Green Infrastructure Champions Program

This program is partially funded by the Rutgers New Jersey Agricultural Experiment Station, The Geraldine R. Dodge Foundation, and NJ Sea Grant Consortium and is a collaboration of the Rutgers Cooperative Extension Water Resources Program, the Green Infrastructure Subcommittee of Jersey Water Works, and Duke Farms.
Green Infrastructure Champion Training: Part 6
“Green Infrastructure Projects for Schools”

March 27, 2020
Duke Farms
Hillsborough, NJ

Webinar due to COVID-19 Pandemic
Presented by Chris Obropta and Toby Horton

Start Time: 10 am

water.rutgers.edu
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A Coronavirus Webinar
Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.
Water Resources Program

Our mission is to identify and address community water resources issues using sustainable and practical science-based solutions.
Why New Jersey Schools?

- 590 School Districts
- 2,526 Public Schools
  - 2,005 Elementary Schools
  - 511 Secondary Schools
- 88 Charter Schools
- Public School Enrollment = 1.37 million
- Charter School Enrollment = 45,982
- Full-time classroom teachers = 116,351

Need more math teachers at NJ Department of Education
More on “why schools”

• Mostly old buildings and parking lots with little or no stormwater management
• Dedicated source of funding ($8.03 billion in state aid in 2016-2017 + local property taxes)
• Educate the youth and the adults will follow
• Enhance all levels of teaching with outdoor education
• Innovative, interdisciplinary “outdoor classrooms”
• Highly visible sites
• Separate government – school board
• Free labor
It is all about controlling runoff from impervious surfaces.
Step 1: Depave
Make Something with your De-Pavement

Greater Brunswick Charter School
Make Something with your De-Pavement

Greater Brunswick Charter School
Existing Courtyard
Existing Courtyard
Existing Courtyard
Existing Courtyard
Design

WINTER RAIN GARDEN: seeds, berries, + bark

FALL RAIN GARDEN: grasses + autumn color

SUMMER RAIN GARDEN: monarch butterfly habitat

SPRING RAIN GARDEN: wildflower meadow

OUTDOOR SEATING AREA
ZANE NORTH ELEMENTARY

Water Flow and Infiltration Diagram

Not to Scale
Dimensions to be verified in the field

Zane North Elementary School
Rain Garden Project
Rutgers Cooperative Extension
April 20, 2017
ZANE NORTH ELEMENTARY
Step 2: Simple Disconnection
Downspout Disconnection

Downspout Connected to Sewer System

Downspout Disconnected from Sewer System
Useful Water: Disconnect to a Rain Barrel or Cistern

Disconnect your downspout by installing a rain barrel.

Impervious area is now “**disconnected**” from flowing directly into the storm sewer system.
Useful Water: Rainwater Harvesting Systems

From Problem to Utility
Rain Garden
Water Quality and Health Habitat
Enhancement Project
This garden is designed to capture, treat, and infiltrate stormwater at the source before it becomes runoff. It helps reduce transport of source pollutants from entering nearby waterbodies. The plants are native to the region and attract wildlife.
Rain gardens are beautiful, low-maintenance, and inexpensive gardens that you can make at home.
www.wssc.nj.gov
Useful Water: Filter Stormwater through rain garden to root-water food beds

Jonathan Dayton High School Courtyard
Useful Water: Filter Stormwater through rain garden to root-water food beds
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Useful Water: Filter Stormwater through rain garden to root water food beds
Rooftop runoff is now “disconnected” from flowing directly into the storm sewer system.
Bioretention Systems/Rain Gardens

Native Plants
A rain garden is planted with a variety of grasses, wildflowers, and woody plants that are adapted to the soil, precipitation, climate, and other site conditions.

Drainage Area
This is the area of impervious surface that drains stormwater runoff to the rain garden.

Curb Cut
This curb cut and concrete flow pad are designed to help redirect stormwater runoff to the rain garden system and out of the storm drain.

Inlet
This is the area where stormwater enters. The inlet is often lined with stone to slow water flow and prevent erosion.

Ponding Area
The ponding area is the lowest, deepest visible area of the garden. When designed correctly, this area should drain within 24 hours.

