

Rain Gardens

Rain gardens have so much to offer. In addition to their beauty, they can educate parents as well as students about the benefits of using native plants for landscaping. The teacher can introduce the concept of living and non-living components by studying the garden and its surroundings. As an outdoor classroom, the concepts of producers, consumers and decomposers can also be observed. Native plants are adapted to their environment and can tolerate moderate droughts and support local habitats for beneficial insects and wildlife. Students will study colors and patterns and practice classification skills. Students can observe how plants filter water and help to clean the environment by absorbing and creating oxygen and reducing carbon dioxide. Plant parts and their functions may be studied. Students will learn about communities and niches and how nature changes from season to season.

Rain gardens are special because they are a specific way that individuals and communities can mitigate stormwater pollution. Water washes gasoline, oil and other chemicals off of impervious surfaces such as roads and parking lots. In urban areas, the water runs into storm drains that empty into streams. The temperature of hot rooftops, sidewalks and roads during the summer heats up the fallen rain and increases the temperature of the water entering the storm drains. This ultimately increases the temperature of streams receiving that runoff.

What washes off of the land impacts water quality. Point source pollution is where pollution enters the stream at a specific location through a drainage pipe. Nonpoint source pollution washes into the stream from diffuse sources, such as roadways or fields. The warmer

a body of water, the less oxygen it can hold. Not enough oxygen in the water leads to fish kills. Fertilizer washing off lawns, farmland and golf courses carries nitrogen into the water and causes algae blooms that decrease the amount of oxygen in the water. Erosion is caused by water flowing along a path. As stream banks erode, sediment, litter and other debris increase water's turbidity.

Rain gardens are planted in low-lying areas where puddles form after big rain events. The depression in the landscape where you will build the rain garden is called a "bioretention area." The purpose of the bioretention area is to collect runoff and hold it so that it can be filtered and slowly absorbed into the ground. The ground in the rain garden may feel spongy after a rainstorm because its hydrologic function is similar to the way a forest, with all of its trees, shrubs and undergrowth, slowly absorbs and filters water. Rain gardens may also be planted as part of a riparian buffer along the sides of ditches or streams to control erosion. Native plants, shrubs and trees in particular do well in water saturated soil and are drought resistant. Rain gardens have multiple benefits. In addition to filtering water before it gets into our water supply, they also provide habitats for beneficial insects and animals. They reduce the number of pesky insects, such as mosquitoes, that breed in still water, reduce flooding and provide aesthetic appeal.

Procedure:

1. **Preliminary planning for the garden.** Get the permission and coordinate the planning of the garden with staff at a nearby state park. Decide who from your school will plant the garden and what groups or individuals will be responsible for maintaining the garden

Grade Levels: K-12

Objective:

Students will investigate rain gardens by:

- *Making* observations about plants, animals, habitat, migration and seasonal changes.
- *Classifying* insects and plants.
- *Observing* similarities and differences between garden insects that are discovered and the plants.
- *Recording* observations of the garden in a journal or drawing.
- *Measuring* the perimeter and area of the garden.
- *Using* charts and graphs to illustrate how many plants and insects there are in the garden.
- *Looking* for patterns.
- *Describing* the needs of the living organisms in the garden.
- *Identifying* the parts of the plants.
- *Exploring* the concepts of ecosystems, populations and communities.
- *Explaining* their observations of the interdependency of plants and animals.

Materials:

- Site plan
- Mulch and topsoil
- Rakes, shovels, trowels
- Work gloves
- Watering cans
- Plants, seeds or both
- Hose or rain barrel (optional)

Where:

Build a rain garden at a state park where water puddles or in and around ditches to slow and filter storm water runoff.

When:

Spring, summer or fall.

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- in the years to come. Such groups may include the park staff, PTAs, environmental or gardening clubs, and Virginia Master Gardeners.
- Decide on the location.** In the park, find a low spot that receives full or partial sun throughout the day. Since the rain garden holds and filters water, you want to pick a spot that is at least 10 feet away from a building so that flooding against the building does not occur. Ask your contact at the state park to call Miss Utility at least three days before you dig to ensure that no underground utilities might be damaged by your garden. In Virginia, dial 811 or 1-800-552-7001. Mark the area with spray paint so that Miss Utility can check the area and tell you whether or not it is safe to put a garden there.
 - Plan the design.** Determine the size and shape of the garden. Have the students calculate the perimeter and the area. Students may work in small groups and draw the designs for the garden. Typically taller plants should be in the center and shorter flowering plants and shrubs should be closer to the perimeter. Students may also figure out how much space certain plants will take in the garden. Students can research the plants to be used in the garden and should be able to state how those plants help native insects and other animals. For example, if milkweed is planned for the garden, students would learn that milkweed is beneficial to monarch butterflies. It is the only plant that monarchs use for laying eggs. Also, the spacing between plants should allow each plant enough room to grow.
 - Register your garden planting as a Stewardship Virginia event.** If members from the community are invited to participate in the planning and planting of your rain garden, and because rain gardens conserve and protect natural resources, your event qualifies for Stewardship Virginia. Stewardship Virginia's calendar of events enables the public to take part in conservation events and projects. If an event is for only a school, those interested may contact the Stewardship Virginia coordinator and request certificates signed by the governor for each participant.
 - Digging the garden.** Outline the area of the garden. If the garden will have a border, mark the border around the perimeter so students know where to dig. You can also spray paint the garden's outline and shape so that students know where to dig. Students should dig up the turf, turn it over and break up large clumps. Turning the grass over is important so that it does not compete with the new plants for nutrients from the soil and for water as the new plants are getting established. Depending upon plant sizes, the garden should be dug from 4 to 8 inches. Adding compost and mixing it in well will also help to provide the plants with nutrients.
 - Plant the garden.** Follow the approximate design that your students selected. Plants should be at least a foot away from other plants. For plants, students will dig the holes wide and deep enough to hold the roots of the plant. For seeds, students should mix equal parts sand and seeds in their hands before scattering them in the garden. They should be careful to not compact the newly dug soil with their feet because the plants may have difficulty growing in such soil.
 - Mulch the garden.** Mulch is important because it retains moisture and protects plants and seeds from weeds. The mulch should be heavy enough so that it won't fly or blow away. Chipped

