Online Master Rain Gardener Class Works to Normalize Residential Best Management Practices in the Middle Huron River Watershed

Abstract (Waterbody Improved):

Portions of the Middle Huron River system fail to meet water quality standards and are listed as impaired waterbodies under Section 303(d) of the federal Clean Water Act (CWA) due to excess nutrients, sediment, pathogens, and altered flow. This project created an online Master Rain Gardener class in Washtenaw County to teach residents how to design, build, and maintain residential rain gardens to increase water quality and decrease urban storm water runoff. Class participants were required to design and build their own rain garden or assist with a community rain garden in order to be certified. Certified master rain gardeners then served as local experts and peer educators who are teaching their neighbors about residential storm water best management practices (BMPs). Social surveys indicate significant positive changes in awareness, attitudes, and behavior of participants.

Problem:
The Middle Huron Watershed consists of nine tributaries or "creeksheds" as well as the drainage areas of two impoundments. While the headwater areas are primarily agricultural and the upstream portion of the Huron River mainstem is designated as a "Country Scenic River" under Michigan's Natural Rivers Act, the Ann Arbor – Ypsilanti area as well as the drainage area of Ford and Belleville Lakes are heavily urbanized consisting of residential and commercial/industrial land uses. Due to the large population and land use changes several waterbodies within the Middle Huron River Watershed are listed as impaired in Michigan's 2018 Integrated Report including four listings for partial body contact and five listings for total body contact due to high *E. coli* levels, one listing for impaired warm water fishery due to flow regime modifications, and five listings of impairments of aquatic life (one for sediment/siltation, two for flow regime alteration, and two due to algae/excess total phosphorus).

Story Highlights:

Washtenaw County previously developed a Master Rain Gardener class, to train and certify residents who then serve as peer educators in the community teaching their neighbors about storm water BMPs. In 2014, the Washtenaw County Water Resources Commissioner's Office was awarded a federal CWA Section 319 Nonpoint Source Pollution Control Grant, which provided funding to develop an online certification class intended to reach a wider audience and a larger number of people than the previous, in-person course. Specifically, three online Master Rain Gardener training sessions were offered to residents, each session included five classes and culminated in the students installing a rain garden. Over 300 people took the organized class and others watched it independently on YouTube. The organized classes also included visits to rain gardens

and plant nurseries, along with plant swaps. Partner organizations also hosted viewings of the class and offered field trips. A Facebook group created for the original Master Rain Gardener Program had its activity bolstered by the online attendees and alumni of the training classes who were then able to mentor new rain gardeners through the social media page.

The project also included a social monitoring component using the Social Indicator Planning and Evaluation System (SIPES) protocols and the Social Indicator Data Management and Analysis (SIDMA) tool developed by the Great Lakes Regional Social Indicators Team (United States Environmental Protection Agency Region 5, the Great Lakes Regional Water Program, the state water quality agencies in Region 5, and the region's land grant universities). SIPES and SIDMA were developed to help measure the change in people's awareness, skills, attitudes, capacity, or constraints related to water quality improvement due to a projects outreach and education efforts. Social surveys were administered to the general watershed population as well as pre and post surveys of each Master Rain Gardener class.

Results:

A short description of the project and a link to the survey was sent to watershed municipalities for distribution in their Newsletters with a goal of receiving 382 responses. A total of 766 responses were received far exceeding the original goal and yielding 95 percent confidence in the results +/- 3.5 percent error. Similar to other surveys in the area, the Middle Huron River general population scored high for all components of the awareness, attitudes, and constraints social indicators (a high constraint score indicates fewer perceived barriers to adopting new practices). Surveys were also given before and after each Master Rain Gardener session. "Pre" and "post" social indicator scores of the Master Rain Gardener sessions for awareness, attitudes, constraints and behavior were significantly higher than those of the general population (Table 1) and the "post" session scores were higher than the "pre" for all subject material covered in class work.

The surveys included a series of questions specifically regarding rain gardens which showed significant positive changes between the post class and general population responses. Post class respondents were, not surprisingly, more knowledgeable about and more willing to try a rain garden. Post class respondents also had a better perception of the actual costs and water quality benefits of rain gardens and were less likely to utilize the "I don't know" response.

Table 1. Social Indicator Scores for the General Population of the Middle Huron River Watershed and Master Rain Garden Class participants.

Social Indicator	General Population	Pre-Class	Pre-Class minus General Population	Post-Class	Post-Class minus Pre-Class	Scale
Awareness of appropriate BMPs to improve water quality	1.77	1.79	0.02	1.96	0.17	Range 1 – 2, less aware to more aware
General water quality attitudes	4.44	4.58	0.14	4.68	0.10	Range 1 – 5, less positive to more positive
Willingness to take action to improve water quality	1.72	1.95	0.23	1.97	0.02*	Range 1 – 2, less positive to more positive
Constraints to behavior change	3.01	3.19	0.18	3.49	0.30	Range 1 – 4, more constraint to less constraint
Constraints to adopting key practices	3.00	3.17	0.17	3.44	0.27	Range 1 – 4, more constraint to less constraint
Percentage of target audience implementing practices	44.15	46.54	2.39	63.02	16.48	Percent

* No statistical difference

469 rain gardens totaling about 1.4 acres have been installed through the Master Rain Gardener Program since 2011. This includes 203 rain gardens installed through the traditional Master Rain Gardener class, 113 rain gardens installed through the on-line class, and 153 rain gardens installed by individuals from outside the organized classes. Rain gardens are among the best BMPs for stormwater quality control incorporating physical and microbiological processes. The removal effectiveness of rain gardens has been studied during field and laboratory studies at the University of Maryland and they have been shown to be effective at removing 90 percent of bacteria, 90 percent of organics, 90 percent of total suspended solids, 70-80 percent of Total Kjeldahl nitrogen, 93-98 percent of metals, and 70-83 percent of total phosphorus. The rain gardens installed as part of this project are designed to capture and treat the runoff generated up

to the two-year 24-hour storm. In addition to the water quality benefits the 469 rain gardens remove up to 120,000 cubic feet of runoff per event.

Partners and Funding:

The Section 319 grant to the Washtenaw County Water Resources Commissioner's Office was for $109,000, with $62,000 local match. Partners included the city of Ann Arbor, the Huron River Watershed Council, Michigan State University Master Gardener Alumni, Genesee Conservation District, Trout Unlimited, and Hidden Lake Gardens.

Master Rain Gardener Leslie Kellman hosted 80 students in her yard, which includes three rain gardens she designed as a part of the online class.

For additional information contact:

Bob Sweet, Nonpoint Source Unit
Surface Water Assessment Section
Water Resources Division
Michigan Department of Environment, Great Lakes, and Energy
Telephone: 517-284-5520
Email: SweetR@Michigan.gov