Rain Garden Installation

GRADE LEVEL(S): 9-12

NEW JERSEY CORE CURRICULUM CONTENT STANDARDS:
- 5.1.12.D.1 Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
- 5.3.12.C.2 Model how natural and human-made changes in the environment will affect individual organisms and the dynamics of populations.
- 5.4.12.G.1 Analyze and explain the sources and impact of a specific industry on a large body of water (e.g., Delaware or Chesapeake Bay).
- 9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
- 9.1.12.B.3 Assist in the development of innovative solutions to an onsite problem by incorporating multiple perspectives and applying effective problem-solving strategies during structured learning experiences, service learning, or volunteering.
- 9.1.12.C.1 Enlist from experts in the field, community members, and other stakeholders to design a service-learning activity that addresses a local, national, or worldwide need.
- 9.3.12.C.7 Pursue a variety of activities related to career preparation (e.g., volunteer, seek employment, and/or apply for training grants, higher education grants, and loans).
- 9.4.12.O.13 Listen to and speak with diverse individuals to enhance communication skills.
- 9.4.12.O.61 Identify and explore careers in one or more career pathways to build an understanding of the opportunities available in the cluster.
- 9.4.12.O.(1).7 Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g., medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).

ESTIMATED TIME: 45 minutes

OBJECTIVES:

Students will be able to:
- Understand what a watershed is and how we all live in a watershed
- Understand how the land is connected to the sea
- Understand how to manage stormwater runoff by the use of rain gardens
- Increase their environmental awareness

- Teach others in their communities about the importance of rain gardens and how rain gardens can serve as one of the solutions to water resources issues in New Jersey

MATERIALS:

- Plant signs with rods
- Plants for rain garden(s)
- Gloves
- Hand Trowels
- Shovels

PROCEDURE:

Part 1: Water Pollution and Rain Gardens
Estimated Time: 20 minutes
Preparation:
1. Have students prepare to go outside and help with the installation of their school's rain garden(s).
Directions:
1. Discuss with the students how they will be going outside shortly to plant in the rain garden(s). Discuss the proper behavior for acting outside.
2. While outside, discuss with the students the following topics:
    a. What is a watershed? *A watershed is an area of land that water flows across, through, or under on its way to a stream, river, lake, ocean, or other body of water. The Lindenwold High School is located within two watersheds: the Delaware River watershed and Cooper River watershed. The Delaware River watershed includes states other than New Jersey, such as New York, Pennsylvania, and Delaware. The Cooper River Watershed includes 16 municipalities in Camden County and is approximately 40 square miles. You could fit 19,000 football fields lying side by side with in this watershed. The Cooper River watershed is named after William Cooper, who acquired land in 1682 in what is now Camden City. The Cooper River watershed is characterized by extensive residential and commercial development.*
    b. What is point source pollution? *Point source pollution comes from an identifiable source at a single location, such as wastewater from a factory.*
    c. What is nonpoint source pollution and what you can do to prevent nonpoint source pollution? *Nonpoint source pollution does not come from an identifiable source – there is no one source to point to. This is sometimes referred to as "people pollution." Examples of nonpoint source pollution include:*

1. *Pesticides- Many household products made to exterminate pests also are toxic to humans, animals, aquatic organisms, and plants.*
2. *Fertilizer- Contains nitrates and phosphates that, in abundance, can cause blooms of algae that can lead to fish kills.*
3. *Motor oil- Used motor oil contains toxic chemicals that are harmful to animals, humans, and fish.*
4. *Soil erosion- Excessive loose soil can lead to turbid (cloudy) water and might clog the gills of fish.*
5. *Pet waste- Animal waste contains bacteria and viruses that can contaminate shellfish and may result in beach closings.*
6. *Litter- Litter can end up in waterways and marine life might confuse litter as food.*

Solutions to nonpoint source pollution include:

1. *Pesticides and fertilizer - Avoid the overuse of fertilizers, pesticides, and herbicides and do not apply them before it rains.*
2. *Motor oil - Keep up with maintenance of your car. Inspect your car to make sure that it is not leaking. Do not dump used motor oil down storm drains or on the ground. Recycle all used motor oil by taking it to a local public or private recycling center.*
3. *Soil erosion - If you live along a stream, make sure that there is adequate plant cover along it to reduce the chance of soil erosion. If you work on a construction site or see a construction site, check to make sure the silt fence is intact.*
4. *Pet waste - Pick up after your pets.*
5. *Litter - Do not litter. Place litter, including cigarette butts and fast food containers, in trash receptacles. Do not throw litter in streets or down storm drains. Recycle as much as possible.*

d. What is stormwater runoff? *Stormwater runoff is a combination of rainwater and nonpoint source pollution. Stormwater runoff can harm our waterways. When it rains in the Cooper River watershed, the stormwater runoff goes into the storm drains that lead to the waterways that lead to the Cooper River. The Cooper River goes into the Delaware River that goes into the Atlantic Ocean.*

e. What is a rain garden and how can rain gardens manage stormwater runoff? *A rain garden is a landscaped, shallow depression that captures, filters, and infiltrates stormwater at the source before it becomes runoff. A rain garden can collect water from impervious (hard) surfaces such as roof tops, parking lots, driveways, and roadways. A rain garden recharges groundwater, which helps replenish the aquifers (New Jersey gets approximately 50% of its drinking water from aquifers). A rain garden is similar to a sponge: it can soak up polluted water and clean it through filtration.*

     f. How did we get to where we are at today? *Discussion of how the school's rain garden(s) came to be (site selection, design, planting plan, and excavation).*

Part 2: Rain Garden Planting

Estimated Time: 20 minutes

Preparation:

1. Rain garden excavation should be completed prior to students planting. Mulch should be applied prior to planting. Additional mulch can be kept to the side for touch-ups after the students plant, if necessary. Watering the plants can be completed after the students have finished planting. If there is enough time, students can assist with the watering of the plants.
2. Prepare plant signs with information for each rain garden plant. The plant signs should include a photograph of the mature plant, common name, and scientific name on front, while information on the mature height, flowering period, wildlife that is attracted to the plant, and any other fun facts should be included on the back of the sign. This sign should be adhered to a rod (e.g., bamboo, hard plastic) to keep the sign in place adjacent to the plant.
3. Each plant should be placed in the rain garden where it should be planted according to the planting plan.
4. Gather materials for the rain garden planting (gloves, hand trowels, and shovels).

Directions:

1. While outside, discuss with the students the following topics:
    a. The plants selected for the rain garden (use the prepared plant signs to share information with the students). During this "show and tell," you can pass around the plants that will be planted in the rain garden.
    b. Conduct a demonstration on the proper planting technique. Explain how to dig a hole with a hand trowel and/or shovel. Then, explain how to remove the plant from its pot. Before the plant is placed in the ground, explain how to break apart the roots of the plant.
2. Provide the students with gloves and hand trowels and have them plant the plants in the rain garden(s). Let the students plant the rain garden(s). If necessary, have the students work in pairs to plant the rain garden(s). While this is occurring, walk around to make sure the students are planting correctly.
3. If desired, take photographs of the students while they are planting.
4. At the end of planting, take a class photograph next to the rain garden(s).
5. At the end of the planting, have students assist with clean-up. Put away gloves, hand trowels, shovels, and pots.

Part 3: Putting it All Together

Estimated Time: 5 minutes

Directions:

1. While outside, moderate a brief class discussion to help pull the module content

together. Ask the students the following questions:
   a. What did you learn today?
   b. What do you now know about water pollution?
   c. What do you now know about protecting water?
   d. What do you now know about rain gardens?
   e. Do you want to learn more about you learned today?
   f. Will you tell someone what you learned today?
   g. What was your favorite part of the program?