Lesson 5: Get Down and Dirty

Lesson Overview:

Purposes: To help students understand:
1) Steps involved in planting the rain garden including site excavation, installation of under drains and/or modified sumps (optional), soil amendments, tillage, drainage testing, planting, and mulching.
2) How to plant a plant,; and
3) How to apply mulch.

Background:
Planting your rain garden is a very special event. Not only is it the culmination of hours of planning and research it is also an opportunity to get everyone at the school and your community involved. One way to get everyone involved is to have a dedication ceremony to break ground before planting or after the garden is complete to recognize the participants and their efforts.

A successful planting day requires advances preparation.

1) Order Plants: Depending on your budget, select plants that are in pint size (4 inch) to 1 gallon size (8 inch) pots if possible. Plugs (2 inch) can be used but the rain garden will need to be planted in the spring and watered regularly until the plants become established. It is a good idea to order the plants as far in advance as possible. Depending on the circumstances, either pick up the plants or and have them delivered. To assure the plants remain healthy, do not pick up or have plants delivered more than a week before planting. Keep potted plants in the shade and water as needed until planting day.

2) Order Soil Amendments: Soil amendments also need to be ordered in advance. Depending on the size of your rain garden, order in bulk by the cubic yard or purchase amendments in bags. Bulk amendments are cheaper than bagged but more difficult to maneuver. Pick them up or have them delivered. If they are picked up by a person with a truck who works at the school, you may be able to store the amendments in the truck. Because soil amendments are heavy, plan to store the amendments as close to the garden as possible on a paved surface if possible. If they need to be stored on the ground, put a tarp down to separate the amendments from the grass. It may be necessary to re-seed the grass where the amendments have been stored if you store the amendments for more than a day or two.

3) Layout Garden: To layout the rain garden bed, use 100 foot measuring tape to measure out the approximate size of the bed and then use a hose or long line to actually create the shape of the bed. When the group is happy with the shape of the bed, use landscape paint to mark the bed shape on the ground. Now the bed is ready to be excavated.

4) Borrow Equipment: If your garden is large, you may want to consider borrowing or renting a backhoe. School maintenance staff or the town's local public works department may be able to provide this service for little or no cost. If you do rent equipment make sure you have a person lined up who is experienced in operating that piece of equipment safely. If the garden is smaller, students can dig it out with pointed shovels. A rototiller works well for loosening the soil but students can use pitch forks and shovels to accomplish this too. Use a rake to smooth out the bed after the amendments have been added and before planting. A rake can also be used to smooth out the mulch after planting. Several pointed trowels and shovels are needed to dig holes for the plants depending on the size of the plants. Garden gloves are desirable, but optional. A hose and a

spigot key (if necessary to the schools outdoor spigot) are needed for watering. If you are not close to a water source, buckets can be used to transport water. Several large buckets are also handy to transport soil amendments and mulch. Wheel barrels are also good for transporting mulch and soil. Finally if you are not close to a restroom where participants can wash up, make sure you have a washing station set up with clean water, soap, instant hand sanitizer, and paper towels.

5) Arrange for Excavation (optional): If you are unable to get the schools maintenance department or the city's public works department to excavate for free, you may need to arrange for the garden to be excavated by landscape professionals. If you need to do this, also arrange for them to rototill and to amend the soil. If the garden requires underdrains, it is best to have them installed professionally when the soil is excavated.

6) Excavate the Garden: It is a good idea to excavate the garden on one day and plant it on another day, but everything can be done in one day. The advantage of excavating and amending the soils in advance is that you can test the drainage before you plant the garden. When excavating with shovels, start on the outside edge marked with landscape paint and work your way to the middle. Remove the upper layer of sod or plant materials and set it aside to compost. Then remove the soil. If you plan to use the native soil in your mix, move this soil to your amendment pile. Use a ruler to measure the garden depth. If your garden is on a slope, make sure to cut and fill so that the rain garden bed is level (See Slope Handout in Appendix). After the bed is dug out to the correct depth, rototill or double-dig the soil to a depth of 12-18 inches before adding the amendments. Then carefully rake the soil to make it level. This will create a transition zone between the native soil and the amended soil. When the rototilling or double-digging is completed, limit foot traffic into the prepared bed to prevent soil compaction. Then add the amended soils on top.

