WATER PAGES

A Quarterly Newsletter Produced by the Rutgers Cooperative Extension Water Resources Program: Creating Solutions for Water Quality Issues in NJ

Fall 2010 Edition

Rain Garden Planting at the Village Elementary School Holmdel, New Jersey

September 22-24, 2010, the RCE Water Resources Program visited the Village Elementary School in Holmdel, NJ. Each of the Pre-K through third grade classes first stopped by the school's K/1 Library for a short lesson about rain gardens. Next, with the help of RCE Water Resources Program staff and volunteers, a total of 839 students were able to plant his/her own plant in the class's designated rain garden.

The RCE Water Resources Program worked with Omni Environmental, LLC to convert an old asphalt play yard near the school's gym into a courtyard classroom with four rain gardens. The rain gardens capture stormwater running off the surrounding rooftops of the school. Each rain garden varies in size, ranging from 300-600 square feet, and is planted with varieties of plants that are native to the region.

The courtyard features four rain gardens: Summer, Fall, Winter, and Spring. Each of the rain gardens contains plants that are specific to its season. The Winter Rain Garden, for example, contains shrubs and grasses that will provide winter interest, as well as food and habitat for song birds during the colder months. The rain garden courtyard will also include an outdoor classroom space, which will be available for all of the classes to use.

First grade class works with older students visiting from the Shrewsbury School to plant the *Summer Rain Garden*.

Village Elementary School First Grade class learns about a rain garden in the K/1 library.

Students from a third grade class work together to plant shrubs in the *Winter Rain Garden.*

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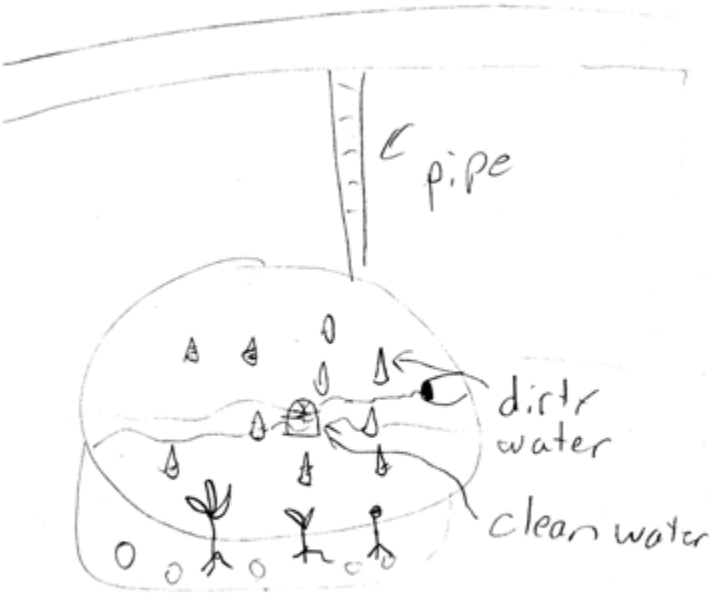
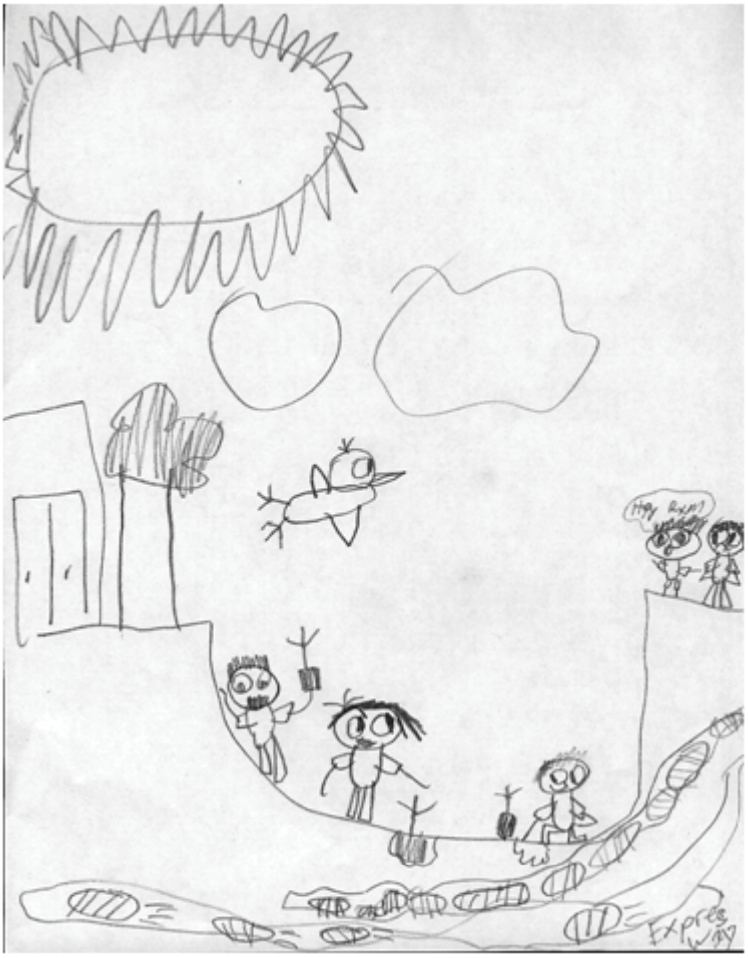
Rain Gardens from a Child's Point of View
Village Elementary School, Holmdel, NJ



