GARDENING FACT SHEET

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Rain Gardens

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What is a Rain Garden?

A rain garden is a garden designed to capture some of the runoff from rooftops, driveways, and lawns, providing a way to slow down and soak up excess rainwater rather than letting it run into storm drains. Since Harris County annually receives more than 50 inches of rain in some areas, stormwater management is essential. Some rainwater soaks into the ground, nourishing our lawns and gardens, but much falls on roofs, driveways and other impervious surfaces. That water flows into neighborhood storm sewers, then into local creeks, bayous, estuaries, bays and, eventually, the Gulf of Mexico.

A rain garden is a type of "bio-retention" system, although "bio-detention" is a better description since the purpose is to detain rainwater for a short time rather than retain it permanently. Some water in the rain garden will be used by water-tolerant plants and returned as water vapor to the atmosphere. Some will slowly filter into the soil, replenishing aquifers and groundwater.

Why a Rain Garden?

Stormwater runoff carries many pollutants with it as it flows into drains and storm sewers that channel it into nearby waterways. These pollutants may include petroleum products from automobiles as well as industrial wastes that are dispersed or spilled on the ground. Many pollutants transported by rainwater come from chemicals and fertilizers used on lawns and gardens.

When stormwater runoff is slowed a bit, natural processes remove some of the pollutants. Microorganisms already at home in the soil are able to degrade many contaminants through their living processes. Naturally purified water then recharges the groundwater system, helping to repair subsidence problems. Home gardeners can easily move from being a part of the problem to being a part of the solution.

One residential rain garden can benefit the landscape, neighborhood, watershed zone, and regional environment. At the same time, a rain garden is a beautiful and peaceful garden feature that will provide months of interest.

Creating a Rain Garden

There is no single correct approach to creating rain gardens. Decisions should be based on the goals and individual tastes of the homeowner. A yard may have odd contours, be too small, or not contain the ideal type of soil. No matter the obstacles, any rain garden is beneficial and can be relatively easy to install.

Selecting a Site

A property's existing drainage pattern is the best place to begin when deciding where to situate a rain garden. Following a heavy rain, mark the areas where water collects naturally. Areas of standing water located downslope, away from the building foundation, are good candidates for a rain garden.

An area where water stands for days at a time may not be the best location because it may have poor infiltration rates. This problem often results from the compaction that took place during construction of the home. If there are several low spots, locate the one closest to the downspouts or near the natural drainage flow on the property.

If none of the existing low spots are suitable locations for a rain garden, one can be created by excavating the soil in another location, provided runoff can be directed there with contouring or piping.

If the property is well drained or has a slope, a rain garden is still possible. Simply build a shallow but level scallop or make a small rain-gathering terrace on the slope.

Remember the following when selecting your site:

- Locate the rain garden at least 10 feet from any building.
- Do not locate on or near a septic drain field.
- Use the free "Call Before You Dig" service to locate underground utilities. Call toll free 1.800.344.8377 at least 48 hours before digging.
- Make sure water can be directed to the selected spot (you may want to add a routing swale as part of the decorative garden feature of the rain garden).
- Make sure existing trees in the area can adapt to the extra water.
- If excavating, make sure to minimize damage to existing tree roots.

Evaluating the Existing Soil

Soil in the rain garden can be anything from native soil to heavily prepared and enriched soil. Some rain gardens are prepared by digging out difficult soil and completely replacing it. To determine how much the soil will need to be amended, dig a hole 8 inches square and 8 inches deep in the middle of the selected area. Fill the hole with water to see how long it takes to drain into the soil (the percolation test). It should drain at a rate of about one inch per hour. If the hole drains too slowly, break up the soil and add compost to improve the drainage. If native plants are to be used in the rain garden, less soil preparation is needed since they are adapted to native soil and varying conditions.

Don't give up on soils that do not drain within the prescribed period of time. If the soil cannot or will not be improved, the absorption rate can be affected by the depth and contour of the rain garden, an approach discussed in more detail below.

Designing the Rain Garden

A rain garden cannot be too large, especially on the upper Texas Gulf Coast. It is probably impossible to install a rain garden that will handle all the runoff from an average-size home. Don't spend much time worrying about complicated calculations of runoff volume. Remember the more water the rain garden holds, the greater the beneficial impact on the environment.

The size and shape of the garden should be planned to complement the existing landscape design. Existing beds can be transformed into a rain garden by excavating the space and installing the appropriate plant material. A rain garden can also be added as an extension to an existing bed. Try to find a way to connect the garden to the existing landscape rather than adding it as a "floater" out in the middle of the yard. Floating or island gardens are discouraged in landscape design, as their disconnection from the rest of the landscape is not aesthetically pleasing.

