On September 28, 2012 twenty-nine people participated in a bus tour of seven sites where stormwater management practices had been installed in the Troy Brook watershed, a tributary of the Whippany River and ultimately the Passaic River. A Regional Stormwater Management Plan for the Troy Brook was developed by Drs. Obropta and Goodrow, Rutgers Cooperative Extension and approved by the NJ Department of Environmental Protection. It is through that Plan that the Troy

Troy Brook Stormwater Best Management Practices Bus Tour
Pat Rector, Environmental and Resource Management Agent Morris/Somerset Counties

Some participants pose before getting on the bus (background) to tour stormwater Best Management Practices (BMPs) in the Troy Brook Watershed, Morris County, NJ. Photo Art Catalucci, Morris County Engineering.

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Brook Phase I 319(h) grant was received to implement stormwater management practices in the watershed to reduce flooding and pollutant loading to the Troy Brook.

The tour was to provide residents and municipal officials and staff with on-the-ground views of the practices. The participants included AmeriCorps Ambassadors who are becoming familiar with issues and solutions of stormwater runoff, municipal officials, planning and engineering staff who visited to see what other municipalities are doing to address stormwater runoff.

The visited sites included rain gardens at the Parsippany-Troy Hills municipal building that are located in the front and back of the building, and combined disconnect 75% of the roof and capture, treat and infiltrate 50,000 gallons of runoff annually. The tour next stopped at Tivoli Gardens, a garden apartment complex where slope stabilization projects were installed to reduce sediment loss and runoff as the stream runs through the parking lot, capturing approximately 188,000 gallons of runoff/year.

A total of ten rain gardens are installed disconnecting roof runoff at Tivoli Gardens. Other site visits included a commercial property where pervious pavement is installed in the parking lot, calculated to infiltrate 960,000 gallons of runoff annually. The Parsippany-Troy Hills Municipal Police and Court parking lot where three Filterra® tree boxes were installed and the Department of Public Works facility where turfstone, a bioswale and a cistern were installed were the last stops on the tour.

Survey results indicated that the Tour was a success. Comments such as “Excellent tour” and “As Pat said, ‘Getting out and seeing, smelling, touching stormwater management Best Management Practices (BMPs) is the best way to understand them,’” confirm the desire to continue on an annual basis.
The Nature Conservancy recently teamed up with Rutgers Cooperative Extension and New Jersey Water Supply Authority (NJWSA) to help protect the area’s drinking water by installing a rain garden in Walck Park, Somerville on September 27, 2012. The park and the surrounding neighborhoods drain to the Ross Brook, a tributary to the Peters Brook, which is a priority watershed in the New Jersey Water Supply Authority’s source water area. In developed areas, rain water can wash pollutants from rooftops and paved surfaces into local waterways, where this “stormwater” can impact drinking water quality.

Like most rain gardens, this project includes a planted depression in the ground that will allow runoff from a nearby impervious surface—the park’s pavilion roof and paved area—to collect and slowly be absorbed into the ground. This process will capture and filter the stormwater before it enters the Ross Brook, reducing pollutants that enter the local drinking water system. The project neighborhood is just a few miles upstream from New Jersey American Water Company’s drinking water treatment plant, which supplies 124 million gallons of drinking water per day to many customers in New Jersey.

“This rain garden will act as a demonstration piece to residents, Bob O’Neil of New Jersey Water Supply Authority says, “We want residents to see how easy it is to implement rain gardens on their own property.” The rain garden was built adjacent to Walck Park’s pavilion in order to capture the roof’s runoff; the pavilion’s roof closely resembles the roof size of a typical house, and O’Neil hopes that this size comparison will reassert the practicality of rain gardens on resident’s properties. When water falls onto the

**Partners Unite for Clean Water**

Ellen Creveling, Conservation Science Coordinator
New Jersey Chapter of The Nature Conservancy

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Ken Klipstein, Director, Watershed Unit of New Jersey Water Supply Authority lays out string to set the outline for the 200 ft square rain garden. The next step will be to use mark-out paint so that the utility companies can verify there are no utility lines near the garden. Photo Pat Rector, Rutgers Cooperative Extension.