sponge-like (soaks up dirty water and gives clean water)

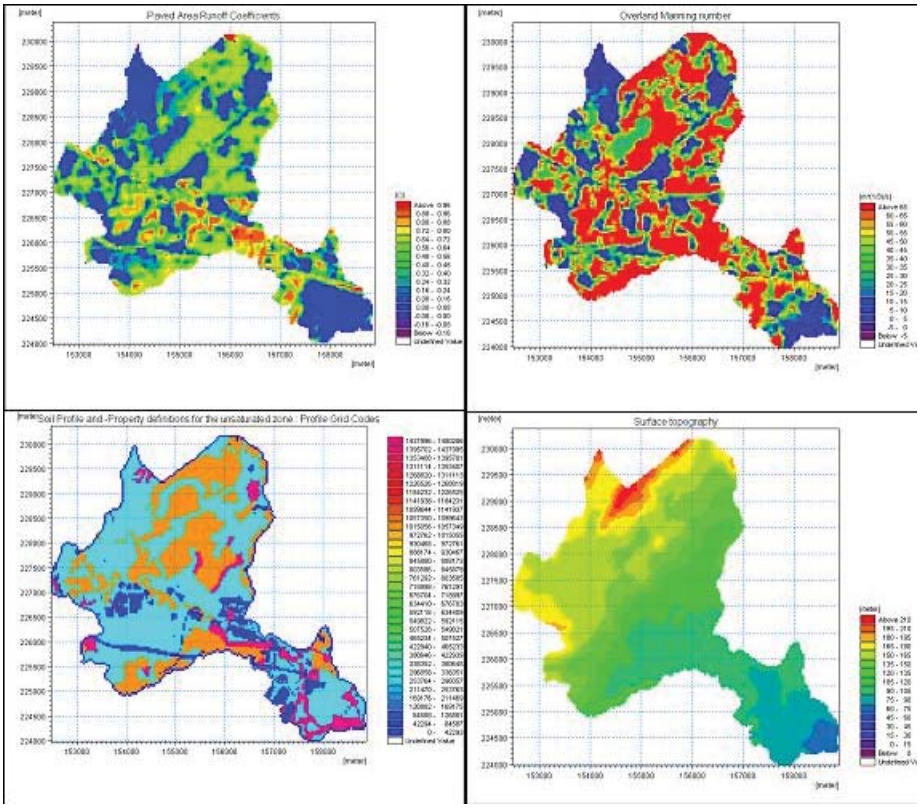


A Watershed Model to Understand Urban BMPs

Watershed management requires good decisions based on sound scientific principles. One method to determine solutions to watershed problems is hydrologic modeling, over land or through the soil. Modeling can predict the transport of water, including how the impact of different land management practices may affect the overall distribution of water throughout the land and in the streams. Modeling the stormwater impacts and the effects of best management practice (BMP) installation in urban areas has traditionally been limited by the inability of models to achieve sufficient spatial resolution required to accurately portray the processes occurring on the land surface or to properly allocate water into the atmospheric, surface, unsaturated and saturated zones.