Rain gardens are divided into three planting zones. The center or deepest area is the wettest. The median or inside edge is drier and the margin is the driest. Plants for the rain garden are chosen based on the zone in which they will be planted. Plants suited to the various zones are listed at the end of this publication. Also consider the amount of sun the garden will receive when selecting plant material.

If the rain garden will be bordered with rock or other landscape material, be sure not to block water flow into the garden or overflow out of the garden. The garden should be aesthetically pleasing and, depending on the plants selected, may also attract desirable wildlife. The use of elements such as a well-placed boulder, a gravel swale, or a large flat rock makes a wonderful place for sunning lizards and singing frogs.

Preparing the Site

When working with an existing low spot, preparation may be as simple as removing sod and perennial weeds from the soil surface, but a bit of excavation is usually required. When excavating even a small site, you may want to hire some help. Larger rain gardens may require a landscape service with excavating equipment.

To define the edges of the garden, mark them with non-toxic construction marking paint. The perimeter of a small hand-dug garden can be laid out with a garden hose. Shape the depression so that its deepest point is about 6 to 8 inches deep. This is where you can adjust for the absorption capacity of the soil. If the percolation test shows that drainage is good, the depression can be a bit deeper. If the results show poor drainage, make the depression a little shallower.

The middle of this depression is referred to as the pond, since it is designed to hold water the longest. The pond will be dry most of the time. Since the pond is an intermittent water-holding area, it is not a permanent water feature or water garden. Contour the rain garden from the pond out to the edges, making the depression shallower as it approaches the edges.

If the soil is to be improved, this is the time to loosen it and work in compost. The rain garden should hold water for a few days but should not become a waterlogged, mucky mess. A thick layer of gravel at the bottom may help. The idea is to create a "living sponge" of soil, plants, root mass, and mulch, not to create a permanent bog.

Planting the Rain Garden

Like any other planting area, the plants in the rain garden will be the crowning glory. If space permits, mixing trees, shrubs, grasses, and flowers will add diversity and beauty to the garden while also extending the seasonal impact to your landscape. Lack of space should not be a deterrent to building a rain garden. Small rain gardens can also be beautiful and effective.

Although many non-native plants will work in a rain garden, there are advantages in using natives. Native plants are adapted to local weather and soil. They have the ability to live

through extremes of drought as well as too much rain, and can survive the extremes of summer and winter with little extra care. They grow well without additional fertilizer or chemical pesticides, and since the goal is to improve water quality, the fewer additions the better.

Native plants are nectar and host plants for indigenous butterflies and hummingbirds. Attracting these life forms to the garden will heighten the gardening experience. In addition, many native plants are a great help in improving water quality since they may have roots that penetrate deep into the soil, creating channels for water to penetrate more easily.

Fortunately, area nurseries have begun to sell native plants. If they cannot be found readily, visit a Master Gardener plant sale or call the county office of the Texas AgriLife Extension Service for a list of growers. Do not remove native plants from the wild. In addition to damaging natural areas by reducing native populations, the practice is illegal in many places and may result in a stiff fine. The Internet is always a good resource, and Web sites of several seed companies may feature collections that are suited for rain gardens.

Create a planting design on paper before planting outdoors. Position the plants based on their mature height and width, light requirements and the appropriate rain garden zone. Plants should be planted so that they overlap slightly when mature. The garden should be designed so that when plants grow to their mature size, the entire garden is covered in plant material so as to avoid weeds. Try grouping plants in groups of three or more. The rain garden is an important contribution to the environment, but it is also a valuable improvement to a property and should be beautiful and pleasing to the eye.

Mulching the Rain Garden

As with any garden, mulch is important, perhaps more so in a rain garden since the objective is to allow water to penetrate into the soil rather than allowing it to evaporate into the atmosphere.

A thick layer of mulch deters weeds and makes the few that do sprout up easier to remove. Mulches can be shredded hardwood, native mulch, leaves, or pine straw. One cubic yard of mulch covers approximately 100 square feet to a depth of about 3 inches.

Caring for the Rain Garden

No garden can be characterized as “no maintenance,” but well-designed rain gardens are “low maintenance.” Usually the rain garden only needs one good cleanup per year. In early spring, cut back any dead stalks of perennial plants, remove refuse and weeds, thin overly successful plants (referred to as aggressives by some gardeners), and replace mulch where needed.

