Master Gardeners educate Maryland residents about effective and sustainable horticultural practices that build healthy gardens, landscapes and communities.
RAIN GARDENS

How do I build one?

2013 edition
A RAIN GARDEN

• Is a landscaped depression.
• Stores rain water for a brief period of time.
• Uses native plants to aid in absorption.
Howard County Conservancy
Rain garden with perennials only
Rain garden with mature trees and bushes
Why do I want a rain garden?

To share in the responsibility to keep storm water on my property.

To reduce flooding and drainage problems such as erosion.

To protect streams from pollutants carried by storm water.
Other reasons to have a rain garden

To increase the amount of water that filters into the ground

To enhance your yard’s beauty

To provide habitat for birds, butterflies and beneficial insects

To receive a reduction in my storm water assessment
Alpha Ridge Landfill Rain Garden
How does a rain garden work?

• Rain gardens collect runoff.
• The soil and plants filter the runoff.
• Native plants and microorganisms in the soil remove the pollutants.
Features of the rain garden

• A **buffer zone** around the garden slows the flow of water.
• A **mulch layer** is home for microorganisms and keeps soil moist.
• **Native plants** are used to best absorb water and nutrients.
• A **depression** stores the runoff.
• A **berm** is the dam that helps pond the water.
Where should I put the garden?

• Make a drawing of your property.
• Note where the water flows on it.
• Note the high and low elevations.
• Note all buildings and impervious areas.
• Integrate present landscapes.
Placement guidelines

• Put it outside the drip line of any tree.
• Place it at least 10 feet from the house.
• Place it upslope from an area where water ponds.
• Don’t locate it over a septic system or well.
• Locate it on a fairly flat area (no more than 12% slope).
• Place it in full or partial sun.
Note the berm and downspout
How big should it be?

- The typical size (to serve one downspout and some lawn) is 100-300 sq. feet.
- Size depends on:
  - How deep the depression will be, (usually 4-8 inches deep)
  - The type soil you have,
  - How much roof and/or lawn will be drained.
How deep should it be?

• They usually have a 4-8 inches deep depression.

• From this surface they can be 18-36 inches deep.

• The base of the garden must be level.

• Find the slope of your chosen spot to help to determine the depth.
How do I find the slope?

• Pound a stake in the uphill side of garden.
• Pound a stake in the downhill side about 15 feet away.
• Attach both stakes with a string and level.
• Measure the width.
• Measure the downhill height to string.
• Divide: \((H/W) \times 100 = \%\) slope.
Uphill stake
Downhill stake

H/W x 100 = Slope
6/15 = .5/15 = .033 x 100 = 3.3% slope
For a single downspout

• If slope is less than 4%, build a 3-5 inch deep garden.
• If slope is between 5-7%, build a 6-7 inch deep garden.
• If slope is between 8-12%, build an 8 inch deep garden.
• Choose another spot if the slope is greater than 12%.
What type of soil is there?

Infiltration rate

Dig a hole 6 in. wide and 18 in. deep.
Pour water into the hole.
If the water has not infiltrated within 48 hours, you will have to amend your soil or find another spot.
Identify soil type

Take a handful of soil and dampen it with a few drops of water. Knead the soil in your hand and squeeze it into a ball. Work the soil between your forefinger and thumb. Squeeze it upward into a ribbon until it breaks from its own weight.

Sandy – feels gritty, breaks easily
Silty – smooth, not sticky; less than inch
Clayey – sticky, clumpy; more than inch
How do I amend my soil?

The recommended soil replacement mix is:

50% sand (coarse, sharp sand; not builder’s sand)

25% topsoil (no clay)

25% compost or leaf mulch
How do I find the area to be drained?

