

NERRS Science Collaborative Progress Report

Reporting Period: November 15, 2011 to February 29, 2012

Project Title: Implementing Credits and Incentives for Innovative Stormwater Management

Principal Investigator(s): Amy H. Brennan

Project start date: November 15, 2011

Report compiled by: Amy H. Brennan

Contributing team members and their role in the project:

- *Project Coordination and Fiscal Agent:* Amy H. Brennan; Chagrin River Watershed Partners, Inc.
- *Collaboration Lead:* Heather Elmer; Old Woman Creek National Estuarine Research Reserve with Ona Ferguson; Consensus Building Institute providing Collaboration Technical Assistance
- *Applied Science Investigator:* Jay D. Dorsey; ODNR, Division of Soil and Water Conservation
- *Additional project team members:*
 - Breann M. Hohman and Crystal Dymond; Erie Soil and Water Conservation District
 - Frank Lopez and Cheryl Wolfe-Cragin; Old Woman Creek National Estuarine Research Reserve

A. Progress overview:

The goal of this project is to promote the implementation of Low Impact Development (LID) and other innovative stormwater systems in the Ohio Lake Erie Basin by addressing barriers to implementation, gathering data on local best management practices (BMPs), building capacity of local stormwater professionals, and developing tools to effectively guide communities and consultants toward more sustainable stormwater management. This project will also highlight the role of LID in adapting to changes in rainfall volumes and intensities due to climate change. The project team includes the Chagrin River Watershed Partners (CRWP), Old Woman Creek National Estuarine Research Reserve (OWC NERR), Ohio Department of Natural Resources Division of Soil and Water Resources (ODNR-DSWR), Erie Soil and Water Conservation District (Erie SWCD), and the Consensus Building Institute (CBI).

Planned activities during this reporting period include: coordination and organization of the project team and our process and subcontracts, identification of additional stakeholders, design and conduct a stakeholder assessment to identify additional opportunities, barriers, and concerns, convene our collaborative learning group (CLG) and begin discussions of site selection for monitoring and modeling objectives. In addition, the project team began review of available research and data on performance and cost of LID BMPs and investigated potential models for the project and initiated the selection process for the monitoring and design of BMPs. In this first reporting period and throughout the project, we will provide model zoning regulations and technical assistance on the adoption and implementation of these codes to help communities manage impacts of land use change through local codes, promote protection of riparian corridors and wetlands, minimize sedimentation and nutrients to Lake Erie estuaries, and manage nonpoint source pollution and stormwater.

CRWP entered into contract with CBI to provide technical assistance on collaborative process management and with Erie SWCD to participate as an active member in all facets of the project and to provide outreach to Erie County communities on design tools, guidance documents, training, and provide implementation assistance to community engineers, development engineers, and individual property owners to implement LID solutions to stormwater problems. A contract with ODNR-DSWR to complete monitoring and modeling components and to provide technical assistance and guidance throughout the project is being drafted. A modeling subcontractor has not yet been selected, but several discussions are ongoing to define the scope of work and potential contractors. Ona Ferguson (CBI) and Heather Elmer (OWC NERR) completed a stakeholder assessment through interviews with a larger group of intended users and members of the CLG. Members of our project team

solicited potential monitoring sites after discussion regarding types of BMPs and criteria for selection with the CLG. Numerous sites have been investigated for their potential and the site identification and selection process is ongoing. ODNR-DSWR has begun research on and collection of possible data for modeling efforts and has begun investigation of potential models for this project. CRWP and Erie SWCD have been working with communities to develop potential projects that may be design or monitored through this project. CRWP has been working with communities to adopt and implement model zoning codes to promote good land use decisions and promote LID. In addition, CRWP is revising several of our model regulations and provided adoption and implementation assistance to numerous CRWP Member communities.

B. Working with Intended Users:

During this first few months, the project team has organized our process with three in-person meetings, numerous conference calls, and two days of visits to potential monitoring sites. We completed an assessment with CLG members and other stormwater professionals (intended users) and held our first CLG meeting with our intended users.

The project team is working together well, focusing on getting essential pieces of the project up and going. We have spent some time refining the overall approach, developing timelines (see below) and clarity on tasks, and working to figure out how to find someone to carry out a few of the technical pieces required on the project. We have also begun working with the NERRS Science Collaborative to develop communications products for local and national audiences related to our project.