Frequently Asked Questions (FAQs)

- Will I have mosquito problems? Mosquito larvae take about three days to hatch. The rain garden is designed to drain in less than three day, thus killing any larvae residing in it. In this way, the rain garden also functions as a mosquito trap.
- What about frogs? There is no such thing as too many frogs! Pull out a lawn chair, enjoy their evening chorus and just think of all the pests they are consuming.
- What about a plant that’s not doing well? Relocate it to a different wet zone and see how it does. If it still does not perform well, replace it. One of the joys of rain gardening is experimenting to find the perfect combinations. There are three wet zones in rain gardens:

margin, median and center. The margin is the high edge around the rain garden and is the driest zone. The median, located between the margin and the center, stays wet longer than the margin. The center stays wet longest and will require plants that tolerate periods of standing water.

- What if there's a spot that stays wet all the time? If this is a characteristic of the site you've selected, take advantage of it by working in some peat moss and compost, filling the spot with gravel (to prevent mosquito hatch) and adding pitcher plants (Sarracenia spp.), crinums (Crinum spp.), and buttonbush (Cephalanthus occidentalis), or one of the many other plants that love to grow in standing water or bog-like conditions.
- How can I use the water flow from my roof? Add a rain barrel to the design. Water can flow from the roof to the rain barrel and then overflow to the rain garden. Use the rain barrel water to soak the rain garden as needed.

Partial Rain Garden Plant List

Botanical Name	*Common Name*	*Category*	*Native or Naturalized*	*Wet Zone*
Acer rubrum var. *drummondii*	southern swamp maple	tree		any
Acorus calamus	sweet flag	grass		any
Adiantum capillus-veneris	southern maidenhair fern	fern		median
Aesculus pavia	scarlet buckeye	tree	yes	any
Alstroemeria pulchella	Peruvian lily	perennial		any
Amorpha fruticosa	false indigo	wildflower	yes	any
Andropogon gerardi	big bluestem	grass	yes	median
Andropogon scoparius	little bluestem	grass	yes	median
Anisacanthus wrightii	flame acanthus	shrub	yes	any
Aquilegia canadensis	red columbine	wildflower	yes	median
Aquilegia ciliata	Texas blue star	wildflower	yes	median
Aquilegia hinckleyana	Hinckley's columbine	perennial		median, margin
Aquilegia longissima	longspur columbine	wildflower	yes	center
Asclepias tuberosa	butterfly weed	wildflower	yes	margin
Asimina triloba	pawpaw	tree		any
Aspidistra elatior	cast iron plant	perennial	no	any
Betula nigra	river birch	tree	yes	any
Bignonia capreolata	crossvine	vine	yes	any
Callicarpa americana	American beautyberry	shrub	yes	any
Canna spp.	canna lily	perennial	no	any
Catalpa bignonioides	catalpa	tree	yes	any
Cephalanthus occidentalis	buttonbush	shrub	yes	any
Chasmanthium latifolium	inland sea oats	grass	yes	any
Clematis pitcheri	leatherflower	vine	yes	any
Crataegus reverchonii	hawthorn	tree	yes	any

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Crinum spp.	crinum	perennial		any
Cyperus alternifolius	umbrella sedge	perennial		center
Delphinium virescens	prairie larkspur	wildflower	yes	any
Dryopteris normalis	wood fern	fern		median, margin
Echinacea purpurea	purple coneflower	wildflower	yes	margin
Equisetum hymenale	horsetail	perennial		center
Erianthus giganteus	sugarcane plumegrass	grass		center
Eupatorium coelestinum	blue mist flower	wildflower	yes	any
Eupatorium maculatum	Joe Pye weed	perennial		any
Gaillardia spp.	blanketflowers	wildflower	yes	margin
Gelsemium sempervirens	Carolina jessamine	wildflower	yes	any
Habranthus spp.	rain lily	wildflower	yes	any
Habranthus texanus	copper lily	wildflower	yes	any
Habranthus tubispathus	Texas copper lily	wildflower	yes	any
Hedychium coronarium	butterfly ginger	perennial	no	any
Helianthus angustifolius	swamp sunflower	wildflower	yes	any
Helianthus maximiliani	Maximilian daisy	wildflower	yes	center
Hemerocallis spp.	daylilies	perennial	no	any
Hibiscus cardiophyllus	heart-leaf hibiscus	wildflower	yes	center
Hibiscus coccineus	red Texas star hibiscus	shrub	yes	center
Hibiscus coccineus 'Lone Star'	white Texas star hibiscus	shrub	yes	center
Hibiscus dasycalyx	Neches River rose mallow	wildflower	yes	center
Hibiscus militaris	halberd leaved swamp mallow	wildflower	yes	center
Hibiscus moscheutos	giant rose mallow	wildflower		center
Hymenocallis liriosome	spider lily	wildflower	yes	center
Ilex decidua	possumhaw holly	tree	yes	margin
Ilex vomitoria	yaupon holly	tree	yes	margin
Iris brevicaulis	Louisiana iris	wildflower	yes	center
Iris fulva	red Louisiana iris	wildflower	yes	center
Iris spp.	wild iris	wildflower	yes	center
Iris versicolor	blue flag iris	wildflower		center
Kosteletzkya virginica	salt marsh mallow	wildflower	yes	center, median
Lantana horrida	Texas lantana	wildflower	yes	margin
Liatris pycnostachya	prairie blazing star	wildflower	yes	margin
Liatris spicata	gayfeather (blazing star)	wildflower	yes	any
Liquidambar styraciflua	sweetgum	tree	yes	any