Resources:

Virginia Department of Education: Making Initial Plans, Build Your Own Rain Garden, Constructing a Rain Garden, Resources for Building a Rain Garden

Virginia Department of Conservation and Recreation: Outdoor Classrooms, Backyard Conservation and Landscaping, Save the Monarch Butterfly

Virginia Department of Forestry: Rain Gardens

Virginia Department of Game and Inland Fisheries (VDGIF): Habitat for Wildlife

Virginia Cooperative Extension (VCE): Publication 426-043 has information about plant selection, installation, maintenance and plant lists for urban water-quality management of rain garden plants.

Three Rivers Rain Garden Alliance

Rain Garden Network

Tuckahoe Elementary School, Arlington, Virginia: Schoolyard Summaries. Information about gardens planted for K - 5 that meet curriculum standards for each grade.

Chesterfield County Rain Garden

Chesterfield County offers workshops about planning and building a rain garden. The county also has a PowerPoint show and a manual to help you with planning and installation. In particular, the guide provides good information about how large a garden should be and how to ensure high quality soil for the garden.

Northern Virginia Regional Commission (NVRC): The NVRC offers workshops, presentations and resources for designing and building rain gardens.

wood works better than straw or pine needles. The mulch should be 2 to 3 inches deep.

- Water the garden.** Students or a volunteer should water the garden every other day for about two weeks or until the plants are doing well on their own.
- Weed the garden.** The garden will need to be weeded about once a month so that the weeds do not compete with the plants. Set up a schedule for the month and ask the families of students to help weed the garden.

At the Site:

Many objectives may be met by making observations in the garden. The following are activities and observations that students should make to address SOLs for each grade that can be made by using the garden:

Reading and Language Arts:

- There are numerous trade books about plants, seeds and seasons that can be shared with students. Visit the library for great books for story time.

Science:

- Measure the sizes of the flowers. *Which ones are taller and shorter, or bigger and smaller?* Record observations.
- Construct picture graphs to represent the observations made by the students. *Have the students describe the garden orally and vi-*

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sually? What senses may be used in observing the garden? What colors can be seen? Do the flowers have an odor?

- Observe shapes, textures, relative sizes and weights of objects in the garden. If there are insects, notice their positions relative to plants in the garden and the speed at which they move.
- Students should observe that water flows downhill. The rain garden is positioned in a place where water should be flowing into it.
- Classify elements of the garden that are living and non-living. Discuss how you know whether an object is living or not. *Can it have offspring? Does it have food, air and water?*
- Talk about the basic needs and life process of plants and animals. Plants need nutrients, water, air, light and a place to grow. Plants have varied life cycles and eventually die, and offspring of plants are similar but not identical to their parents or to one another. Use the garden to study the life cycle of the plants and the effects of seasons on it.
- Use the garden to talk about what causes shadows. Manipulate shadows in the garden.
- Discuss where the plants get energy (from the Sun). Notice the direction from which the Sun

risers and moves through the sky.

- Talk about the Sun being a source of renewable energy. *What are some other sources of renewable and non-renewable energy? How about renewable and non-renewable resources?*
- What important functions do plants serve?* They provide oxygen, are a food source for animals and can reduce erosion. A rain garden also helps filter and purify storm water as it sinks back into the soil.
- Use the garden to discuss producers, consumers and decomposers. *What in the garden would be a producer? Are there any consumers in this garden? Do you see any signs of decomposition?*
- The students will understand that ecosystems support a diversity of plants and animals that share limited resources. *What populations and communities might be present in this garden? What roles do humans play in conserving limited resources?*
- Talk about the importance of the soil in providing support and nutrients necessary for plant growth.
- Use the plants to study their basic anatomy and life processes. *How do they reproduce, photosynthesize and adapt and respond to the environment?*