The Assessment helped confirm that the analysis of needs on which we based our proposal is still accurate. It clarified some of the needs and opportunities for us, and helped us begin to build relationships with those CLG members we didn't already know and work with. It confirmed the need for demonstration sites and more Ohio-based data, as well as the timeliness of building collaboration and coordination. Please see the attached Assessment report for more details on findings.

The first CLG meeting went very well. Members were almost 100% present and were eager to dig into key questions about what types of BMPs this project should monitor and what criteria are important for selecting individual sites. Their perspectives on these questions were invaluable to the project team, and have altered how the Project Team thinks about monitoring opportunities and potential application of results at the local and state level. Based on the CLG's input, the project team is targeting the following stormwater practices for monitoring and modeling: bioretention, pervious pavement, water quality swales, grass filter strips, and retrofits of existing dry detention basins. Criteria for monitoring site selection have been established based on CLG input at this first meeting. Stakeholders affirmed their commitment to participating and indicated their support of the project and joint learning approach. Please see the CLG meeting summary for more information on the discussions during our first meeting.

In the next six months, we have scheduled two quarterly CLG meetings and are offering an additional two-day Collaborative Training for project team members and CLG members. This training is offered by the NERRS Science Collaborative and we are looking forward to learning from trainers and tailoring the sessions to meet the needs of our project. The project team will also engage CLG members in selection of proposals for stormwater design assistance, discussions about stormwater modeling, and the approach for developing implementation tools associated with the project.

In addition to the CLG meetings, the project team will be soliciting possible BMP projects for monitoring and design through a request for proposals that will be distributed to a larger group of intended users. As monitoring

sites and additional monitoring and modeling contractors are identified and entered into contractual relationships with CRWP, they may be added as members of the CLG.

C. Progress on project objectives for this reporting period:

Objective 1: Engage stormwater professionals in a collaborative process to identify and remove regulatory and technical barriers to implementation of LID in Ohio.

1. Completed activities and products:
 - a. Identify other potential stakeholders
 - b. Design and conduct stakeholder assessment
 - c. Convene a collaborative learning group
 - d. Document lessons learned, conflict, and ideas from CLG meetings
 - e. Compile interview results into assessment findings document

Objective 2: Quantify BMP specific and site level hydrology for local soil and climate characteristics.

1. Review available research and data on performance and cost of LID BMP's
 - a. ODNR-DSWR contacted Dr. Bill Hunt at NCSU about using hydrologic performance data sets from BMPs monitored by his program.
 - b. CRWP completed a review of available costs of LID BMPs that have been constructed in northeast Ohio. This information was presented at two conferences on November 30, 2011 in Columbus and December 1, 2011 in Cleveland in concert with presentations on LID BMP design from Dr. Bill Hunt of North Carolina State University.
 - c. ODNR-DSWR reviewed Church et al. (1999; Basic Requirements for Collecting, Documenting, and Reporting Precipitation and Stormwater-Flow Measurements) and WERF (2009; Urban Stormwater BMP Performance) with special attention to Chapters 3 (Hydrologic and Hydraulic Monitoring) and 8 (Low Impact Development Monitoring) in the latter in preparation for working with monitoring contractor.
2. Selection of LID BMPs for monitoring.
 - a. Discussed BMP type and selection criteria with the CLG
 - b. Investigated and/or visited 54 possible BMP sites to match with selected types of BMPs and selection criteria (the most critical criterion is the ability to monitor).

Objective 3: Simultaneously model treatment of water quality and quantity volumes to meet local and state requirements.

A literature search was conducted to identify models, tools, or approaches used by others to characterize the hydrology of BMPs. This resulted in addition of a couple models new to us, several additional BMP modeling studies, several BMP performance monitoring studies that may serve as sources of modeling data sets, and a couple studies discussing climate change projections for the Midwest. This search was not exhaustive and will be continued.