7) Install Underdrain: If the site has heavy clay soils and drainage is an issue, install an underdrain. An underdrain is a 3-6 inch perforated PVC or black plastic pipe. To install the underdrain, make a channel of pea gravel from the center of the bed to where the underdrain will exit. Make sure that the underdrain slopes 1-3 % away from the garden. Wrap the pipe in a fabric filter or leave it bare. Then lay the underdrain on the pea gravel and cover it with more pea gravel. Then add the amended soil. Another way to install an underdrain is to dig out a deep round hole (like a French drain) in the center of the excavated rain garden and to fill it with gravel. Cover the gravel with a filter fabric and then add the amended soil.

8) Create a Berm: Depending on your garden design, create a full or partial berm around the garden to prevent the runoff from leaving the garden. Berms are usually located on the downstream side of the garden. To create a berm, mound up the native soils to a depth of 4 – 6 inches and tamp the soil down using a Tamp or you can have your students jump on it. If using a backhoe, you can use it to roll over the berm and compact it.Keep adding soil until you have created a compact rounded 4-6 inch lip above the grade of the surrounding land.

9) Amend the Soil: To prepare your amended soil, mix the components together in the proportions chosen. Break up any large clumps. Then use shovels to load the soil into wheel barrels to transport to the rain garden. Dump the soil into the prepared bed and use rakes to smooth it out. Avoid walking in the bed and compacting the soil.

10) Test Drainage: If the rain garden will not be planted the same day as the beds are dug, test the drainage. To test the drainage, use a hose to fill the rain garden so that it is flooded. Record the time. Come back in 24 hours and check to see if the garden is completely drained. If there is standing water, wait a few more days until the soil is drier, remove the soil and add sand to improve the drainage. Then refill the bed and test drainage again. If the garden does not drain in 24 hours, dig out the amended soils. Then either add an undersdrain, French drain or add additional sand or compost to the mix to improve the drainage. Then refill the bed with the amended soils and test it again. It is better to correct drainage issues before you plant the bed. Use the information from soil percolation testing in the ***How Deep Will if Flow*** Activity to choose amendments that work with the soil on the school site.

11) Plant Rain Garden Plants: It is a good idea to actually lay out all of the plants in the rain garden bed to see if the layout works. Leave the plants in the center and use Popsicle sticks or marking flags to label where the outer plants go. Start planting in the middle and work your way out. Avoid compacting amended soil by walking on it as little as possible during planting. To plant a potted plant, dig a hole that is 30% wider than the

pot and approximately the same depth as the plant in the pot. Remove the plant from the pot. If the plant roots are coiled around in a circle, the plant is root-bound. Loosen and straighten the roots before putting the plant into the hole. Do not coil the roots in the hole; if you cannot fit the plant in the hole with the roots straight down, dig a deeper hole or trim the roots. Then center the plant in the hole and add soil to fill in the space between the plant and the hole. Use your fingers to pack the soil down and repeat this process until the hole is filled and the top of the root ball is covered. When the plants in the middle are planted, move to the outside edges. If the plan is to label plants, it is best to do this as each plant is planted. Use Popsicle sticks, wire tags, or plant stakes depending on the look desired. Labels are a good idea because they can help with monitoring plant success and teach students/community members the names of the plants.

12) Mulch the Garden: When finished planting all of the plants, mulch the garden. Newspaper makes an excellent weed barrier. Lay down sheets about 4-6 pages thick and overlap the sheets leaving room for the plant to grow. Then add the mulch. Double shredded hardwood mulch works best because it does not float like pine bark and plastic mulches. Approximately 2-3 inches of mulch is needed. Use buckets and pour the mulch between the plants. Then use hands to push the mulch into an even 2-3 inch layer. Students can use their fingers to measure mulch depth. Generally you want to much to the depth of your longest finger.

13) Water the Garden: It is a good idea to water the rain garden right after you plant it to settle in the plants. Depending upon what time of year you plant the garden, keep an eye on the garden and water it periodically if it becomes dry. After the garden is established the garden should not have to be watered.

14) Maintain the Garden: Rain gardens need to be weeded 2 times a year in the spring and fall. More need to weeding may be at first to allow the rain garden plants to get established. Mulch the garden at least once a year in the fall. If a more formal ornamental-type rain garden was planted, the flowers may need to be dead-headed to promote blooming. Cut plants back after blooming.

