

Rain Gardens: A Homeowners Guide

What is a rain garden?

A rain garden is a planted shallow depression designed to capture and absorb rain water that runs off roofs, sidewalks, parking lots, lawns, streets, and other various surfaces. Rain gardens (also known as bioretention areas) improve water quality much the same way that a wetland naturally cleans water.

A regular garden or planter bed would typically be raised so that water can quickly drain from it. A rain garden, in contrast, is a bowl shaped depression that water is directed into, so it can be held and filtered for the purpose of soil infiltration.



A rain garden located at the Ghirardi Family WaterSmart Park in League City, Texas

Why build a rain garden?

In nature, rainwater typically soaks into the soil, providing water for plants and recharging groundwater. A rain garden can capture and treat stormwater runoff, removing contaminants from the water before it reaches our local waterways.



Impervious surfaces such as rooftops, driveway, roads, and even compacted soil prevent stormwater runoff from soaking into the ground. In areas with a large percentage of impervious surface area, rain falls so quickly that soil can not soak it up, leading to flooding (even in urban areas) and riverbank erosion. Rainwater runoff becomes contaminated by yard fertilizers and pesticides, pet waste, sediment, and car oil get into our rivers, lakes, and oceans.



Stormwater running off an impervious surface. This water could be directed into a rain garden.

How does a rain garden work?

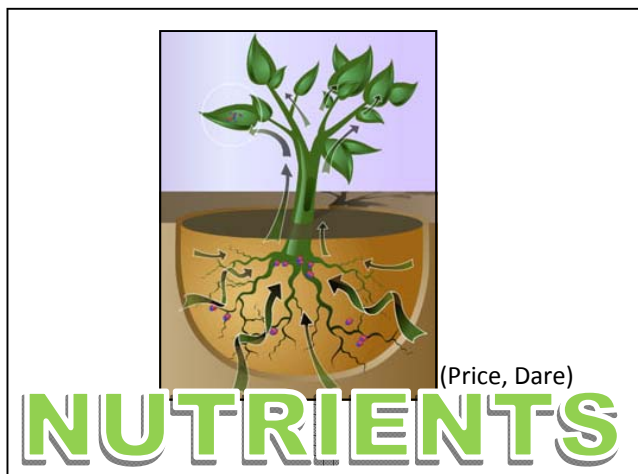
Rain gardens use chemical, biological, and physical properties of the soils, plants, and microbes to remove pollutants from stormwater through four different processes:

Settling: particles, sediment, and other debris that enter the rain garden tend to settle in the top layer of the soil and mulch.

Biological degradation: microbes in the soil break down organic and inorganic compounds and help eliminate disease-causing pathogens.

Chemical reactions: Pollutants can either stick to the soil in the rain garden or they can evaporate, removing them from stormwater.

Plant uptake: Plants take nutrients up through their roots and use these nutrients for growth and other processes.



How does a rain garden help?

- Slows down the stormwater and lets it soak into the soil leading to lower volumes of stormwater runoff
- Filters stormwater and protects water quality
- Recharges ground water with cleaner water
- Reduces pollution from runoff
- Creates beautiful landscapes
- Provides habitat for wildlife

Where should my rain garden go?

A rain garden should be situated to collect sheet flow or water from a downspout. Rain gardens should be placed *at least* 10 feet from building foundations, though 30' away from the downspout is highly recommended, so water does not seep into the foundation. A swale, or shallow depression, can be used to channel water into the garden if needed. Full or partial sun is optimal for rain garden growth.

The slope of the lawn will determine how deep the rain garden will be. Rain garden depth usually ranges from 4-8 inches; gardens deeper than 8 inches may hold water for too long and also present a tripping hazard.