Robert O’Neil, New Jersey Water Supply Authority uses a rototiller to loosen the clayey soil at the site so the shovelers can shovel. Photo courtesy Shea Zwerver, The Nature Conservancy.
pavilion’s roof it is then collected in the gutters, travels to the down spout which then carries the water into the rain garden. The rain garden retains the influx of water and then slowly absorbs the water while the plants and soil mixture of sand and compost help purify the water as it infiltrates into the ground. A rain garden is an inexpensive measure residents can take at a micro level, but this rain garden mimics that of a larger, macro ecosystem. The plants in this garden mimic trees and our world’s forests; forests are living filters that provide us with clean water by intercepting and absorbing sediment, excess nutrients and pollutants.

The rain garden builds on previous efforts by Rutgers and NJWSA to engage the community, enhance the environment, and improve water quality in Somerset County. “New Jersey Water Supply Authority, Rutgers Cooperative Extension and the Borough of Somerville have conducted several community rain barrel workshops in the Peters Brook watershed which were enthusiastically received,” says Pat Rec-
tor of Rutgers Cooperative Extension. “Follow-up surveys indicated that 80% of participants are interested in learning more about rain gardens.”

This project is also part of The Nature Conservancy’s Forest to Faucet Program. This program, funded by Johnson & Johnson, is a community education effort designed to increase awareness of the vital role trees and plants play in ensuring clean drinking water for New Jersey residents. The plants in this garden play a similar role as trees; our forests act as living filters that provide us with clean water by intercepting and absorbing sediment, excess nutrients, and pollutants. “Next time you walk through a forest, imagine that the trees are affixed to the end of your kitchen faucet like a large green purifier, cleaning the water before it splashes into your drinking glass,” says Eric Olsen of The Nature Conservancy.

Rain gardens not only filter pollutants from runoff thus improving the water quality, they also provide a range of benefits such as providing habitat for wildlife, lessening the burden on stormwater infrastructure, po-

Soil test results. Plants were chosen that would grow well in this soil with a low pH. Nutrient results for the soil suggest that in the future, the plants may need a fertilizer application.

The plants in the Walck Park rain garden portray a more subtle beauty. Photo Pat Rector, Rutgers Cooperative Extension.
Partners Unite... continued

tentially reducing localized flooding, and adding beauty to a neighborhood. Rain gardens are becoming more prevalent as awareness of their many benefits grows. “The Borough of Somerville would be very proud to share our newly funded rain garden with others to demonstrate the wise and effective use of runoff water,” says Jay Scott, a Commissioner of Recreation and Master Gardener.

The partners hope that the Walck Park rain garden will inspire local residents to install similar rain gardens in their own back yards to help protect this important drinking water source area. “We want residents to see how easy it is to implement rain gardens on their own property,” says Bob O’Neil of New Jersey Water Supply Authority.

Volunteers and staff from The Nature Conservancy, New Jersey Water Supply Authority and Rutgers Cooperative Extension adding plants to the garden. Photo courtesy Shea Zwerver, The Nature Conservancy.


Hurricane Sandy also found the rain garden, as seen in the picture above. But like the state, the rain garden will survive with some tree removal and rebuilding. Photo courtesy Heather Desko, New Jersey Water Supply Authority.

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In this subtle rain garden plants include:
- red chokeberry, which will provide a bright red to reddish purple color in the autumn with bright red fruit in late summer and early fall that is eaten by birds;
- witch hazel, which produces flowers in fall that smell of spice and citrus and seeds that are eaten by birds, squirrels, chipmunks, deer and beaver;
- inkberry holly, an evergreen with black fruit that is consumed by birds;
- winterberry holly, which will be covered with berries in January and attracts songbirds.

The grasses that have been planted include:
- soft rush which helps to reduce the flow in the lower portion of the rain garden as the water enters the garden and also provides habitat for macroinvertebrates while the seeds can provide seeds for waterfowl, game birds and song birds;
- broomsedge along the buffer, with leaves that turn reddish-orange in the fall with seeds that can be eaten by small rodents and habitat for wildlife species; and
- switchgrass that is along the buffer and helps to stabilize the buffer. Switchgrass is being investigated as a biofuel. Animals that will eat switchgrass seeds include Canada goose, mourning dove, northern bobwhite, wild turkey, red-winged blackbird, northern cardinal, brown-headed cowbird, dark-eyed junco, meadow vole, white-footed mouse, Eastern gray squirrel, mallard, Eastern chipmunk, and sparrows.