The MIKE System Hydrologique European (SHE)/MIKE 11 software system from the Danish Hydraulic Institute (DHI) is being used in the Troy Brook Watershed in Morris County to assess its applicability in the simulation of BMP impacts to the hydrology of a watershed system. MIKE SHE/MIKE 11 is a fully integrated modeling framework capable of simulating all components of the land-phase of the hydrologic cycle (Refsgaard, 1995). This model has the ability to simulate the transport of water overland, in the unsaturated zone and in the saturated zone. This enables the calculation of a complete physically based water balance at a full spatially distributed scale. Grid to grid calculations allow for the hydrologic interaction of adjacent land use types and simulation of specifically targeted BMPs.

Characterization of the surface of the model domain was completed using information contained in the NJDEP 2002 land use geographic information system (GIS) layer (NJDEP, 2008). This layer provides high resolution spatial information regarding land use type, as well as the extent of imperviousness in each area. This information was used to create the grids that depict the surface topography, soil type distribution, vegetative cover classification and paved area index (Figure 1).



Bioinfiltration is one method of stormwater management that encourages excess precipitation to infiltrate or evaporate close to the source. The MIKE SHE model created for the Troy Brook Watershed ran scenarios that reflected the land surface alterations that would occur during actual construction of a bioinfiltration structure, including the re-grading of the land to form a depression, the alteration of soil media and the installation of native vegetation chosen to enhance evapotranspiration. The relatively high resolution of the model domain in the MIKE SHE model has facilitated the installation of these structures in the model and has not averaged the effects into the surrounding land use. The BMPs simulated were sized to correspond to a single grid cell and were placed down gradient of specific high runoff areas such as parking lots or commercial zones. This was done in coordination with recommended sites for BMPs noted in the Troy Brook Regional Stormwater Management Plan (RCE Water Resources Program, 2007).

Results of the model included a water balance of individual grid cells, allowing a prediction of bioinfiltration unit success. Preliminary results indicate that surface runoff was reduced on five of the eight modeled sites and evapotranspiration was increased or remained the same on all the sites. The three ineffective bioinfiltration cells were located adjacent to the stream where the saturated zone was too close to the bottom of the modeled unit. Future scenarios using the MIKE SHE model could include determining a method of choosing the most effective sites for the implementation of BMPs to maximize groundwater recharge and minimize the peak flows caused by urban stormwater runoff.

References:

New Jersey Department of Environmental Protection (NJDEP), Office of Resources Information Management (ORIM), Bureau of Geographic Information Systems (BGIS) NJDEP 2002 Land use/Land cover Update, Upper and Mid Passaic, Whippany, and Rockaway Watershed Management Area, WMA-6, Edition 20080304(vector digital data), Trenton, NJ, 2008.

Refsgaard , J.C. and and Storm, B. MIKE SHE. In Computer Models of Watershed Hydrology, 809-846. V.P. Singh, ed. Highlands Ranch, CO, Water Resources Publication (1995).

Rutgers Cooperative Extension (RCE) Water Resources Program, The Troy Brook Regional Stormwater Management Plan, New Brunswick, New Jersey, 2007.

For more information about this topic, please contact Dr. Sandra Goodrow at 732-932-9800 x6125 or sgoodrow@envsci.rutgers.edu

Insights from New Hampshire and a Request for Help

The RCE Water Resources Program had the opportunity in October to travel to Portsmouth, New Hampshire to deliver a two-day rain garden training session for landscapers. The training program was developed by Madeline Flahive DiNardo, an RCE Agricultural Agent from Union County, with funding from a USDA 406 Program grant. Helping with delivering the training program was faculty and staff from New Hampshire's Cooperative Extension and Dr. Robert Roseen from the University of New Hampshire's Stormwater Research Center. The training was a great success with over 50 people in attendance. We built a fabulous rain garden on the second day of training, and Dr. Roseen took us for a tour of some of the stormwater BMPs that have been installed in the area.

I had the opportunity to sit down with Dr. Rosen and discuss one of the BMPs that he is extensively testing at his Stormwater Center, as well as at locations throughout the state. The BMP is a "Subsurface Gravel Wetland." Dr. Roseen has water quality testing data that shows this system to be very effective at removing dissolved inorganic nitrogen. As a matter of fact, the system can consistently produce 98% removal. We talked about how to use these systems in New Jersey, particularly in the Barnegat Bay Watershed, where nitrogen loading is having a severe impact on the bay. We determined that dry detention basins and possibly wet detention basins could be retrofitted with a Subsurface Gravel Wetland, and this might actually be fairly easy to accomplish. Dr. Roseen agreed to help the RCE Water Resources Program design a system for New Jersey so we can test the effectiveness of this system in our state.

