

Rain Gardens

What is a Rain Garden?

A *rain garden* is a method in which plants, soils and soil dwelling organisms remove pollutants from stormwater, improving water quality. Runoff flowing from rooftops, parking lots and driveways can be directed into rain gardens.

A rain garden allows about 30% more water to soak into the ground compared to conventional lawn. These gardens are specifically designed to treat and filter stormwater runoff in 4 to 6 hours after a rainfall event; therefore they will not become a breeding area for mosquitoes. *Bioretention* refers to larger sites that are specially engineered to treat runoff.

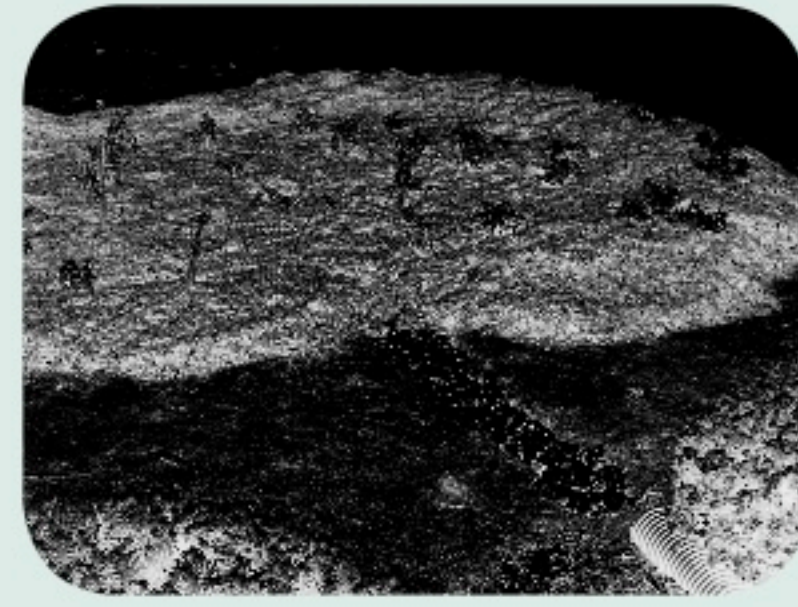
Some benefits of rain gardens include:

- increasing the amount of water filtering into the ground and recharging the groundwater supply, while reducing the amount of pollutants such as sediment and nutrients from entering local waterways.
- providing valuable wildlife habitat and free educational opportunities to observe birds and butterflies visiting the garden.
- reducing streambank erosion by decreasing the volume and power of a storm's runoff.
- adding sheer beauty to the landscape.

How does a rain garden work?

A rain garden has four zones: the ponding area, middle zone, outer zone and berm area. The ponding area is the wet area where the runoff enters the rain garden from the outer zone. The plants that grow in the ponding area must tolerate standing water and fluctuating water levels. The middle zone is slightly drier and the plants can tolerate fluctuating water levels. The higher outer zone includes a portion of the berm and often is the driest of the three zones. The plant material selected for the outer zone must be able to tolerate dry conditions most of the time. The berm area is a low "wall" that surrounds the garden on three sides. Its function is to "hold" the water in during a storm event.

Within the garden, a mulch/organic layer plays an important role in removing harmful chemicals. Shredded hardwood mulch is recommended because it allows for a greater surface area for absorption and resists flotation and washout. The planting medium should be a good mixture of leaf mulch (20%) blended into a sandy soil (50%) and topsoil (30%). Maintain these gardens as you would other landscaped areas around your home. If sediment builds up in the garden, it must be removed. Do not use this area for composting organic yard waste.



A young rain garden

What size should the rain garden be?

The recommended size of rain gardens typically range from 100 to 300 square feet to allow for adequate plant variety and easier installation. The size is determined by how deep the garden will be, type of soils and area of the roof/lawn draining into the garden.

As a general rule, allow at least 150 square feet or 15–20% of the roof area for sandy soil, 30% of the roof area if the soil has some clay and 60% of the total roof area for true clay soils.

Planning Tips

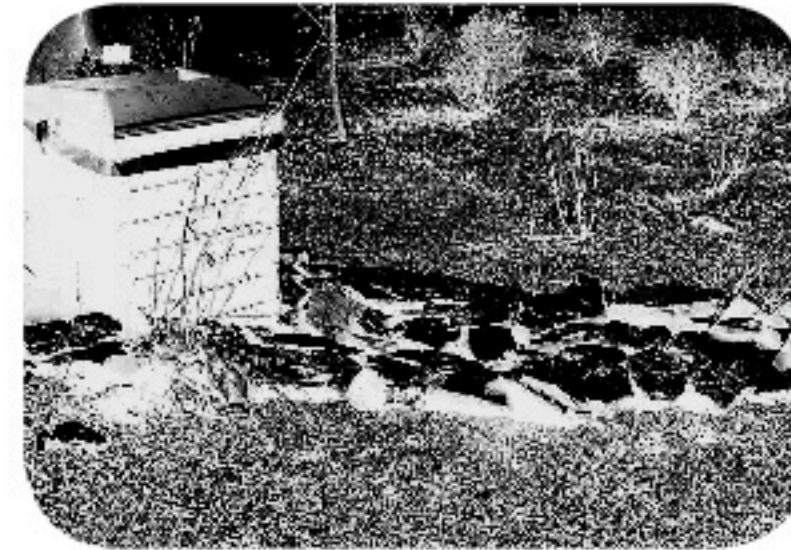
- Each site is unique depending on topography, soil permeability, drainage basin, volume and velocity of water flow.
- The rain garden should be placed at least 10 feet from the foundation so infiltrating water doesn't seep into the building. If space is limited, make sure the area is graded to slope away from the foundation.
- Build the garden in full or partial sun. The sun helps evaporate the excess water.

