

Project Title: Understanding the Factors that Influence Outdoor Residential Water Conservation: A Case Study in Suburban Boston

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Project Overview

In the face of recent droughts and climate change impacts, water conservation is critical for meeting water demands of humans and freshwater ecosystems. Since residential landscaping is a major component of domestic water use, efforts to promote outdoor residential water conservation are critical. Water harvesting using rain barrels, infiltrating stormwater using rain gardens, and landscaping with native plants have been promoted through outreach campaigns as a means to reduce water use and provide ecosystem benefits. There is a need to understand how these recent water conservation outreach efforts impact local residents' attitudes towards and behaviors incorporating these low-impact development (LID) strategies, and subsequently lead to measureable improvements in water conservation and ecosystem health. In addition, it is important to understand the formal and informal role the green industry plays in promoting residential landscape water conservation.

The Ipswich and Parker River watersheds north of Boston drain into the biologically rich Plum Island Estuary. The Ipswich is considered one of the most threatened rivers in the US, due to polluted stormwater runoff and overdraft of water by local communities. Water conservation and stormwater management are critical priorities for local government agencies faced with frequent water shortages and impaired water quality. This initiative will examine the influence of policy and outreach efforts on local residents' adoption of water conservation and stormwater strategies in the residential landscapes of the Ipswich and Parker River watersheds. The project team will assess the impacts of land use change on water use and the potential for green stormwater infrastructure to restore watersheds while creating a new line of research and outreach inquiry focused on linkages between local policies, outreach efforts, and household decisions related to water conservation.

Activity Summary - 2014

- Graduate landscape studio in the Ipswich River watershed focusing on green infrastructure and open space planning. (1)
- Interviews with representatives from stakeholder groups (16)
- Monitoring residential landscape water use and creation of a data set (22)
- Presentations on residential water conservation for homeowners, municipal officials and community groups (3)
- Review of local conservation programs available at the state, watershed, and local levels.(12)

Activity Summary – 2014 cont.

- Survey of local residents' conservation behavior, attitudes, and actions (270)
- Training/advising of Phd student in interviewing and data analysis. Training of master's level student on survey design. (3)
- Website/webpage on residential water conservation for homeowners (1)

Total educational contacts

	Adult Contacts
In Person	507
Indirect Contacts (Print, Web, etc...)	50

Narrative Summary and Impact

This study in the Ipswich River Watershed of Massachusetts had made progress on all three of our main research goals. For the first goal: identify local policy and outreach efforts across the watershed and to evaluate connections between those and the adoption of LID practices, our focus over the past year has been to investigate the external and internal factors that drive decision-making and demand-side management (DSM) implementation by small residential water suppliers. We used semi-structured interviews of 16 stakeholders from state, local, and non-profit organizations and qualitative analysis of interview transcripts and of current water withdrawal permits and interchange basin transfer agreements to characterize water conservation policies and programs within the Ipswich and Parker watershed.

Our analysis showed that although state mandated residential water efficiency requirements are similar across communities, mandates are not specific in how suppliers must achieve residential water conservation and suppliers vary in their level of engagement with DSM. In addition to our analysis of current policy, we developed a conceptual model for characterizing decision-making at the supplier level and found that it is influenced by attitudes toward water conservation and perceptions of organizational capacity, and often ensues without information on the structural (device-saturation, lawn area, etc.) and non-structural (residential attitudes, community norms, etc.) factors that influence DSM tool effectiveness. We have submitted this work for publication in the Journal of the American Water Resources Association (JAWRA).

Our findings have provided significant knowledge about the role of water suppliers in shaping residential water conservation policy, as well as on the process by which water suppliers make DSM decisions. This work has provided necessary background information for goals 2 and 3 as well as established relationships with stakeholders that will be useful for dissemination of overall findings. More broadly, findings from goal 1 indicate potential inefficiencies in the current support system for decision-making at the water supplier level that may be improved by tightening connections between residents and suppliers.

In order to address the second goal of our study, to explore the factors that influence local residents' decisions to engage in low impact development strategies to conserve domestic water and manage stormwater, we developed a survey instrument that was pre-tested, refined, and administered to 999 residents within 1000' of the river in four towns (Middleton, North Reading, Topsfield and Wilmington). The survey instrument included questions about willingness to adopt landscape water conservation practices. A link to the digital version of the survey was also shared on a Facebook page of a local watershed group. A total of 270 completed surveys were received to date. Subsequent survey mailing resulted in additional surveys being returned, so the final response rate will be determined in the new study year. Initial analysis indicates that generally, the survey population is representative of the homeowner population in the two counties where the survey was sent. Data analysis of the survey results will be completed in the coming year. Initial results suggest that homeowners are both aware of water shortages and of the potential for low-impact design strategies to conserve water. Yet, they are hesitant to implement low-impact design strategies.

The third goal of the study was to understand the connection between adoption of water conservation practices and actual water quantity savings at the household level. In order to explore this question, we began recruiting local residents in the Ipswich Watershed to meter their residential landscape water use, using post-cards mailed in the surveys, as well as advertisements. A total of 22 residents participated during the late summer-fall growing season. With the data we have collected so far (Aug-Sept 2014) we have found that lawn watering uses the largest quantity on average and also has the broadest range (27-1010 gallons). Watering other garden areas was the second highest use with a range of 2.3-284 gallons. Other outdoor water uses include filling pools as well as washing cars and other equipment. We plan to expand our recruiting efforts in the coming year to increase this sample to our goal of 50 participants.