To calculate the slope of your yard use the method described in figure 1 below:

$$\text{Slope} = (\text{height} / \text{length}) \times 100$$

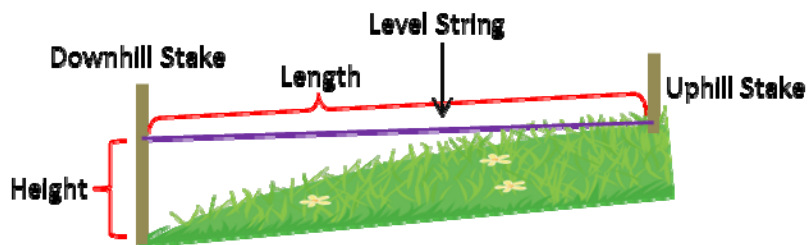


Figure 1. Calculating Slope

Design and construction

To properly site your rain garden consider:

1. Depth of the rain garden (Table 1)

Table 1. Rain garden depth based on slope of yard.

% Slope	Rain Garden Depth
< 4%	3 - 5 inches
5% - 7%	6 - 7 inches
8% - 12%	8 inches

2. Soil used in the rain garden. If the existing soil where you are installing the garden has a high clay content, or is draining very slowly, till compost into the top 6 inches of soil. Amending the rain garden with compost will allow water to drain faster.

3. Drainage area from the roof and/or lawn.

$$\text{Drainage Area} = \frac{(\text{Rooftop Length} \times \text{Width})}{\# \text{ of Downspouts}}$$

After the drainage area is calculated, multiply by the sizing factor found in Table 2 to determine the square footage of your garden.

Table 2. Sizing Factor for rain gardens.

	Rain Gardens < 30 ft. from downspout			> 30 ft. from downspout
	3-5 in deep	6-7 in deep	8 in deep	All depths
Sandy Soil	0.19	0.15	0.08	0.03
Silty Soil	0.34	0.25	0.16	0.06
Clayey Soil	0.43	0.32	0.20	0.10

For instance, a rain garden with a 4% slope, clayey soils, with a 100 square foot drainage area would have a sizing factor of 0.43. **(0.43 X 100 = 43 ft.)** This means the rain garden should be about 8 x 6 ft.

After the rain garden is properly sited, the next phase is excavation. When excavating the rain garden, the soil removed can be placed around the edge of the garden on three sides. This is called a berm and will act as a barrier, stopping water from spilling out of the rain garden during storm events.

What are the best plants to use?

Native plants are the best for rain gardens because they are already adapted to our climate, soil types, and require less care. Once the plants are established, they don't require the use of chemical fertilizers and pesticides, and they attract birds, butterflies, and hummingbirds

Rain gardens have three different planting zones. The deepest part of the rain garden should be planted with natives that can tolerate wet conditions or standing water. The middle zone of the rain garden should contain plants that are tolerant of

occasional standing water. The outer edge of the rain garden or berm can be planted with dry tolerant native plants.

What about mosquitos?

