

Introduction to Rain Gardens

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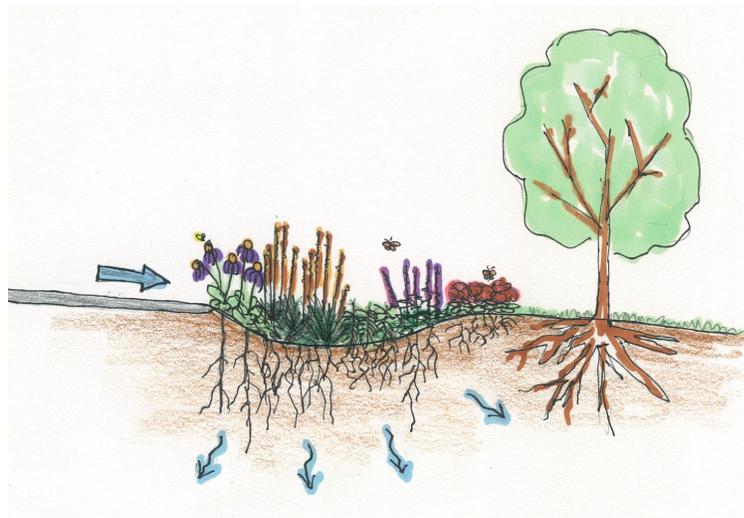
This paper is an introduction on how to build a rain garden. It is based on the book, **The Blue Thumb Guide to Raingardens, Design and Installation for Homeowners in the Upper Midwest**. The book was written with Rusty Schmidt and Dan Shaw, two outstanding landscape ecologists and designers. This paper summarizes the high points of the book. If you would like more detailed, step-by-step instructions I think you will find the full book to be helpful.

The book was written for the upper Midwest U.S., but the general guidance on garden sizing, design, and construction should be applicable in much of the U.S., especially the more moist regions in the eastern half of the country. Plant choices are quite variable around the country, however, and will need to be customized for your region, especially in the arid parts of the country.



Why Are Rain Gardens Important?

Rain gardens were originally developed as ways into integrate stormwater runoff controls into urban landscaping. They catch and slow stormwater runoff from buildings, streets, and parking lots and filter pollutants from the water in the process. In doing so they improve water quality, reduce flooding, and protect local streams and lakes.



The photo above shows a rain garden constructed along a street edge; it is used to catch and filter storm runoff before it flows to storm drains and ends up in a neighborhood lake. The garden design and photo were by Rusty Schmidt. The sketch shows how water drains into Rusty's garden from the road and soaks into the soil.

Rain gardens can provide additional benefits when used in home landscapes too. They can be used to control erosion and create attractive landscaping in damp areas. They conserve water by soaking it into the ground and retaining soil moisture for plants. Rain gardens can also be used to restore native habitat, which is especially important for pollinators.

As more and more of our country becomes developed we are altering the landscape on an epic scale, losing native habitat, losing insect and pollinator populations, creating urban heat islands, and polluting streams and lakes from urban runoff. Rain gardens are one way each of us can help make a difference in our own back yards to help address these problems.

How to Build a Rain Garden

Locating Your Rain Garden

Locate raingardens where water drains away from downspouts, driveways, patios, sidewalks, or sump pump outlets – impermeable surfaces that produce stormwater runoff. Try to locate the garden near the source of runoff before the water picks up a lot of speed flowing downhill. This photo shows my home raingarden that collects drainage off the driveway.



Raingardens are designed to soak rainwater back into the ground. But, in a residential yard, there are some locations where it is best to avoid infiltrating water into the subsurface. Do not locate the raingarden over buried utility lines, on top of septic tank leach fields, or over water supply wells. If you have a basement, keep the garden 10 to 20 feet away from the foundation. If your house is located on a slope, avoid infiltrating water on the uphill side of the house. Also try to avoid placing your raingarden beneath trees to avoid damaging their roots when you dig the garden.

Make sure you have buried utility lines marked before you locate your garden. In most states there is a free services to do this, often listed under terms like Dig Right, Dig Safe, One Call, or 811.

