
Designing a Rain Garden

Activity Overview

Students create a rain garden design and optional planting plan.

Objectives

Students will

1. Create a rain garden design plan based on information gathered about the site, the size of the drainage area, and soil conditions
2. Develop a planting plan for the rain garden using ecological and aesthetic guidelines
3. Work cooperatively as a team
4. Use group processes to select a master rain garden design

Subjects Covered

Science, Math, Language Arts, and Art

Grades

3 through 12

Activity Time

70 minutes to complete the rain garden design process, 50 minutes to create an optional planting plan.

Season

Any

Materials

Map of rain garden site on grid paper where 1 square equals one square foot; markers and colored pencils, rulers; “Post-it” notes; soil type results from EPS activities, “Getting to Know Your Soil for Rain Gardens” or “Infiltration Test: Exploring the Flow of Water through Soils”; rain garden size results from EPS activity, “Sizing a Rain Garden,” and species list from EPS activity, “Rain Garden Species Selection.”

Background

Designing a rain garden on the school ground with native plants is an exciting process that improves the quality of water, provides habitat for wildlife, and offers opportunities for educational and serendipitous experiences with nature. A rain garden is simply a depression in the ground that allows water to soak into the ground to reduce surface runoff and to recharge groundwater. Rain gardens catch runoff from roofs, driveways, sidewalks, yards and other hard surfaces, which reduces pollutants entering waterways. The idea is to capture rain water close to where it falls rather than allowing it to collect and increase in volume and speed as it travels to the nearest waterway picking up pollutants and washing away soil.

When locating a garden, observe the drainage area and where storm water naturally runs over the school grounds. Locate a garden where water collects in a low spot or along a swale. Low areas with bare and/or eroded soil are ideal for rain gardens because the plants will cover the soil and stop it from eroding. Typically, rain gardens are located near downspouts to collect water draining from a roof. To avoid water problems, locate the garden at least ten feet away from building foundations and septic fields. Also, avoid locating rain gardens over underground utilities. If planning to capture rain water coming off streets and large parking areas, request advice from an engineer or landscape architect owing to increased complexity.

For a design perspective, consider how the garden fits with the surrounding landscape. Fit the garden into the landscape so that it relates to other landscape features rather than looking like a blob plopped in the center of a space. Think about how it looks from different positions such as from a window or around the corner or from the street. Design a rain garden with curvilinear shape that will look more natural. If you are interested in planting a rain garden with a particular theme or purpose, such as a song bird, butterfly, sensory, shade, or ethno-botanic garden, see Earth Partnership for Schools activity, “Where Does Your Garden Grow?” This activity describes site conditions necessary for theme gardens such as shelter from wind for a butterfly garden.

Once the rain garden location is determined, the next step is determining its size. The size of the garden is dependent upon the amount of water draining into the garden (i.e., the drainage area), the soil type, slope, and distance from a downspout (if applicable). The type of soil probably has the greatest influence on the size of the garden. Basically, sandy soils that drain quickly can handle smaller and deeper rain gardens. Clay soils that drain slowly require larger and shallower gardens. The guiding principle for size is to ensure water drains within 6 to 12 hours after a rainfall. See Earth Partnership for Schools activity, “Sizing a Rain Garden” to calculate the square area of the rain garden that fits your site conditions.

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State Standards

Language Arts

Use effective reading strategies
(A.4.1, A.8.1, A.12.1)

Orally communicate (C.4.1, C.8.1,
C.12.1)

Math

Use reasoning abilities (A.4.1, A.8.1,
A.12.1)

Science

Present a scientific solution to a
problem (H.8.2)

Investigate a resource management
plan or proposal (H.12.5)

Evaluate data and information
sources (H.12.6)