Rain Barrels

Stormwater can be collected from rooftops by diverting downspouts into rain barrels. Rain barrels help slow the flow of runoff from impervious surfaces and store water for future landscape uses. Multiple rain barrels can be linked to increase storage capacity.

What are the advantages of having a rain barrel?

Lawn and garden watering make up nearly 40% of a typical household's water use during the summer growing season. A rain barrel could save most homeowners about 1300 gallons of water during the summer months, lowering water bills significantly. A 70 gallon rain barrel full of rooftop runoff will water 240 square feet of garden space (10' x 24').² The water collected and stored in the rain barrel can also be used for car washing and window cleaning, but not for drinking.



The lid on a rain barrel should be screened to prevent mosquitoes from entering and breeding. If children are present, a lock may need to be installed on the lid.

Where can I get a Rain Barrel?

You can purchase or order a rain barrel at most local lawn and garden centers. You can also make your own using a large trash can or food grade container (i.e. 55-gallon drum). Do not use containers that have stored chemicals, motor oils or other toxic products. See Resource Section for online sources to purchase a rain barrel or learn how to make one.

How do I install a Rain Barrel?

Most are easy to install; however, installation methods vary depending upon the brand. Installation of a typical rain barrel will involve disconnecting and cutting off a portion of the downspout and redirecting it into the top or side of the barrel. Most rain barrels have an overflow pipe that either redirects the water back into the downspout via a diverter or into the lawn or rain garden in the event that the barrel becomes full. The rain barrel should be placed on concrete blocks, bricks, etc. for ease of attaching a hose to the spigot. Always be sure to empty your barrel before winter freezes and turn it upside down to prevent water collecting in it.

What is a cistern?

A cistern is a large rain barrel that has a greater holding capacity and can be installed either above or below ground depending on the model. A little more up-front engineering and physical space may be needed when installing a cistern. Water from an outdoor cistern may be used to water your lawn and garden. Indoors, this stored water can be used for flushing toilets, washing clothes, and for drinking if filtered adequately. A cistern is considerably more expensive than a rain barrel, but it can provide for more of your water needs and may pay for itself in the long run.

Roof Gardens/Greenroofs

Roof areas may represent up to 50% of impervious surfaces in new developments. Planting vegetation on a specially designed rooftop can capture rooftop runoff. The vegetative layer retains water in the soil and plants. This water is later released through evapotranspiration. Vegetation can be installed in containers that make up a *roof garden* and may not require the roof to be re-engineered. *Greenroofs*, on the other hand, involve planting vegetation directly on the roof surface and require engineering expertise.

Benefits

The cost of installing a greenroof is 30% more than a traditional roof. However, the benefits of roof gardens and greenroofs are many: reduced stormwater runoff (up to 50%); improved air and water quality; reduced energy consumption (by insulating buildings); increased habitat for birds and beneficial insects; sources of urban food production; enhanced building value; extended roof life; reduced heat island effects and sound barrier. A recent study estimated that the greening of all of Chicago's rooftops would produce \$100 million in saved energy annually.



1 inch of rain on a 1,000 sq. ft. roof generates about 623 gallons of water

Design and Plant Material

The slope of your roof will determine what kind of roof garden you can have. You must consult a licensed engineer regarding the load carrying capacity of the roof to ensure that the structure will support your garden design. A low cost way to start a roof-top garden on a flat roof is to use containers, such as plastic swimming pools.

Plant material for a roof garden should be drought tolerant and like hot, sunny growing conditions. Certain native wildflowers, grasses and shrubs will also survive in a raised bed containing at least eight inches of soil (i.e. plastic swimming pool). Vegetables for human consumption can be grown if a heavy layer of organic mulch is applied. A greenroof, however, requires plants that can thrive in a thin layer of growing medium. Sedum, a low-growing succulent perennial plant that can be found in hues of green, pink, yellow and white are good for greenroofs. Sedums thrive in poor soil and with little rainfall. Annual plants may not thrive on rooftops due to high water demands and dry conditions.

Before planting, check the following:

- Has the load carrying capacity of the roof been checked? Can the roof support a garden?
- Will the roof garden be a variety of containers or a greenroof that is professionally designed and installed?
- If it is a roof garden with containers, what type of plants will be planted?
- If the plants last more than one season, is there a way to protect them from freezing temperatures and drying winter winds?
- Is there an auxiliary watering system in case of drought? Can a rain barrel or cistern be installed to capture rainwater or can a hose be attached to a water tap close to the roof?
- Who will maintain the garden, especially if it is located on a commercial or school building?
- Are there liability issues to be addressed if it is for public use?