As indicated by the surveys of rain barrel workshop participants, many in the community “are interested in learning more about rain gardens as another personal contribution to clean water and reducing storm water runoff in their community, while adding a beautiful garden to their yard,” says Pat Rector. “This demonstration rain garden is a first step towards this.”
Water Quality and Sustainability Grounded in Soil Health

Over the past four centuries, the landscape of New Jersey has shifted from "native" vegetation to large areas of agriculture and then gradually to urban and suburban. In addition to population density, the development of land has demanded more and more infrastructure, such as buildings, roads, and other impermeable cover. Even the unpaved areas that remain in the midst of development are often severely damaged by the human activities nearby. The rich, fertile topsoil may be removed or eroded, the topsoil or subsoil may be deeply compacted by traffic of heavy loads, or building materials may contaminate the soil during the construction process.

And so, land development has, in many ways, impaired the natural ecosystem processes that once acted to infiltrate, store, and filter rainwater and thus sustained healthy vegetation. While practices to control soil impairment at construction sites are regulated by the State–through local Soil Conservation Districts–there is still much that can be done to repair and manage the landscape for ecosystem health.

These issues have taken center stage at several recent conferences organized by the New Jersey Association of Conservation Districts (NJACD). The most recent widespread effort, "S.O.S. – Sustainable Opportunities through Soil," was held in May 2012 at Ocean County College in Toms River, NJ. The event, which attracted over 200 attendees, was organized jointly by NJACD, the Ocean County Soil Conservation District, and the Barnegat Bay Partnership. Other major sponsors included Rutgers NJAES and the New Jersey Association of Professional Soil Scientists.
This statewide conference targeted a wide range of land care professionals, practitioners, and policy-makers. Its goal was to develop a better understanding of healthy soils and their necessity to sustainable ecosystems and to initiate discussions in local communities about moving from gray infrastructure (referring to impermeable pavement and the need for engineered solutions) to green infrastructure (such as permeable soil/landscapes, allowing natural ecosystem functions to serve needs).

A new focus at the conference was the importance of maintaining soil health and how it contributes to healthy turf, a critical component of our suburban environment and an important factor in stabilizing soil. Stephanie Murphy, director of Rutgers NJAES Soil Testing Laboratory, along with Rutgers colleagues Sal Mangiafico, environmental and resource management agent, and James Murphy, extension specialist in turf management, shared their knowledge about creating and managing soil health in the suburban/urban environment for minimizing runoff and sustaining plant health.

Mangiafico stressed that the need for irrigation, as well as stormwater management, would be greatly lessened if all landscaped areas could infiltrate and store rain to their maximum extent, largely dependent on soil properties.

"Even in sandy soils, intense compaction can occur to the extent that water won’t infiltrate and be stored in the rootzone," explains Stephanie Murphy "When the water runs off instead or evaporates from the surface, irrigation is required to maintain vegetation."

She adds, "You have to continually apply nutrients, because the zone of root growth is so shallow." The restricted root growth, lack of water, and lack of oxygen in soil limit the biological processes that might otherwise remedy the situation, thus continuing the cycle.

At the conference, James Murphy pointed out that turfgrass often gets blamed for negative aspects of suburban landscapes. He offered instead that it’s the condition of the underlying soil—not the grass itself—that results in runoff and subsequent consequences. He discussed management options, such as core aerification, which can be used to alleviate compaction and get natural processes moving in the right direction.
Keeping your landscape plants healthy and happy is an important aspect of having an attractive, water-efficient landscape. Following a few basic guidelines will help ensure healthy, attractive landscape plants:

- Choose plants that thrive in this climate. One tool to help with this is the USDA Plant Hardiness Zone Map.

- Choose plants that thrive in the conditions of your site. This entails first determining if the conditions of your site might be stressful for some plants. For example, if the area is shady or if soils stay wet, finding plants that tolerate these conditions will be important.

- Conduct a soil test to determine the chemical properties of your soil, like pH and phosphorus level. If necessary, amend soils to make them hospitable for your landscape plants.

- Use horticultural information specific to the plants you are growing from reputable sources such as local Cooperative Extension publications and personnel. Along with the other resources mentioned in this publication, good sources of information include the Rutgers Cooperative Extension website (njaes.rutgers.edu/extension/) and eXtension (extension.org/).

The right plant for the climate

For landscape plants to thrive year after year, species and varieties should be chosen that tolerate the local climate. One tool to help with this is the USDA

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Plant Hardiness Zone Map, which indicates “average annual minimum temperature” and so suggests the degree of cold tolerance required by a plant to thrive in each zone. The zones in New Jersey vary from zone 6a in the northwest of the state, through 6b and 7a for the bulk of the state, and 7b for some areas on the coast and near the Delaware Bay (see figure). Note, though, that elevation, topography, and microclimate can influence the actual coldest temperatures for a specific spot within a zone.