If you are less than 30 ft. from downspout:

1. Estimate the % of roof feeding the downspout.
2. Find area of first floor.
3. (First floor area) x (% of roof feeding) = roof drainage area.
If you are more than 30 ft. from downspout:

1. Measure length and width of uphill lawn area that will drain into garden.
2. Multiply length x width to get lawn area.
3. (Lawn area) + (roof drainage area) = total drainage area.
4 downspouts: 25% roof
Area = 2000 sq. ft.
\( \frac{1}{4} \times 2000 = 500 \text{ sq. ft. roof} \)

Area on side of house
10 x 50 = 500

Area in front of house
100 x 30 = 3000

500 + 3000 = 3500 grass
+ 500 roof
\[ \frac{4000 \text{ Total}}{4000} \]
Which size factor do I use?

Rain gardens less than 30 ft. from downspout

<table>
<thead>
<tr>
<th>Soil type</th>
<th>3-5 in. deep</th>
<th>6-7 in. deep</th>
<th>8 in. deep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>0.19</td>
<td>0.15</td>
<td>0.08</td>
</tr>
<tr>
<td>Silt</td>
<td>0.34</td>
<td>0.25</td>
<td>0.16</td>
</tr>
<tr>
<td>Clay</td>
<td>0.43</td>
<td>0.32</td>
<td>0.20</td>
</tr>
</tbody>
</table>
Rain gardens more than 30 ft. from downspout.

<table>
<thead>
<tr>
<th>Soil type</th>
<th>For all depths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>0.03</td>
</tr>
<tr>
<td>Silt</td>
<td>0.06</td>
</tr>
<tr>
<td>Clay</td>
<td>0.10</td>
</tr>
</tbody>
</table>
Finding the garden surface area

- Find the size factor for your soil type and garden depth. (previous slides).
- Multiply factor by drainage area.
- Voila! This is the recommended size for your garden.
Rain comes from lower left, moves through curb cut & slowed by rock.
Comments

• If your size is greater than 300 sq. ft., consider:
  1. Digging 18-36 inches deep,
  2. Making two gardens, or
  3. Having a reliable contractor install it.

• You can reduce the size of your garden by as much as 30% and still control almost 90% of the runoff.
How long and wide should the garden be?

• Length of garden should be perpendicular to the slope and downspout.
• It should be wide enough to spread water evenly over the area and have a wide variety of plants.
• Usually? At least twice as long as wide.
• Usually? 10 ft. wide – no more than 15 ft.
• Divide the size of garden by width to find the garden’s length.
Building the rain garden

• Call Miss Utility 410-712-0056
Layout the garden

• Use a string and place it on the ground where the garden boundaries will be.
• Place stakes along the uphill and downhill sides.
• Tie a string at the uphill stake at ground level and directly opposite at the downhill stake at a location where it is level.
• Dig out at the uphill side of the string.
Building the berm

• As you dig soil, place it on the 3 sides of the garden which will contain the water. This process is forming the berm.
• It is highest at the downhill side.
• Taper the berm as it approaches the uphill side.
• Stomp on the berm to compact it.
• The berm should have gently sloping sides.
• Plant or mulch the berm. Little bluestem grass is a good choice.
• Dig until you reach the depth you want for your garden.
• Make the bottom of your garden level.
• To add 2-3 inches of mulch, dig 2-3 inches deeper than planned.
Connect garden to downspout

- Dig a shallow swale from downspout to garden or
- Attach an extension from downspout to garden.
Slow the Flow to Increase Absorption

Place rock:

1. At the water entrance point of your garden to slow down the water and
2. At the most likely point where water would exit in a heavy storm.
Rock can slow the flow
Plant location

- Deepest part of garden will support very wet to wet-loving plants.
- Middle part will support the wet to dry plants.
- Upper rim will support the drier types of plants.
Factors to consider

• Mix heights, bloom time, color and texture.
• Clump individual species in groups of 3-7.
• Repeat individual groupings.
• Incorporate sedges, rushes and grasses with flowering species.
Why native plants

• They are best adapted to local climate.
• Many are deep rooted and drought resistant. They reduce erosion.
• They are attractive to a diverse group of pollinators.
• They provide habitat, food, protection, and a place to raise young for native wildlife.
You will need to do some maintenance.

