RAIN GARDENS: QUESTIONS ANYONE?

A rain garden is a landscaped, shallow depression that is designed to intercept, treat, and infiltrate stormwater at the source before it becomes runoff. The plants used in the rain garden are native to the region and help retain pollutants that could otherwise harm nearby waterways. Rain gardens are an important way to make our cities and neighborhoods more attractive places to live in while enhancing ecological health.

The RCE Water Resources Program has been inundated with requests for assistance in building rain gardens. These requests have come from RCE County Agents, Watershed Groups, Boy and Girl Scout Troops, schools and individual homeowners. This is a great sign that people do care about the environment and are beginning to think about how they can take more responsibility for better managing stormwater from their property.

The first question we are frequently asked is: How do you build one? There are numerous resources available on rain gardens including the RCE Fact Sheet (FS513), a color flyer, and a "How to" manual from New Jersey's Native Plant Society. All of these resources can be accessed from our web site at www.water.rutgers.edu. We have even constructed a special page dedicated to rain gardens so people do not need to go hunting for these resources.

The second question we always get is: Where can I go see one? Well, we now have an answer to this question. Over the last two years, the RCE Water Resources Program has had the opportunity to work with several RCE County Agents and Program Associates: Madeline Flahive-DeNardo (Union County), Bill Hlubik and Rich Weidman (Middlesex County), and Mary Cummings (Gloucester County) to construct demonstration rain gardens. Four rain gardens have been built in Union County, two in Middlesex County and one in Gloucester County. We also just built a demonstration rain garden in Somerset County about ten minutes from Cook Campus. These rain gardens are available for use as educational tools.

The third question that we always receive is: Can the RCE Water Resources Program help us build rain gardens in our community? Well, we currently are running three programs that can incorporate the construction of a rain garden. The first is our "Restore-a-Waterway" Program, which was described in our Spring 2006 Newsletter. The second is our "Stormwater Management in Your Backyard" Program, which was described in our Winter 2004 Newsletter. The third is our Community-Project-Based Learning Program, which is described in this newsletter. The Newsletters are available on our web site, along with other information on these programs. If you are interested in working with us to offer one of these programs in your area, please feel free to contact Greg Rusciano at greg.rusciano@rutgers.edu to check on our availability.

COMMUNITY-PROJECT-BASED LEARNING

CHANGING THE FACE OF MIDDLE SCHOOL SCIENCE EDUCATION

The RCE Water Resources Program has joined forces with Research in Education Applied to Learning (R.E.A.L.) Science to create a new method of science instruction called "Community-Project-Based Learning." R.E.A.L. Science is a nonprofit organization that provides a support system for innovative standards-based authentic science projects along with effective teacher in-service training programs in science education. Community-Project-Based Learning incorporates the authentic practice of real scientists into the regular classroom setting. Community-Project-Based Learning identifies a real environmental problem in the community and works with the students to address these driving questions: Is there a real problem with our watershed? What is our contribution to the problem? If there is pollution in our watershed, how can we fix it? The project objectives include the students investigating various aspects of the natural environment on and around the school grounds, students documenting findings, and students communicating these findings to fellow classmates and the community. Working in teams the students design a solution to a problem and present these solutions to their classmates. The best solutions are selected and built on the school grounds.

Christopher C. Obropta, Ph.D., P.E.
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These projects expose students to the actual practice of scientists in the fields of ecology and environmental science and cover issues in geology, biology, chemistry, and applied mathematics. Lessons and activities are designed with classroom teachers to instruct students within the state standards-based curriculum. The students work together to address relevant environmental problems in their community.

Students participate as legitimate members of a scientific community. They work with their teachers, parents, local scientists, and other knowledgeable members of the community to create a solution to a relevant environmental problem in their community. As scientists, the students assemble existing data, collect new data, and work with professionals from the community to fully understand the problem, while honing their skills and learning within the guidelines of the New Jersey State Core Curriculum Content Standards.

South Brunswick Crossroads South Middle School students hard at work.

Community-Project-Based Learning was demonstrated in the South Brunswick Crossroads South Middle School. For this project, the problem in the community was excessive algae at Davidson Mill Pond downstream of the school. The main cause of this problem was phosphorus pollution. The students designed and built a large rain garden to capture and treat stormwater runoff on the school property. The students were tested prior to the unit and after the unit. There were significant gains for all students participating in the Community-Project-Based Learning project on standards-based measures of ecology content knowledge. Furthermore, the data indicated that low-achievers improved their standards-based knowledge to within the same range of academic achievement as their high-achieving peers.

The RCE Water Resources Program continues to work with R.E.A.L. Science to promote Community-Project-Based Learning throughout New Jersey. For more information, please contact Chris Obropta at obropta@envsci.rutgers.edu.

UPDATE ON MICROBIAL SOURCE TRACKING (MST) IN NEW JERSEY

Many waterways in New Jersey are impaired for fecal coliform, and the State is making a strong effort to restore these impaired watersheds through the TMDL (total maximum daily load) process and through the development and implementation of watershed restoration plans. This process requires fecal coliform sources to be clearly identified and quantified so that restoration efforts can be prioritized to cost effectively address these water quality problems. Microbial Source Tracking (MST) can play an important role in helping New Jersey achieve this goal of restoring these waterways.

On October 26, 2006, Monmouth University's Urban Coast Institute, in collaboration with RCE and the New Jersey Microbial Source Tracking Working Group, held a seminar entitled "Microbial Source Tracking as a Monitoring and Management Tool" at the Monmouth County Agricultural Building in Freehold, New Jersey. NJDEP personnel lead the seminar by discussing the State's protocol for the development of fecal coliform TMDLs. This discussion included the State's procedure of using Multiple Antibiotic Resistance (MAR) testing coupled with coliphage testing to track down fecal coliform sources. Although MAR has been successfully used by both the NJDEP Leeds Point Laboratory and Monmouth University to identify sources of bacterial contamination in various watersheds in New Jersey, it is a library based technology that requires a watershed specific library that can be costly and time consuming to develop.

Several case studies were presented at the seminar including work being conducted in Southern California by Weston Solutions using a quantitative PCR (qPCR) assay targeted to host-specific markers for different members of the bacterial genus Bacteroides and "ribotyping" that targets the DNA of the seven sequences that code for ribosomal RNA [rRNA operons]. The qPCR and the ribotyping produced similar results, and together they provided a weight of evidence in identifying and quantifying sources. Katie Buckley then presented information on MST work that is being conducted at Rutgers Cook College, which uses qPCR for Bacteroides. Becky Cosgrove presented her work with Enterococcus as a recreational bathing water indicator. John Tidemann provided an update on his work with antibiotic resistance analyses (ARA) to identify pollutant sources. Cara Muscio and Anne Grimes gave a presentation on the challenges of using optical brighteners to track pollutant sources. The MST Working Group decided to form a subcommittee to examine using optical brighteners with volunteer