So now I need your help, I am looking for a dry detention basin in the Barnegat Bay Watershed that we could retrofit with a Subsurface Gravel Wetland. I am also looking for funding to install the system and test the system. If anyone is interested in partnering on this project, please contact me. If this system is as promising as it seems, it would be a very cost effective tool to clean up the Barnegat Bay.

Dr. Christopher Obropta, Associate Extension Specialist in Water Resources and Associate Professor in Environmental Sciences can be reached at 732-932-9800 x6209 or Obropta@envsci.rutgers.edu

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The RCE Water Resources Program Green Infrastructure Initiative

Water and sewer infrastructure systems in many communities throughout New Jersey are reaching the end of their functional life and will need repair and replacement over the next decade. Opportunities exist to reduce costs for replacing this aging infrastructure using new techniques and technologies, better preparing the state for a sustainable future. Infrastructure planning and design approaches are needed to reduce demand on existing infrastructure, extend its functional life where possible, and provide cost-effective and sustainable solutions that conserve and protect water resources while improving the quality of life of our citizens. The Green Infrastructure Initiative works to establish partnerships to provide targeted assistance to communities throughout New Jersey. Examples of our ongoing efforts include:

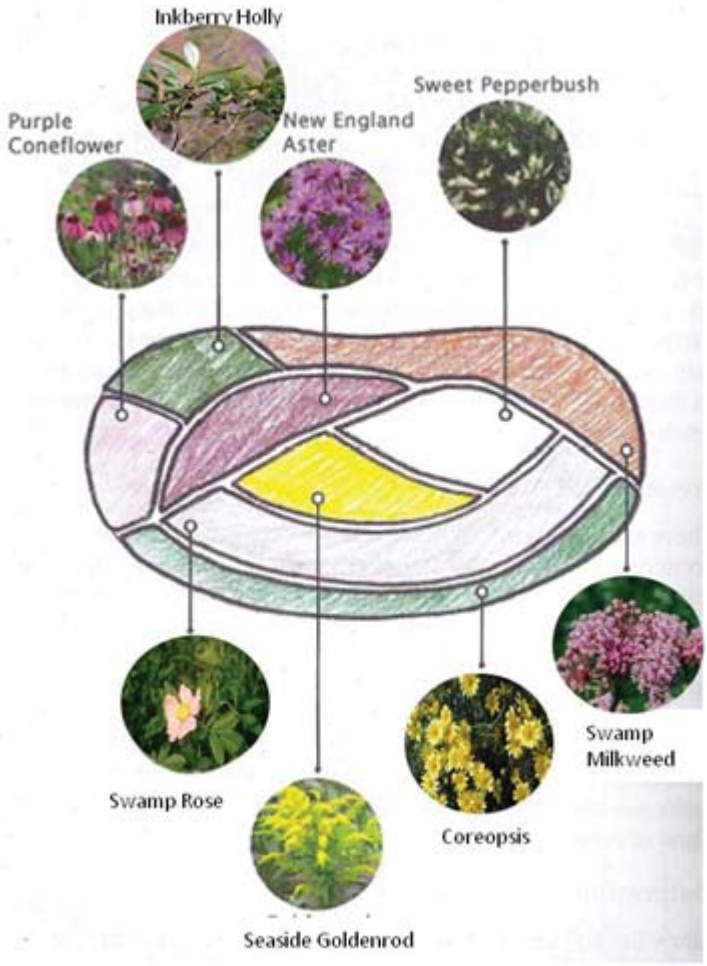
- Sustainable South Bronx Training and Demonstration Projects
- Environmental Justice for the City of Newark
- The Cooper River Stormwater Education & Implementation Plan
- Green Infrastructure for Camden.