Sizing Your Raingarden

There are two things to remember when sizing rain gardens for residential yards. First, it should fit the size of your property, and the space available for the garden bed. If you don't have a lot of space available, that is OK; just fit the garden to your yard and landscaping.

Second, for residential yards, the depth of the raingarden is often more important than the area it covers. You want to select a garden pool depth that will allow the collected water to soak away into the soil within 24 to 36 hours. If you do that, you will have a wide selection of plants to choose from, and you won't create a mosquito resort. Raingardens are made to soak water into the ground and dry out between rainstorms.

Select the garden depth by running an infiltration test on your soil to see how fast or slow water soaks into your soil. See the next photo and follow the steps below.

1. Dig a hole in the proposed garden area. Make it about eight inches wide and 12 inches deep.
2. Clean the loose dirt out of the hole, and then fill it to the top with water.
3. Allow the water to soak into the soil for a couple hours to saturate the soil.
4. Fill the hole back up with water so that the water level is about one inch from the top. Mark the starting water level with a toothpick. Check your watch and record the time.
5. Measure how far the water level drops at known time intervals with a ruler or tape measure. If you have clay soils like I do, and the water level goes down very slowly, you may have to record the water levels after several hours.
6. Based on the infiltration rate you measure, calculate how many inches of water will soak into the soil over 24 hours. For example, if the water level dropped one inch after four hours, you can expect approximately six inches of water to soak into the soil in one day, so you would make your raingarden six inches deep.

The area of the garden (the length x the width) depends on how much water you want to capture in the garden and how deep it is. A common approach is to size the garden to hold about an inch of rain that falls on the area that drains to the raingarden.

So if your garden is four inches deep, it can hold the water volume that drains from an area four times its size. If it is six inches deep, it can collect runoff from an area six times its size.



Example garden sizing calculations are shown in the book. An average size for a garden located next to a corner downspout of a typical house might be about 6 feet by 10 feet in area, and 6 inches deep.

Preparing the Soil and Garden Bed

Outline the basic shape of the garden in your yard with a rope, garden hose, or stakes and string. Remove your sod with a spade or sod cutter. Then begin digging out the garden. The basic shape is a wide, flat-bottomed bowl – see the garden photo on the next page as an example.

If your yard is mostly flat, you will need to dig out the center of the garden. If your yard is sloped, you may need to build up a small berm or wall on the downhill side to hold the water in the garden.



Roughly shape the garden bed and dig it out to the desired depth. Remove additional soil to dig it a few inches deeper. Set that soil aside. Rototill or double dig the garden bed to loosen the subsoil. Add an inch of compost to the garden, plus a little bit of the extra soil you removed, then till again or turn over the soil to work the organic matter into the soil. Repeat this process a couple times in order to work 2 to 4 inches of compost into the garden bed.

When you get the garden bed back up to your desired depth, rake and grade the garden to the shape you want. By tilling or double digging the bed of the garden and working compost into the soil, you will provide a loose planting bed that will allow the young plant roots to penetrate the soil and help the plants establish quickly.

After preparing the garden bed, re-check the infiltration rate before planting the garden.

Simply get out your garden hose and fill the garden up with water. Then watch it to make sure it drains in a day, as planned. If the garden does not drain fast enough, it is a lot easier to rework the soil before the plants go in the ground.

Selecting Plants

Remember that a raingarden is not intended to be a wetland or a water garden with permanent water. It is designed to soak the water into the soil in about one day.

Raingardens have different moisture zones in them. The bottom of the garden holds water the longest while the edges can stay pretty dry. So check the moisture preferences listed in your favorite plant catalogue. Plants that like moist conditions go in the deepest section of the garden (typically the center). Plants that like average conditions go on the sides where the water does not get quite so deep. Plants that like dry conditions can go around the top edges.



