan Ann Arbor, 1999
B.A. with Highest Distinction, Philosophy, University of Michigan Ann Arbor, 1999
Ph.D., Marine Science, The College of William and Mary, 2006

Employment

2009-Present Research Biologist, United States Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Division, Ecosystem Assessment Branch, Duluth, Minnesota

Research Interests and Skills

I study human-driven changes within aquatic ecosystems, especially coastal tributaries, wetlands, and estuaries because they are ecological transition zones, generally ecologically important, and subject to increasing pressure from human activities. My research principally has been aimed at developing and using ecological tracers to address energy and nutrient flows between ecosystems, tracing movements of fishes of conservation concern, and developing new isotopic approaches to understand how coastal habitats support fish populations and fisheries-related ecosystem goods and services. My research and associated advisory activities support the development of a workable practice of sustainable, ecosystem-based management.

My areas of expertise including using ecogeochemical markers, particularly stable isotopes, to study aquatic food webs and fish movements, using hydroacoustics to study fisheries and fish habitat, and developing tools and designs for coastal ecosystem assessment.

Selected Appointments

2012-present. Adjunct Assistant Professor, Department of Biology, University of Minnesota, Duluth campus

Selected Publications

Blazer, V.S., J.C. Hoffman, H.L. Walsh, R.P. Braham, C. Hahn, P. Collins, Z. Jorgenson, and T. Ledder. 2013. Health of white sucker within the St. Louis River Area of Concern associated with habitat usage as assessed using stable isotopes. Ecotoxicology DOI 10.1007/s10646-013-1167-5

Hoffman, J.C., J.R. Kelly, G.S. Peterson, A.M. Cotter, M. Starry, and M.E. Sierszen. 2012. Using $\delta^{15}N$ in fish as an indicator of watershed sources of anthropogenic nitrogen: response at multiple spatial scales. Estuaries and Coasts 35: 1453-1467.

Sierszen, M.E., J.A. Morrice, A.S. Trebitz, and J.C. Hoffman. 2012. A review of selected ecosystem services provided by coastal wetlands of the Laurentian Great Lakes. Aquatic Ecosystem Health and Management 15:92–106.

Hoffman, J.C., A.M. Cotter, G.S. Peterson, and J.R. Kelly. 2010. Using stable isotope mixing in a Great Lakes coastal tributary to determine food web linkages in young fishes. Estuaries and Coasts 33:1391-1405.