For more information on The Green Infrastructure Initiative, contact Jeremiah Bergstrom, Senior Project Manager at 732-932-9800

Green Infrastructure for Camden

The Camden County Municipal Utilities Authority (CCMUA), in partnership with the Rutgers Cooperative Extension (RCE) Water Resources Program, is piloting a community-based initiative implementing green infrastructure projects throughout the City of Camden and Gloucester City to reduce impacts to waterways and neighborhoods from combined sewer overflows, flooding, and sewer backups into private properties. The initial target will be to implement pilot rain garden and green infrastructure projects to prevent one million gallons of stormwater from reaching the combined sewers in the City of Camden and Gloucester City. The program will include:

- Educating community leaders, businesses, and residents on the benefits and opportunities for green infrastructure projects;
- Providing training to local contractors and residents on green infrastructure installation techniques; and
- Establishing a network of community-based organizations to provide capacity for continual growth and expansion of the program.



Sumner School Sixth Graders by their completed rain garden.

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Beginning in July 2010, the RCE Water Resources Program has actively worked to develop and establish relationships with local community leaders in the City of Camden. Over the next several months, RCE Water Resources Program staff is preparing to:

- Facilitate a series of local workshops with community activists and leaders;
- Conduct neighborhood site visits and tours;
- Identify funding opportunities and prepare grant proposals for implementation and continuation of the initiative;
- Conduct a rain garden training workshop for local landscape professionals;
- Install two (2) demonstration rain gardens (See the following Sumner Elementary School – Stormwater Management in Your School Yard).

Sumner Elementary School – Stormwater Management in Your School Yard

The RCE Water Resources Program collaborated with the Rutgers Cooperative Extension of Camden County 4-H Program to develop Stormwater Management in Your School Yard. The Stormwater Management in Your School Yard educational program was designed to provide the sixth grade students of Sumner Elementary School (Camden, NJ) with an opportunity to apply their science, math, and communication skills to real-world environmental problems through the building of a rain garden on the Sumner Elementary School's campus. The goal of the Stormwater Management in Your School Yard educational program is to increase the sixth grade students' environmental awareness as they go forth and teach others in their communities about the importance of water quality and quantity.

For more information on "Stormwater Management in Your School Yard", contact Amy Boyajian at 732-932-9800 x6164 or at Boyajian@envsci.rutgers.edu.

Sumner School students planting their rain garden.

Sumner School Rain Garden Planting

Announcing the Turf Management for a Healthier Lawn Survey Winners

An online survey (http://salem.rutgers.edu/nre-surveys/lawn-care-survey.html) characterizing respondents' attitudes and practices regarding lawn and landscape maintenance was conducted in Belmar Borough, East Greenwich Township, Egg Harbor Township, the City of Rahway, and Livingston Township. The online survey was available from March 29, 2010 to May 30, 2010. Respondents reported learning about the survey through advertisements in newspapers, municipality websites, university websites, and through their local environmental commissions. The survey had approximately 40 questions, and 112 homeowners responded.

To encourage participation, New Jersey Water Savers offered a $50 gift card to one winner in each town. The winners were randomly selected and notified in June. We are pleased to announce the survey winners: Neil Scheck of Belmar, Rebecca Popp of East Greenwich Township, Dawn Yacovelli of Egg Harbor Township, Sarah Kathleen McKeon of Livingston, and Jeffrey Robinson of Rahway.

The Turf Management for a Healthier Lawn Program has four elements, including an online survey, two demonstration sites in East Greenwich Township, an outreach educational program, and a comprehensive reference website on environmentally-friendly lawn care. For more information, please visit www.water.rutgers.edu or call Elaine Rossi-Griffin at 732-932-9800 x 6129.

Water Resources Program

Welcome, Amy Rowe!

Amy Rowe is the new Rutgers Environmental and Resource Management Agent for Essex and Passaic Counties. Prior to coming to Rutgers, Amy worked at the Environmental Protection Agency's Urban Watershed Management Branch in Edison, NJ. At the EPA, her research focused on runoff from sealed asphalt surfaces and on the monitoring of a permeable pavement demonstration site. Amy received her Ph.D. from Rutgers in Environmental Sciences and her dissertation work examined the fate and transport of polychlorinated biphenyls in the Delaware River Estuary.

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Welcome, Caitrín Higgins, to the Water Resources Program!

Caitrín Higgins joined the Water Resources Program in August 2010 as a Program Associate. She is a LEED professional with a background in landscape architecture, urban planning, graphic design, ecological restoration, and stormwater best management practice design. Caitrín received a Master of Landscape Architecture degree from the University of Pennsylvania and a Bachelor of Arts in Environmental Studies from Middlebury College.

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