- An example of a “new” model is the Bioretention Hydrologic Performance (HyPer) Model developed at North Carolina State University (<http://www.bae.ncsu.edu/stormwater/downloads.htm>). This model is a spreadsheet design tool based on the DRAINMOD model.
- This project will be using the SWMM, DRAINMOD and WinSLAMM models and ODNR-DSWR has begun collecting guidance on populating these models (soil characteristics, developing climate data, etc.).
- Organization of a modeling focus team was discussed at the first CLG meeting, and will be explored in more depth at our April 4, 2012 CLG meeting.

Objective 4: Adapt models to include rainfall runoff scenarios anticipated as a result of climate change and characterize climate change adaptation functions of LID BMPs.

No work was proposed for this objective in this reporting period.

Objective 5: Develop and provide training and technical assistance materials to build capacity of stormwater professionals and communities to implement LID approaches.

1. Informal training with CLG.
 - a. CLG meeting on January 26, 2012, initiated planning for training on collaborative processes, possible BMP types, and draft criteria for BMP site selection.
2. Technical assistance on the adoption and implementation of local codes and project recommendations.
 - a. CRWP provided technical assistance on possible stormwater retrofits, codes for downspout disconnection, riparian setbacks, erosion and sediment control, stormwater management, conservation development, and off street parking.
 - b. CRWP is updating our model codes for stormwater management and off street parking.
 - c. CRWP is partnering with Cuyahoga County Planning Commission on review and update of our model code for alternative energy.
3. Evaluation of adoption and implementation status
 - a. CRWP maintains a database of CRWP Member community zoning code status.
 - b. CRWP has assisted the Tinkers Creek Watershed Partners with a review of zoning code adoption for 14 Tinkers Creek (tributary to Cuyahoga River and Lake Erie) communities.

What data did you collect?

- Interview transcripts – (18 Ohio stormwater professionals)
- Database of CRWP Member community zoning code status and Tinkers Creek Watershed communities

Has your progress in this period brought about any changes to your methods, the integration of intended users, the intended users involved or the project objectives?

The project team added CLG members based on stakeholder and project team member input and is considering several other additions based on CLG member input and possible BMP site selection.

Have there been any unanticipated challenges, opportunities, or lessons learned?

The project team discussed using modeling and guidance development activities/funds to add staff in the ODNR-DSWR stormwater program thus enhancing the agency's capacity to characterize and model stormwater management systems, as well as producing project deliverables. Unfortunately, this does not seem possible at this time, so the CRWP and ODNR are proceeding by hiring a subcontractor to perform the bulk of the modeling. This subcontractor will work closely with ODNR-DSWR staff to complete this modeling activity and may also assist with developing guidance on project findings.

In January, the project team learned that we cannot subcontract with a federal agency to complete the monitoring components of this project. The Project Team had been in communication with USGS for two years about the BMP monitoring planned for this grant project. USGS provided guidance on monitoring protocols, needs, and costs. USGS also expressed their interest in contracting to monitor BMPs as part of this project.

Upon learning of the grant award, the PT revisited our goals for the grant which included building capacity throughout Ohio's stormwater management program. We had discussed that this grant would be an opportunity to build capacity to monitor stormwater practices in the Lake Erie watershed and the State of Ohio. Yet, we were determined to maintain the quality and integrity of data collection provided by USGS. The PT decided to explore what other (i.e., non-USGS) capacity already existed for BMP monitoring by participating in a parallel effort by the Ohio Department of Natural Resources, Division of Soil and Water Resources (DSWR) to assess, facilitate, and enhance consistency of stormwater monitoring in Ohio.

What are your plans for meeting project objectives for the next six months?

Objective 1:

1. Host and co-facilitate collaboration training for project team members and stakeholders.
2. Two quarterly CLG stakeholder meetings.

Objective 2:

1. Continue to review available guidance and research on LID BMP monitoring and draft a generalized protocol for LID BMP monitoring.
2. Identify a contractor to complete the monitoring on the project.
3. Select initial 2 or 3 BMP monitoring sites
4. Site characterization at each monitoring site:
 - a. Characterize site soils, including soil and subgrade infiltration on sites where BMP monitoring is proposed
 - b. Design each BMP so discharge (i.e., outflow) over the entire range of rainfall events will be directed through a v-notch weir or H-flume; similarly instrument the inflow(s) to the BMP as practicable
 - c. Characterize BMP drainage area and site watershed
 - d. Work with monitoring contractor, USGS and project team to fully instrument BMPs to track hydrologic performance
 - e. Calibrate weirs to develop a stage-discharge relationship
5. Begin data collection from monitoring of 2 or 3 BMPs.

