

Abstract

The U.S. freshwater ecosystems (e.g., streams, lakes, groundwater, and wetlands) have been heavily influenced by both runoff and stormwater-derived pollution in urbanized, agricultural, and other disrupted landscapes. The U.S. Environmental Protection Agency (EPA) has identified agriculture and urbanization as the No. 1 and No. 2 sources of pollution, respectively, of freshwater systems in the U.S. Runoff carries various pollutants, including nutrients, pesticides and other synthetic chemicals, toxic metals, pathogens, and emerging contaminants into freshwater systems, thus degrading water quality and resulting in severe ecological, economic, and social damages to coastal and marine ecosystems. Since most of the U.S. population lives in the metropolitan regions along the coasts, urbanization in those regions has become an increasing threat to freshwater systems that are directly connected to the coastal ecosystem. Although innovative stormwater management practices and strategies including green infrastructures (GI) and low impact developments (LID) have been developed and applied to address issues related to both quantity and quality of urban runoff over the past decades, there are still significant concerns such as the uncertainties on their realistic performance in treating runoff pollutants, the buildup of toxic metals in topsoil, high implementation costs and maintenance requirements. The involvement of the Sea Grant Network in building the knowledge base on those innovative techniques in mitigating runoff and pollution to freshwater systems has been limited in the past.

The **objective** of this project is to optimize the deployment of innovative GI/LID techniques through science and catalyzed collaboration of the Sea Grant Network with other agencies in mitigating runoff and pollution impacts on the freshwater systems and eventually protecting the coastal ecosystems in the U.S. to maximize their environmental, economic, and social benefits. A three-year, two-component project is proposed to achieve this objective. Component I is a scoping study that applies various approaches and engages stakeholders to develop a living strategic document that discerns the roles of various governmental agencies and identifies the unique roles and strategies of the Sea Grant Network on effective use of innovative LID/GI to tackle the challenges related to runoff and pollution on the freshwater systems in the U.S. and will be completed within the first six months of the project. Component II is to administer a competitive funding program that implements up to three projects within the next 18-21 months in metropolitan areas of the Mid-Atlantic Sea Grant Region (NY-NJ-DE-PA-MD-VA-NC) to demonstrate the success of the developed strategic document in Component I. The PI team will continue to oversee the implementation of those projects and engage more stakeholders in various education and outreach activities to disseminate the research findings. The findings from the implemented projects and the inputs through additional and broader stakeholder engagement will be incorporated into the living document developed in Component I to guide the future Sea Grant Network programs.

Outcomes are multifaceted. The project will integrate existing knowledge, expert opinions, and stakeholders' comments to reduce runoff and abate runoff pollution-related environmental, economic, and social issues. The improved water management will

straightforwardly safeguard the health of freshwater systems. Economic benefits will be achieved by reducing costs, improving public acceptance and market adoption of new GI/LID techniques, and creating new economic opportunities. Meanwhile, the project will guarantee that community residents, particularly from underrepresented and/or economically disadvantaged groups who typically reside in urban areas, have right to access freshwater in dignity, safety, and equitability.