The right plant for the right spot

In order to keep landscape plants thriving, it is important to start with some knowledge about the types of conditions these plants prefer, what stresses they have tolerance for, and how those preferences and tolerances match the conditions of your site.

Some common stresses found in landscapes include:

- low pH, or acidic, soil
- poorly drained, or wet, soil
- sandy and droughty soil
- compacted soil
- low fertility soil – soil low in organic matter or some essential nutrients like nitrogen or potassium

If you determine that any of these conditions exist at your site, one solution is to choose landscape plants that have tolerance for growing in that condition. Alternatively, modifications could be made to the site or the soil to make the site more hospitable for the plants you desire. For example, low pH soils could be limed, compacted soils could be aerated, and droughty soils could be improved with compost or other organic matter.

There are a variety of books and websites on horticulture that are useful for collecting information about the preferences and tolerances of landscape plants you may be interested in. A few sources that may helpful be are given in the Table.
Nutrition is critical for plant vitality, and probably the best tool available to determine if plants are receiving proper nutrition is a soil test.

Reasons why soil testing is important include:

- Determining if there is an deficiency or an excess of nutrients
- Saving money on potentially wasted fertilizer and lime
- It is environmentally friendly, since it prevents excess fertilizer application

The basic soil fertility test at the Rutgers Soil Testing Laboratory analyzes the acidity (pH) of the soil and the levels of important macro-nutrients for plants—phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg)—as well as a handful of important micronutrients—including copper.
(Cu), zinc (Zn), iron (Fe), and boron (B). If you indicate the types of plants being grown, recommendations for lime and fertilizer that should be applied will be included with the results.

**Two important principles of plant nutrition:**

- Adjusting the pH of the soil according to recommendations is critical for plants to be able to take up nutrients from the soil. If the soil is too acidic or too basic, soil nutrients—even when they are in the soil in high amounts—will be unavailable for plants to use.

- It is also important to remember that plants need all their critical nutrients in sufficient quantities to be healthy—just like people do. For example, if there is a deficiency of calcium in the soil, applying nitrogen or phosphorus fertilizer will not improve the plants’ health. Soil testing every three years is recommended. If there are nutrient or pH problems in your soil, testing every year may be better.

If you are unfamiliar with the physical properties of your soil, you might consider a “soil suitability” or “topsoil evaluation” test that indicates the textural class (whether a soil is a sandy, loamy, or clayey) and the organic matter level in the soil.

It is important to follow the directions for soil sampling, particularly to sample areas with different kinds of plantings separately. For example, areas with rhododendron, azalea, and other acid-loving plants should be sampled separately from turf areas.

Remember that soils tests can only identify problems related to soil acidity and soil nutrients. Plant problems may very likely be caused by other factors like wet soils, insects, plant diseases, or other environmental factors.

For more information and directions on how to soil sample, visit [njaes.rutgers.edu/soiltestinglab](http://njaes.rutgers.edu/soiltestinglab), or contact the Rutgers Cooperative Extension office in your county, [njaes.rutgers.edu/county](http://njaes.rutgers.edu/county).
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**Video: Rain Barrel Installation at home (from Rutgers Cooperative Extension)**

Follow the creators on YouTube:

[http://www.youtube.com/user/ScarletScience](http://www.youtube.com/user/ScarletScience)
Contents include:

- An innovative use for rain barrel water when the power goes out
- Stormwater management in Hamilton Township
- A review of the Rutgers Environmental County Agents
- New Jersey Water Savers goes corporate
- *Short Course to be held on collecting data for watershed restoration planning*

Download the newsletter here:
Creating Jobs through Stormwater Management (from Rutgers Water Resources Program)

Stormwater Utilities = Jobs. It’s fair and it’s time. Let’s get New Jersey back to work, repair our aging infrastructure, reduce flooding, and get businesses coming back to our great State.

Read the article: http://rutgerswaterresources.blogspot.com/2012/09/normal-0-false-false-false-en-us-x-none.html
Soil Health Website from the USDA

With factsheets and videos. Geared mostly toward agricultural production.

Visit the website:

WASHINGTON — The U.S. Environmental Protection Agency (EPA) today launched a new app and website to help people find information on the condition of thousands of lakes, rivers and streams across the United States from their smart phone, tablet or desktop computer. Available at http://www.epa.gov/mywaterway, the How’s My Waterway app and website uses GPS technology or a user-entered zip code or city name to provide information about the quality of local water bodies.
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