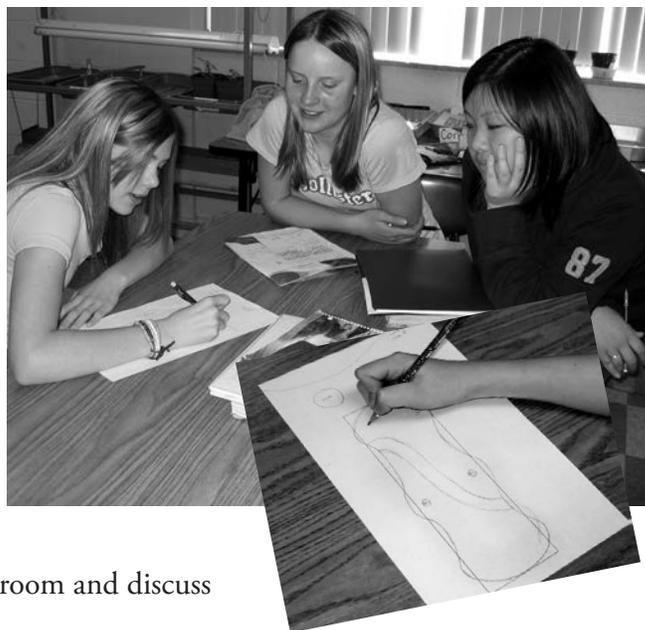
Use scientific knowledge & reason-
ing (H.12.7)

With the size and location of the rain garden determined, you may begin designing a native rain garden. The process involves creating a shape for the garden and determining a layout for the plants. Please see following activity directions for implementing these steps with students.

Activity Description

Creating a Rain Garden Design (Integrating the garden into the landscape)

1. Go out to the area designated for the rain garden. Walk the area to get a feel of the space and review the site analysis data such as sun availability, slope, and existing landscape features.
2. Go back to the classroom and discuss what was observed.
3. Brainstorm design criteria such as the goals and objectives for the rain garden. Examples may include creating habitat for wildlife, using native species, educating the community, providing seating nearby, planting trees for shade, signage, etc.
4. Divide into teams of three or four students.
5. Draw rain garden design plans for the site. Allow 10 to 15 minutes.
5. Identify designated team speaker(s) and present plans to the class within two to three minutes.
7. Display each design plan. As teams, discuss and choose the best features of each design. Write your favorite feature on a “Post-it” and apply it on the plan. Group the “Post-its” with similar desired features on each plan. As a class, summarize the best elements to incorporate into a master design.
8. Choose a committee or have a professional take these ideas and create a composite design plan.



Designing a Rain Garden (cont.)



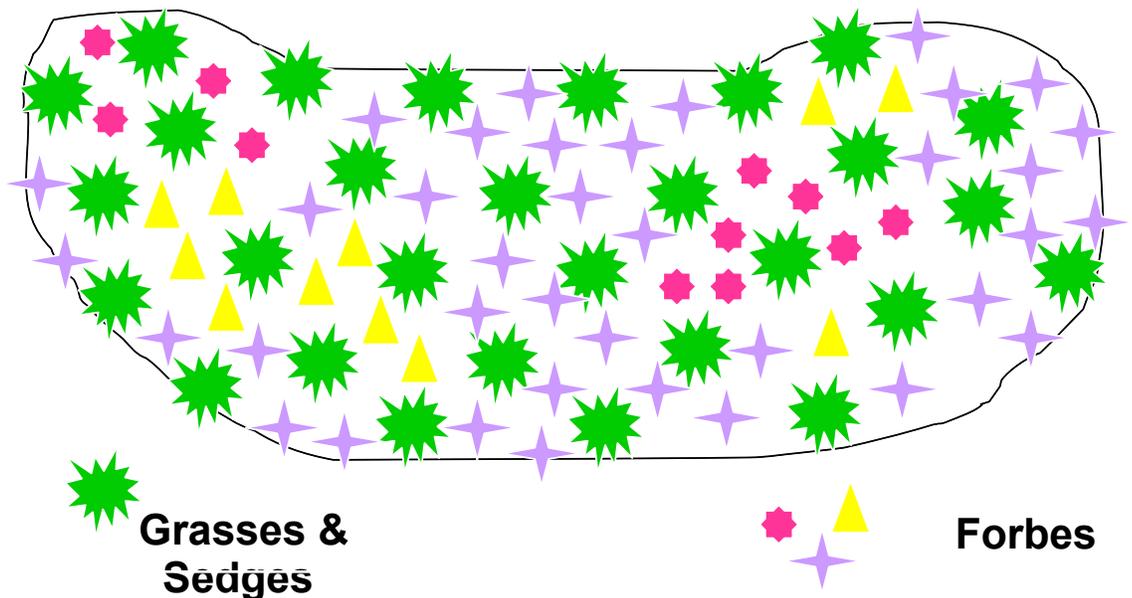
Student teams drew their designs and presented their ideas to their classmates at Winnequah Middle School, Monona, WI. Photos: Cheryl Bauer-Armstrong