Objective 3:

1. Begin development, calibration, and validation of models that quantify infiltration capacity and hydrologic performance of LID BMPs.

Objective 5:

1. Provide informal training through CLG meetings.
2. Provide a formal training with CRWP staff, Tinkers Creek Watershed Partners, OWC NERR, Cleveland State University, and Erie SWCD to review CRWP model codes, adoption steps, and implementation tips and concerns. This “train the trainer” will increase the capacity of these organizations to work with their respective communities on model code adoption and implementation.
3. Provide technical assistance on the adoption and implementation of local codes and project recommendations.
4. Solicit CLG input on approach for training and tool development through this project.
5. Begin development of training materials on BMP life cycle.

D. Benefit to NERRS and NOAA: List any project-related products, accomplishments, or discoveries that may be of interest to scientists or managers working on similar issues, your peers in the NERRS, or to NOAA. These may include, but are not limited to, workshops, trainings, or webinars; expert speakers; new publications; and new partnerships or key findings related to collaboration or applied science.

- A conceptual timeline (draft presented below) can be a useful tool for implementing and communicating with others about large scale complex projects.
- Distilling complex scientific information and honing in on specific questions is essential for productive stakeholder meetings. While our team recognized this, preparing for our first CLG meeting deepened our appreciation of the commitment required and will affect how we approach designing and preparing for future meetings.

E. Describe any activities, products, accomplishments, or obstacles not addressed in other sections of this report that you feel are important for the Science Collaborative to know.

On January 23, ODNR-DSWR hosted a half-day meeting of 30 individuals involved in some aspect of stormwater management research in Ohio, or whose organization has an interest in conducting or supporting stormwater BMP/system monitoring. Attendees represented U.S. Geological Survey, Ohio Department of Natural Resources, Ohio University, University of Cincinnati, Cincinnati Metropolitan Sewer District, Northeast Ohio Regional Sewer District, US EPA Office of Research and Development (Cincinnati), Ohio State University, Wittenberg University, Heidelberg Water Quality Laboratory, City of Columbus, City of Toledo, CRWP, OWC NERR, Ohio EPA, Ohio DOT, URS Cleveland Office, JF New Cincinnati Office, Miami Conservancy District. The meeting provided an excellent snapshot of stormwater monitoring in Ohio, and began to develop a community and infrastructure to support a statewide monitoring program. From this meeting, it was clear no organization except USGS offered the opportunity to “hit the ground running” with the monitoring on our project.

Learning USGS cannot be contracted using dollars from this grant has forced us to rethink our strategy. Since learning we cannot contract USGS with grant dollars, ODNR-DSWR has had preliminary discussions with Heidelberg Water Quality Laboratory and Ohio State University about their interest in the research and contracting them for the monitoring and is awaiting a return call from Ohio University.

The project team discussed the possibility of encouraging Ohio EPA to recommend or require that projects being awarded grant funding under Ohio EPA’s Section 319 and Surface Water Improvement Fund (SWIF) programs be designed to facilitate monitoring for selected BMPs.

The project team has discussed the possibility of extending monitoring dollars by monitoring multiple practices at a single site or targeting sites that already have a weather station installed.

Project Timeline:

	Year 1	Year 2	Year 3
Modeling	Develop scenarios, select models, calibrate models	Validate models, add precipitation data, test SWMM model	Test model, have working model
Tools	Review model codes	Draft tools	Produce user friendly tools, model regulations, recommendations
BMP Selection & Monitoring	Select sites & contractor, start collecting data at 2 sites	Collect data at 6 sites	Fold data into tools and models.
Collaboration	Assessment, convene CLG, quarterly CLG meetings	Quarterly CLG meetings, advise on tools, focus groups	Test models and trainings, trainings, do outreach
Project Management	Financial management, track lessons learned, annual review	Annual review, track lessons learned	Track lessons learned, final project review
Other	Scope economic needs	Compile economic data on BMPs	