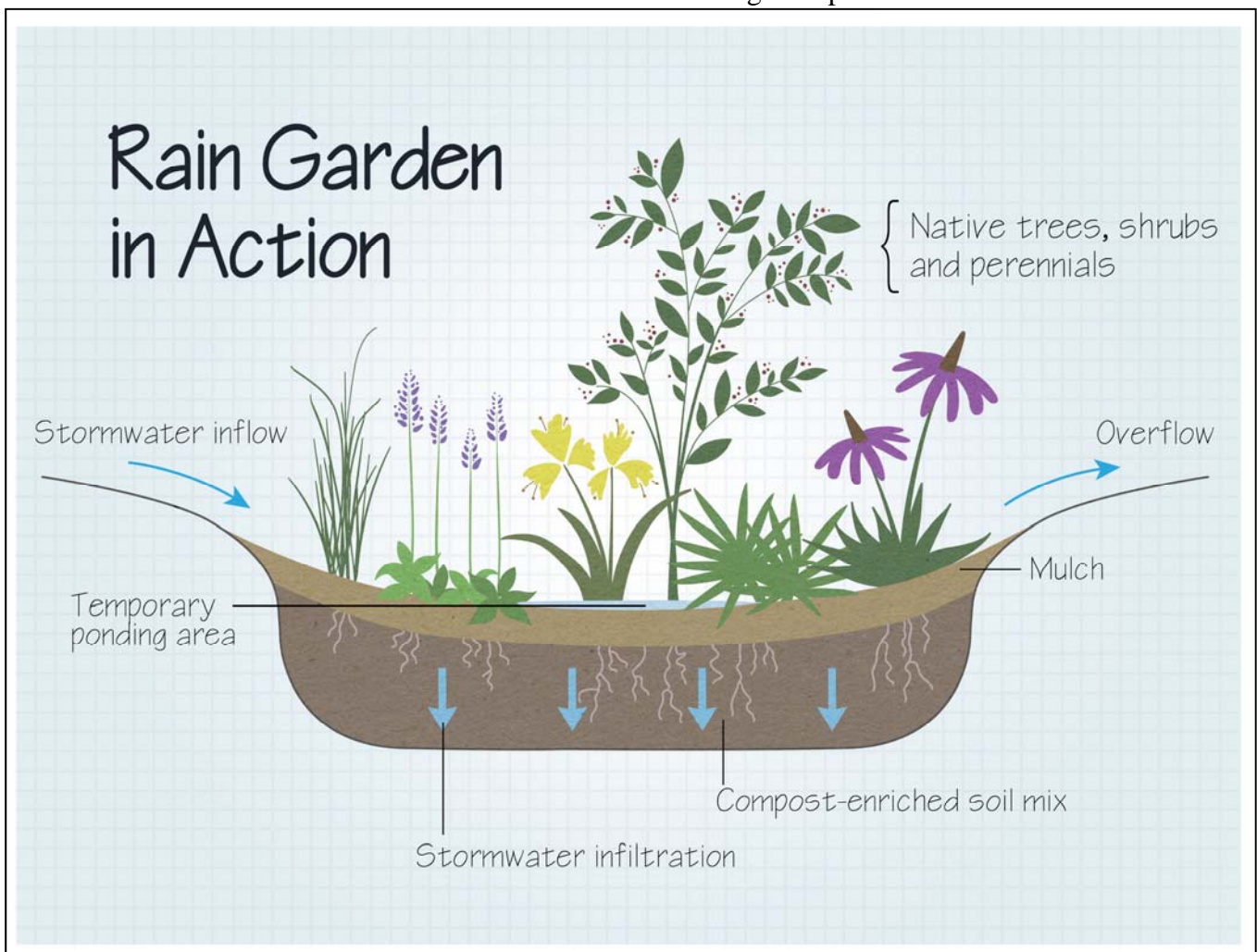
Rain gardens should only hold water for a maximum of 1-2 days after a storm or rain event to prevent mosquitos.

Operation and maintenance

Rain gardens, like any flower garden, need to be maintained regularly.

Maintenance tasks include:

- Weeding: remove invasive plants and other aggressive plant species. To avoid water contamination, it is best to remove these undesirables by hand and avoid using herbicides.
- Aerating: Aerate the rain garden to avoid compaction, it will decrease the infiltration rate.
- Add compost to the rain garden on an annual basis.
- Water the rain garden in times of drought or high temperatures.



Cost

Materials and other tasks that are necessary to build a rain garden include:

- Mulch
- Plants
- Soil amendments (compost)
- Excavation

The cost per square foot of these materials varies based on the size of the rain garden, type of soil used, etc. Rain gardens can be built entirely by the homeowner. This usually entails digging the rain garden by hand or renting small machinery to do the digging for you. An estimate of the costs can be found in Table 3.

Table 3. Cost estimates for rain garden construction.

Activity/Material	Unit	Unit cost	Cost for 200 ft ²
Compost and installation	Cubic foot	\$0.50	\$100
Mulch	Square foot	\$0.50	\$100
Plants	Square foot	\$2	\$400
Total			\$600
Cost/ft²			\$3

For more information visit:
WaterSmart.tamu.edu/rain-garden

References:

Price, Janice, and Stephen Dare. "Sunflowers for Lead. Spider Plants for Arsenic.." Metro Jacksonville. N.p., n.d. Web. <<http://www.metrojacksonville.com/article/2010-jun-sunflowers-for-lead-spider-plants-for-arsenic>>.

"What is a Rain Garden?." Rain Gardens. N.p., n.d. Web. <<http://www.watershedcouncil.org/learn/rain-gardens/>>.



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