



# USGS NSF GRIP, GSP Opportunity

- Point of Contact Name:** Kristina Hopkins
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- USGS Center:** South Atlantic Water Science Center
- Project Title:** Ecosystem Services of Urban Stormwater Management
- Summary:** As urban development continues to expand, the ecosystem services provided by the urban landscape will be increasingly important to human well-being. Join our interdisciplinary team to help us quantify the water quality services provided by urban stormwater management practices such as rain gardens, infiltration trenches, and detention ponds.
- Project Hypothesis or Objectives:** A variety of stormwater management approaches are available to control and treat polluted runoff. A new paradigm in urban stormwater management is the use of Green Infrastructure (GI), specifically, multiple, small-scale stormwater control measures (e.g., rain gardens, infiltration trenches) distributed across the landscape to treat runoff closer to where it is generated. The goal of this project is to use an ecosystem services approach to compare this new paradigm in stormwater management to the traditional approach of installing large, centralized stormwater control measures (e.g., detention basins). Little is known about watershed-scale installation of distributed stormwater practices (GI), especially if it can mimic the natural hydrologic cycle and replace water infiltration and purification ecosystem services as is intended. This project will allow for the quantification and valuation of water infiltration and purification services provided by watershed-scale GI stormwater management as compared to the traditional approach.
- Duration:** Up to 12 months
- Internship Location:** Raleigh, NC
- Field(s) of Study:** Engineering, Geoscience, economics

**Applicable NSF Division:** EAR Earth Sciences, SES Social and Economic Sciences, SMA SBE Office of Multidisciplinary Activities, CBET Chemical, Bioengineering, Environmental, and Transport Systems

**Intern Type Preference:** Either Type of Intern

**Keywords:** Ecosystem services, stormwater, green infrastructure, urbanization, water quality

**Expected Outcome:** This project will result in the quantification and valuation of water quality ecosystem services provided by distributed (GI) versus centralized (traditional) stormwater management in urban watersheds. The ecosystem services of interest will vary depending on intern interests but may include groundwater recharge, flow attenuation, denitrification, or human health (fecal indicator bacteria). The intern is expected to provide technical support for his/her project that may include data collection, GIS mapping, and biophysical and economic data analysis and interpretation. The intern is expected to develop an independent research project that compliments ongoing research efforts by the team. The intern will have to opportunity to lead the development of a manuscript associated with their project and continue to work through manuscript preparation after the internship, as this will likely take longer than the duration of the internship. The intern will benefit from interaction with our interdisciplinary team including economists, geographers, hydrologists, and physical scientists.

**Special skills/training Required:** Familiarly with basic economic principles and valuation approaches is expected. Familiarity with basic concepts of how urbanization alters hydrology and water quality in streams and rivers would be beneficial, but is not required. The intern need not have extensive experience applying ecosystem services concepts, but must have a genuine interest applying these concepts to quantify the services associated with water quality improvement. The ideal candidate will have working experience with statistical software programs such as R.

**Duties/Responsibilities:** This research opportunity will focus on 1) synthesizing and interpreting biophysical datasets on water quality, stream flow, and groundwater from watersheds located in Clarksburg, Maryland and 2) collecting and analyzing valuation datasets to estimate the economic and/or noneconomic value of water infiltration and purification ecosystem services. The intern will be responsible for combining biophysical and socioeconomic datasets into an integrated ecologic-economic analysis of the selected ecosystem services of interest. The intern's primary focus will be on synthesizing existing datasets, but he/she will have the opportunity to supplement datasets with new field data depending on the intern's specific focus and the selected ecosystem service(s) of interest. This may include collecting water samples and installing continuous water quality monitoring sensors within the study sites. The unique study sites include one forested reference watershed, one watershed with distributed

stormwater management, and one watershed with centralized stormwater management. This study design allows for comparisons of watershed-scale impacts associated with a particular stormwater management approach.

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**Internal Information - Not to be posted:**

**Center Director Name:** David Kirtland

**USGS Responsibilities:** Equipment, Facilities, Mentoring, On-boarding, Background Check, Volunteer Agreement Management

**Preliminary Approval:** This opportunity has my Center's approval

**I already have a student in mind:**

**Comments:**

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