



Interdisciplinary Consortium
for Applied Research in the
Environment

National Science Foundation
Research Training Grant

*Broadening Participation Across the
Environmental Sciences in & around
Baltimore Harbor*



Project Title: Contaminant movements through food webs, water, and terrestrial environments using spiders

UMBC mentor name & department: Chris Hawn, Geography and Environmental Systems

Partner mentor name & institution: Dexter H. Locke, USDA Forest Service, Baltimore Field Station

Aims

Spiders move through aquatic and terrestrial systems and may carry toxins with them. By examining their webs and bodies, we aim to learn about the flows of toxins throughout the urban environment.



Some spiders have been shown to respond positively to urbanization, as evidenced by larger body sizes. Some hypothesize this is due to prey subsidies including moths which are attracted. If the prey subsidy hypothesis is supported, and urban spiders also carry more toxins than their rural counterparts, they may have an increased chance of becoming vectors for spreading toxins throughout the food web. In other words, urban spiders may accumulate and spread toxins to organisms that in turn eat them.

Hypotheses

We hypothesize that spiders will bioaccumulate pharmaceutical and personal care products, and act as vectors to transport aquatic contaminants to nearby terrestrial systems.

Potential impact

The results will indicate the extent and amount of toxic transport by spiders, which will improve understanding of urban food webs generally. Specifically, the role of urban water systems moving toxins laterally via spiders. It is well-known that urban streams can carry contaminants down streams, but the role of lateral spread via spiders is less clear. This study intends to fill that gap.



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Project Title: What do property rights and land tenure security tell us about forest health and connectivity in Baltimore?

UMBC mentor name & department: Dr. Margaret Holland, Geography & Environmental Systems, University of Maryland Baltimore County

Partner mentor name & institution: Dr. Miranda Mockrin, USDA Forest Service, Baltimore Field Station (UMBC Research Park)

Brief project description:

Protected areas, or parks, form the backbone of many forest conservation efforts, yet substantial areas of forest are found outside parks, across a variety of private and community land ownerships. In the city of Baltimore, 20% of tree canopy is in forest patches outside parks, where ownership and management can be complex, overlapping, or unclear as to who is responsible for safeguarding forests. While much of Baltimore County remains rural, here as well, forests are highly fragmented into approximately 9,000 patches, with an estimated 50,000 or more owners. These forest patches provide vital ecological services, including maintaining the health of aquatic systems and the Baltimore Harbor.

Scientists at the US Forest Service and UMBC have developed a unique database of legal ownership and responsibility for managing forest patches in Baltimore City and County. We now seek a student to help us develop this into a mixed methods analysis, through ground-truthing the geospatial analysis of property ownership and forest patch persistence, and through interviews with forest patch owners and managers, examining management challenges and perspectives across the urban-rural gradient. Additional measures and knowledge of forest condition and land use history will help extend our research to develop a comprehensive assessment of forest conditions.

This research adds a new lens to our understanding of Baltimore's forests, and under what settings publicly- and privately-owned forests thrive, persist, or vanish. Such knowledge is important for the multiple partner organizations who work with forests in Baltimore to enhance and maintain ecosystem and human health. Specifically, a better knowledge of forest owners' perspectives across urban and rural settings will enhance outreach and stewardship efforts, resulting in a healthier Baltimore Harbor and Chesapeake Bay.