• Water 1 inch per week when nature does not do it for you.

• Weed for the first two years or until plants are well established.

• After each growing season leave seedheads and stems to encourage wildlife.
Do they really work?
Some plants for partial shade gardens

Silky dogwood (Cornus amomum)
Red twig dogwood (Cornus sericea)
Arrowwood viburnum (V. dentatum)
Spicebush (Lindera bensoin)
Winterberry holly (Ilex verticillata)
Summersweet (Clethra alnifolia)
Virginia sweetspire (Itea virginica)
Smooth white penstemon (P. digitalis)
Cinnamon fern (Osmunda cinnamomea)
Royal fern (O. regalis)
Blue lobelia (L. siphilitica)
Resources


Rain Gardens Across Maryland; www.co.worcester.md.us
http://www.co.worcester.md.us/drp/natres/rain_gardens_across_md.pdf
This program was brought to you by volunteers from Howard County Master Gardeners, University of Maryland Extension 410-313-2707

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NOTES

• Slide 1 - Presentation updated January, 2013. Sylvia Huestis

• Slide 4 - This slide shows a rain garden at the Howard County Conservancy, 10520 Old Frederick Rd (Route 99), Woodstock, MD 21163. The plants include: Virginia sweetspire (Itea virginica), med to wet; Blue flag iris (Iris versicolor), med to wet; Sweetbay (Magnolia virginiana), med to wet.
NOTES

• Slide 6-This is the river birch rain garden at Adams Academy in Annapolis. The plants include: Tussock sedge (Carex stricta) med to wet; Foxglove beardtongue (Penstemon digitalis) dry to med; Swamp milkweed (Asclepias incarnata) med to wet; Switchgrass (Panicum virgatum) dry, med, wet; Blue-eyed grass (Sisyrinchium augustifolium) med; River birch (Betula nigra) med; Common Elderberry (Sambucus nigra) med

• Slide 10-Alpha Ridge 2350 Marriottsville Rd, Marriottsville, MD 21104

• Slide 13-The buffer zone is often rock. The berm should have an area of rock to slow any overflow in severe storms.
NOTES

• Slide 15-This is a sample drawing for discussion. The four arrows at the corners of the house are the downspouts showing the direction of water flow.
• Slides 18-It can be 30% smaller than calculated size and still control almost 90% of the annual runoff.
• Slide 25-For Howard County residents, excellent compost can be purchased by the pick-up truck full for VERY reasonable price.
• Slide 29-The “size factor” takes soil permeability into consideration. It reduces the size needed for a successful rain garden.
NOTES

• Slide 39-This is the Sweetbay rain garden at Adams Academy in Annapolis. Its plants include Sweetbay, blueberry, bayberry, red osier dogwood, inkberry, and switchgrass.

• Slide 40-This is the back side of the Sweetbay Rain garden. Note the berm.

• Slide 44-Grass and/or plants can be used in place of rock; however, they are not as effective with rushing water.

• Slide 45-This rain garden was put into the backyard of a private home by the Columbia Association and Village Gardeners. Note the rock is used to slow the flow from the hill and to slow the flow leaving the garden.
- Slide 46-Use plants that are 1-2 years old. Dig holes twice as wide. Mulch. Plant shrubs 3 feet apart, annuals & perennials 1 foot apart, trees 15 ft. apart.
- Slide 49-See the Master Gardener maintenance sheet.
- Slide 50-The picture on the left was taken as a rainfall (well over an inch) was ending. The picture on the left was taken less than 24 hours later.
- Slide 52-All of these wonderful resources can be obtained on line.
- Slide 53-Homeowners can arrange for a visit from Master Gardeners (call 410-313-1913) and we will provide advice and information.