Developing a Planting Plan (Locating plants in the garden)

There are many techniques for laying out a planting design on paper. Each method has pros and cons. Choose the method that will work for your class given student ages, time, interest and subject applicability. Techniques include using graph paper where one square represents one plant, drawing circles/shapes indicating individual plants, or drawing shapes to indicate groups of plants. (Please see an example at the end of the activity description.) Another option is to divide the plants by height and draw zones for tall, medium, or short plants. Within each identified zone, students locate and plant the appropriate species on planting day. The exact location of each plant is not identified on a plan.

The following directions suggest using the graph paper technique. This activity can be accomplished in student teams, individually, or by a student committee.

1. Transfer rain garden design to graph paper. Have one square represent one square foot. Assign one plant per square. Develop a code for each species on the rain garden species selection sheet. Use colored pencils to indicate flower colors. Use green for grass-like species. Combine colors and symbols so there is one color/symbol combination per plant species.
2. Assign every other or every third square to a grass-like species such as a grass, a sedge, or a rush. These plants form the matrix for the planting, physically support the forbs/wildflowers, and help reduce weed competition.



Sample rain garden planting plan. Plan drawn by Susan Kilmer.

Designing a Rain Garden (cont.)

3. Locate the wildflowers on the design plan. Color coding the wildflowers by season—spring, early summer, late summer and fall—will help you to visualize what is blooming at similar times and what the garden will look like at a given time of year.
4. Landscape designers/architects often use design guidelines to determine plant placement so that the rain garden will look attractive and well-designed. Consider the following guidelines for your rain garden:
 - Locate shorter plants in the foreground and larger species in the rear or middle.
 - Place plants in groups of three, five, or more. Avoid planting in pairs—the eye jumps back and forth between the two.
 - Species such as the sunflowers and blazing stars tend to self-spread by rhizomes, stolens, corms, or bulbs. These types of species can form large masses. When planting transplants, plant these species in groups to mimic the spatial patterns of these species. Some designers cluster a few plants together and a few plants outside the cluster to form “drifts” of color.
 - Avoid planting in straight lines or perfect circles.
 - Use repetition of groups of plants and colors to allow the eye to flow through the planting.
 - Be aware of each plant’s ultimate height and spread at maturity. This is most important when planting shrubs or trees. Space shrubs 3 to 6 feet apart depending upon their mature size. Spacing varies for trees; in a woodland planting space trees about 5 – 10 feet apart; for open-grown trees space plants 20 or more feet apart.
5. Present planting plans to the class.
6. Display plans on school bulletin boards.

Extensions

- Design a rain garden planting for a local park or other public land or for your home.
- Build models of the design plans.
- Write descriptions of the rain garden plants with a photo and compile into a rain garden book.

Additional Resources

- ... Build your own rain garden. Chesapeake Bay Foundation. http://www.cbf.org/site/DocServer/rain_garden_guide-web.pdf?docID=2869
- ...Landscaping with native plants. 4th Edition Wild Ones Handbook. Wild Ones Natural Landscapers, Ltd.
- ... (2005). Rain garden educator’s kit. UW-Extension Basin Education Program and the WI DNR Runoff Management Section.
- ...Rain gardens: A how-to manual for homeowners. (DNR Publication PUB-WT-776 2003, UWEX Publication GW0037) Order on the Web at <http://cecommerce.uwex.edu> or <http://dnr.wi.gov/education/> Download at http://myfairlakes.com/what_more.asp#yardgarden_raingardens

Designing a Rain Garden (cont.)

Web Sites

- How to Build a Rain Garden. Rain Gardens of West Michigan. www.raingardens.org
- Dane County Lakes and Watershed Commission: Rain Garden Information. <http://www.co.dane.wi.us/commissions/lakes/raingarden.shtml>
- Rain Garden Network: <http://www.raingardennetwork.com/index.htm>

Assessment

- Describe three basic guidelines for locating and designing a rain garden.
- Develop a rubric for a rain garden design.
- Describe your experience as a team member in your design group; identify what went well and what you would change.