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Botanical Name	*Common Name*	*Category*	*Native or Naturalized*	*Wet Zone*
Lobelia cardinalis	cardinal flower	wildflower	yes	center
Magnolia grandiflora	southern magnolia	tree	yes	any
Malvaviscus arboreus	giant turk's cap	shrub		any
Malvaviscus drummondii	turk's cap	shrub	yes	median, margin
Mirabilis jalapa	four o'clock	perennial	no	any
Monarda didyma	bee balm	wildflower	yes	any
Muhlenbergia capillaris	gulf muhly grass	grass	yes	median, margin
Myrica cerifera	southern wax myrtle	tree	yes	median, margin
Oenothera speciosa	pink evening primrose	wildflower	yes	median
Onoclea sensibilis	sensitive fern	fern		any
Osmunda regalis	royal fern	fern		any
Oxalis crassipes	wood sorrel	groundcover	yes	margin
Panicum obtusum	vine mesquite		yes	center
Panicum virgatum	switchgrass	grass	yes	center
Passiflora incarnata	passionflower	vine	yes	any
Penstemon cobaea	wild foxglove	wildflower	yes	median
Penstemon tenuis	Gulf Coast penstemon	wildflower	yes	any
Physostegia praemorsa	obedient plant, fall	wildflower	yes	center
Physostegia pulchella	obedient plant, spring	wildflower	yes	any
Plumbago auriculata	blue plumbago	shrub	no	margin
Rosa palustris	swamp rose	shrub	yes	margin
Rudbeckia hirta	black-eyed Susan	wildflower	yes	margin
Rudbeckia maxima	giant coneflower	wildflower	yes	any
Ruellia spp.	Mexican petunia	wildflower	yes	any
Ruellia brittoniana 'Katie'	dwarf Mexican petunia	wildflower	yes	any
Sabal minor	dwarf palmetto	shrub	yes	any
Sabal palmetto	cabbage palm	shrub	yes	any
Salvia greggii	cherry sage	wildflower	yes	margin
Sambucus canadensis	American elderberry	shrub	yes	any
Setcreasea pallida	purple heart	groundcover		median, margin
Silphium albiflorum	rosinweed, white-flowered	wildflower	yes	median
Silphium asperrimum	rosinweed	wildflower	yes	median
Solidago spp.	goldenrods	wildflower	yes	any
Sophora affinis	Eve's necklace	tree	yes	any
Sorghastrum nutans	Indiangrass	grass	yes	median

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Botanical Name	*Common Name*	*Category*	*Native or Naturalized*	*Wet Zone*
Stokesia laevis	Stokes aster	perennial		median, margin
Tagetes lucida	Mexican mint marigold	perennial		margin
Taxodium distichum	bald cypress	tree	yes	any
Tradescantia spp.	spiderwort, dayflower	wildflower	yes	median, margin
Tripsacum dactyloides	eastern gamagrass	grass	yes	center
Typha latifolia	cattail	perennial	yes	center
Ungnadia speciosa	Mexican buckeye	tree	yes	any
Ulmus crassifolia	cedar elm	tree	yes	any
Verbena elegans	hardy verbena	wildflower	yes	median, margin
Vernonia baldwinii	ironweed	wildflower	yes	margin
Washingtonia filifera	California fan palm	tree	no	any
Zephyranthes spp.	rain lily	perennial	yes	any

HARRIS COUNTY Master Gardener ASSOCIATION

Gardening fact sheets are distributed by Harris County Master Gardeners, community volunteers trained in basic horticulture by the Texas AgriLife Extension Service. For information about Master Gardener volunteer training classes, call Extension's Harris County office at 281.855.5600, or send an e-mail to harris@ag.tamu.edu.