Berm
The berm is constructed as a barrier to control, slow down, and contain stormwater.
PARTS OF A RAIN GARDEN

BUFFER
SLOPE
BASE
BUFFER
SLOPE
SOIL
SOIL
Lots of Rain Gardens
2014
• Installed rain garden with assistance from the DPW
• Educated students about rain gardens and planted with them
2016
• Returned to conduct maintenance
October 2018

- Educated the Life Skills students about non point source pollution, rain gardens and how to do maintenance
- Conducted hands on maintenance with the students
WOODS ROAD
ELEMENTARY SCHOOL

Site visit March 2011

Post excavation April 2011

Post planting May 2011

Follow up site visit June 2011
Rain garden at Catto School in Camden, NJ
Step 3: Convert to Permeable Pavement

**Porous Asphalt**
It is common to design porous asphalt in the parking stalls of a parking lot. This saves money and reduces wear.

**DRAINAGE AREA**
The drainage area of the porous asphalt system is the conventional asphalt cartway and the porous asphalt in the parking spaces. Runoff from the conventional asphalt flows into the porous asphalt parking spaces.

**Underdrain**
Systems with low infiltration rates due to soil composition are often designed with an underdrain system to discharge the water.

**Asphalt**
This system is often designed with conventional asphalt in areas of high traffic to prevent any damage to the system.

**Subgrade**
Porous pavements are unique because of their subgrade structure. This structure includes a layer of choker course, filter course, and soil.
Permeable Pavements

- Underlying stone reservoir
- Porous asphalt and pervious concrete are manufactured without "fine" materials to allow infiltration
- Grass pavers are concrete interlocking blocks with open areas to allow grass to grow
- Ideal application for porous pavement is to treat a low traffic or overflow parking area
ADVANTAGES

• Manage stormwater runoff
• Minimize site disturbance
• Promote groundwater recharge
• Low life cycle costs, alternative to costly traditional stormwater management methods
• Mitigation of urban heat island effect
• Contaminant removal as water moves through layers of system

COMPONENTS

- Design Guidelines for Porous Asphalt with Subsurface Infiltration
- RiverJacks open into recharge bed
- Porous asphalt pavement
- Uniformly graded stone aggregate with 40% void space for stormwater storage and recharge
- Uncompacted subgrade is critical for proper infiltration
- Filter fabric lines the subsurface bed
How do we get started?

• Be clear about what you have to offer the school and why you want to work with them
• Ensure them that you are not going to make more work for the teachers or administrators
• Do not scare them with a lengthy discussion on maintenance but inform them of the tasks
• Tell them how the work will be funded, don’t be afraid to ask for funding but make sure they know you have skin in the game
Educational Programming

• Educational program can vary in length
• Community-Based Project Learning was eight weeks – one day in the classroom per week and then building and planting a rain garden
• You can also educate the students why they plant the garden
• Students can continue these efforts beyond the classroom – Eagle Scout Project, National Honor Society, or simply a college resume builder
Jonathan Dayton High School Springfield

a) NJ Physiography modeled in the garden
b) Interpretive Design
c) Embedded Narrative
d) Local Aesthetics
e) Built with Town DPW and Board of Education Facilities Personnel
“Physiography/Geology Teaching Garden”

Design Goals:

Demonstrate a rain garden that:

Is useful as a teaching tool specific to place

Highlight New Jersey’s geology, and how it is connected to water and plants

Demonstrate the relationship between paving (imperviousness) and unpaved areas

Create interest in “real” landscapes by reference and mimicry in the garden
Beyond Water Control: Connecting with Geology, Soils and Plant Communities
Beyond Water Control: Educational Garden

Rutgers Landscape Architecture, NJAES, Springfield Township
Coastal Plain
(Low)
The Enviroscape Model

• Great for all ages
• Simple to use and conveys all the necessary concepts
• Easy to clean up
• The students can jump right in and make it rain
Stormwater Management in Your Schoolyard Program

http://water.rutgers.edu/Projects/SWMIYSchoolyard/SWMIYSchoolyard.html#K8
Sustainable Jersey for Schools

Two Actions (10 points each):

- Green Infrastructure Assessment & Plan
- Green Infrastructure Installation
What’s next?

• Many of the ICAs, RAPs, and Green Infrastructure Feasibility Studies have identified opportunities at schools

• Check is the school is registered in Sustainable Jersey for Schools: http://www.sustainablejerseyschools.com/actions-certification/participating-districts-and-schools/

• Reach out to the school and see if they are interested in green infrastructure planning or installing a practice
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