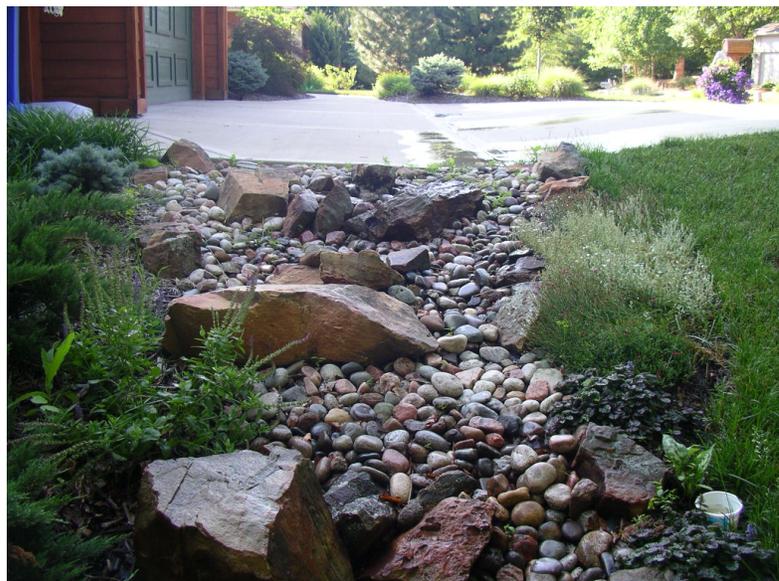
This photo is a rain garden planted next to a parking lot about eight hours after a rainstorm. Notice how the deepest water remains in the center but the edges of the garden are already drying out.

Native plants tend to be great selections for rain gardens. They are well adapted to the local climate and soils and they provide habitat for butterflies, pollinators, and wildlife. In my part of the country many of our Midwest prairie species also have very deep root systems that help them survive summer drought, improve infiltration over time, and sequester carbon.

When selecting plants, also consider their sun/shade preferences, plus their size and aggressiveness. Choose plants that are appropriate for the size of your yard and garden.

Inlets, Outlets, and Finishing Touches

At the garden inlet and outlet, add decorative stones or splash blocks to dissipate the energy of the flowing water. Sooner or later, you will get a big gully-washer of a rainstorm, your garden will fill up quickly, and then overflow. The key to avoiding erosion problems is to make sure that the water enters and exits the garden where you



want it to, and you control the flow by lining the channel and slow the water down or spreading it out at those points.

While some of us like the random appearance of native wildflower meadows or woodlands, others prefer a more manicured appearance, especially in residential yards. You can create a more formal look by: Defining the garden edges with edging, a wall, fence, or row of similar plants; Grouping common plants in masses of three or more plants, rather than scattering them around the garden as individual plants; Repeating patterns in the garden to provide symmetry.

Mulch the plants to keep them cool and moist and keep the weeds down. I use coarse, double shredded hardwood mulch. Pine bark and cypress nuggets float too easily. Cover the ground with a layer about three inches thick and leave about an inch of space around the plant stems.

Caring for Your Raingarden

Water your plants regularly until they are established if you do not get consistent rains. Provide one inch of water a week for the first growing season. During the second and subsequent years after the plants have established root systems, you should not have to water them, except during extremely dry periods.

Each spring, prune dead vegetation and plants that get too large, weed the garden, and touch up the mulch. Remove leaves or debris if materials begin to pile up where the water enters the garden. Then generally care for the garden as you would any other garden. As the plants mature and fill in the garden, you will need to weed less.



Considerations for Arid Areas

This paper describes raingardens for moderately moist locations – generally the eastern half of the U.S. Very arid areas, such as the Desert Southwest, pose unique challenges. When it only rains 10 inches per year, all the plants in the garden need to be able to survive drought, and the garden moisture zones described in our raingarden book do not apply.

The garden in the photo below is in Tucson, Arizona, and you can see the plants are appropriate for arid areas, not wet locations. Check local resources for plant recommendations for your area.

I believe the general sizing and design guidelines in our book should mostly translate to other areas of the country, however.



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For more information, please check out:
www.WaterConservationConnection.com

If you would like a copy of the book, **The Blue Thumb Guide to Raingardens**, ordering information is also on the website.

Have fun playing in the rain,

David