Lesson Descriptions:

Option 1: Elementary School

Objectives: Students will:

1) Participate in and/or observe the excavation of the rain garden and preparation of the rain garden bed;
2) Participate in and/or observe the mixing or the rain garden soil and adding it to the rain garden bed;
3) Conduct a drainage test of the rain garden before planting;
4) Layout the plants in the rain garden and properly plant the plants in the garden;
5) Mulch the garden with 2-3 inches of mulch; and
6) Water the rain garden immediately after planting the garden.

Topics Covered: Project Planning, Project Implementation, Problem Solving, Teamwork, Garden Construction, Underdrains, Planting Techniques, Mulching Techniques, Garden Maintenance

Activity Time:
1 class period

State Standards: (See Appendices – Rain Garden Lesson Guide Correlations by Grade)

Materials:
Design plan from Put on Your Design Cap
Rain Garden plants
Soil Amendments (top soil, compost, and/or sand – depends on your school site)
Mulch
Pointed shovels
Trowels
Buckets
Wheel barrel (optional)
Hose
Water Source
Gloves
Under drain materials (option depends on your design)

Follow Up
Journals (one per student or team)
Pencils with erasers
Colored markers or crayons
Digital or regular camera (optional)

Extension
None

Introduction: Review the steps in planting the rain garden. Tell the students they are going to be involved primarily with planting the plants. Show students the different plants. Hold up a pot of each plant type. Ask the students if they know which plant it is? If students were assigned a plant to research in the ***Put on Your Design Cap*** Activity that is being used in the rain garden, have that students introduce the plant to the rest of the class. Then plant the garden.

Hands On: Divide the garden into 4 zones and assign 4-6 students and a volunteer to each zone. Allow each student to plant at least one plant. Then have the students help distribute the mulch. Allow students to take turns watering the sections after you finish planting and mulching the garden.

Follow-ups: Have the students pick one plant from the rain garden plant (or use the same plant they researched in the ***Put on Your Design Cap*** Activity) and start a journal. If the students have not researched a plant already, have them conduct research to learn more about the plant. Then observe the plant throughout the seasons through bloom to seed. Have them write their observations in a journal. Have them sketch the plant in its various phases or photograph it for the journal.

Extensions: Have the students share what they learned from observing their plant with the rest of the class.

Option 2/3: Middle School/ High School

Objectives: Students will:

1) Participate in and/or observe the excavation of the rain garden and preparation of the rain garden bed;
2) Participate in and/or observe the mixing or the rain garden soil and adding it to the rain garden bed;
3) Conduct a drainage test of the rain garden before planting;
4) Layout the plants in the rain garden and properly plant the plants in the garden;
5) Mulch the garden with 2-3 inches of mulch; and
6) Water the rain garden immediately after planting the garden.

Topics Covered: Problem Solving, Experimental (Rain Garden) Design, Garden Themes, Plant Selection Criteria, Garden Orientation, Design Evaluation Criteria, Modeling, and Oral and Written Presentations

Activity Time:
1-3 class periods

State Standards: (See Appendices – Rain Garden Lesson Guide Correlations by Grade)

Materials:
Design plan from Put on Your Design Cap
Rain Garden plants
Soil Amendments (top soil, compost, and/or sand – depends on your school site)
Mulch
Pointed shovels
Trowels
Buckets
Wheel barrel (optional)
Hose
Water Source
Gloves
Under drain materials (option depends on your design)

Follow Up
Journals (one per student or team)
Pencils with erasers
Colored markers or crayons
Digital or regular camera (optional)

Extension
None

Introduction: Review the steps in planting the rain garden.

Hands On: If possible, involve the students in every phase of the planting event. This will take 3 site visits: 1) sketch out the bed and spray the lines, 2) excavate the bed, install underdrain (optional), mix soil, amend soil, and organize plants for planting day; and 3) plant and water the rain garden.

Follow-up: Observe the rain garden once a week and write their observations in a journal. Note how well the garden drains after a rain, which plants are doing the best and which are not doing well, what weeds are taking up residence in the garden, when the plants go to flower and seed, if the plants have a color change over the season, and what insects, birds, and other animals are visiting the garden.

Extensions: Have students monitor the rain garden (see ***Measuring Up*** Activity).