



RAINSCAPING WITH RAIN GARDENS...

*Working With Nature to Transform
Stormwater Runoff into Garden Oases*



Several examples of Rain Gardens and more extensive **Bioretention** installations can be viewed at:

Chesapeake Ecology Center (CEC), top center and right), located at Adams Academy at 245 Clay Street, Annapolis, MD; **Maryland Department of Natural Resources (DNR)**, bottom left; and **Navy-Marine Corps Memorial Stadium (NMCMS)**, top left and center) —all of which are within easy walking distance (three blocks or less) of each other.



C H E S A P E A K E E C O L O G Y C E N T E R

RAINSCAPING WITH RAIN GARDENS...

Working With Nature to Transform Stormwater Runoff into Garden Oases

“What is stormwater runoff?”

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater runoff from naturally soaking into the ground.”

“Why is stormwater runoff a problem?”

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.”

Source: www.epa.gov/weatherchannel/stormwater.html

Our manmade system of curbs, gutters, and storm drains quickly carries stormwater runoff directly to local streams, rivers, and the Chesapeake Bay—without any natural filtering process. However, there are various techniques we can employ to lessen the detrimental impact of stormwater runoff, such as installing rain gardens, rain barrels, green roofs, and pervious pavers. This publication focuses on rain gardens.

Imitating Nature with Rain Gardens

Leaving or creating depressions in the landscape promotes stormwater infiltration and reduces stormwater runoff. Take a walk through a forested area and you’ll notice knolls and swales. Shaping the land in this fashion imitates nature by creating contours throughout the landscape, which allows rainwater to soak into the ground—as nature intended. The human tendency is to level the landscape, unaware of the environmental impact of this type of grading. Rain gardens are simply low-lying, vegetated depressions—generally 3 to 6 inches deep—which have absorbent soils that temporarily collect stormwater runoff from impervious surfaces and allow the runoff to slowly percolate into the soil. The depression should be a flat-bottom, saucer shape rather than a bowl shape so that rainwater runoff can sheet out throughout the garden to allow for better infiltration. This generally takes a few hours and shouldn’t take more than 2 days. Rain gardens are attractive landscaping features that function like a natural moist garden, moist meadow, or light forest ecosystem. They can look as informal or as formal as you like.

Rain gardens provide flood control, groundwater recharge, and water-cooling benefits, while the plants, soils, and associated microorganisms remove many types of pollutants—such as excess nutrients, pesticides, oils, metals, and other contaminants—from stormwater runoff. Stormwater pouring off hot roofs, pavement, and other impervious surfaces is temporarily captured, cooled, and allowed to percolate into the ground. Nutrients such as nitrogen and phosphorus, which would otherwise contribute to algae blooms and other problems in the Bay, are instead put to beneficial use by being taken up by the plants in the garden. Some studies show that about 50 percent of such pollution comes from individuals and homeowners, through yard care, yard waste, and chemical pollution from household activities.

Native plant rain gardens also become wildlife oases with colors, fragrances, and the sights and sounds of songbirds and butterflies regularly visiting. Additionally, rain gardens increase groundwater supplies, significant because many people get their water from underground aquifers. The replenishment of groundwater—which is particularly important in times of drought—depends on the absorption of rainwater into the ground.

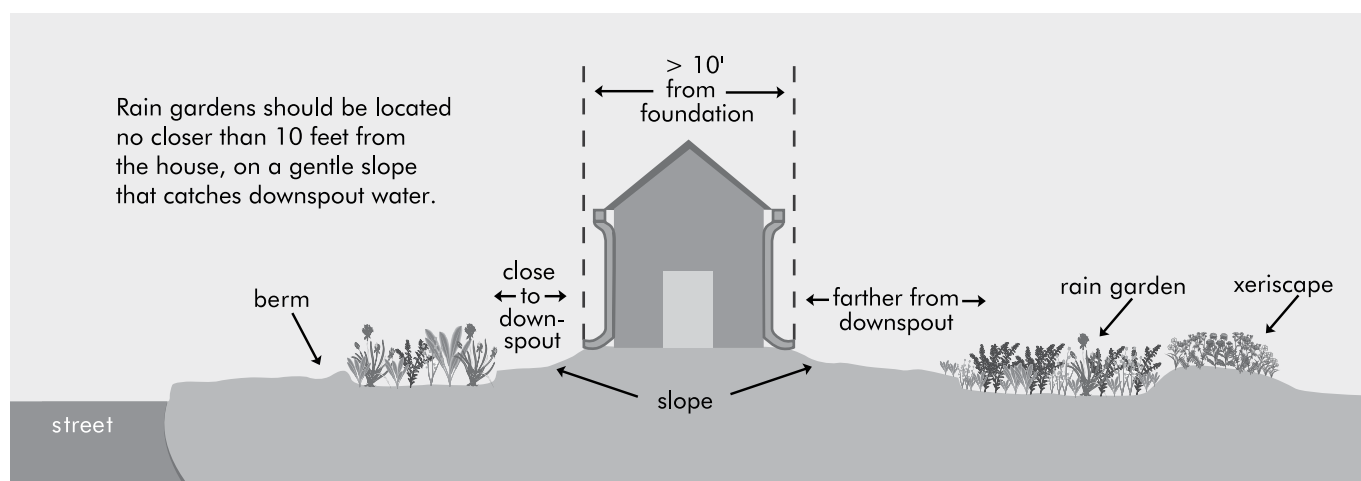
By creating rain gardens and keeping most of the rain that falls on your site contained on site—the way nature intended—you can help improve water quality in local streams and rivers and ultimately the Chesapeake Bay. Native trees, shrubs, and herbaceous perennials improve the ability of water to filter down and recharge groundwater supplies, unlike turf grass, which tends to form a partially impervious barrier to water infiltration.

Notably, a rain garden is a type of bioretention installation, however, “bioretention” often refers to installations that are designed and engineered to be more complex than home rain gardens in order to mitigate larger amounts of runoff. They are deeper and typically incorporate underdrains.

Guidelines for Planning Your Rain Garden

There is usually an existing drainage pattern for most landscaped sites (even if it is not very noticeable), and it is generally best to go with the flow. Determine the direction of runoff and low spots where water collects, either by observing the flow of water during rainfall or by running hose water on the ground. If the low areas are away and downhill from your building foundation, they would be good places to locate rain gardens. Take care not to discharge excess runoff onto your neighbor's property. If you have more than one low spot, you can choose those that are closest to the downspouts from your roof (but at least 10' away from a building) or nearest to a paved driveway.

Many rain gardens are designed to contain runoff from roof downspouts. You can even bury an extension to the downspout and have it discharge right into the rain garden. For single-family homes, rain gardens are typically between 150 to 400 square feet. Any size rain garden is better than no rain garden, and the bigger or the more rain gardens, the better. Ideally, all of the rainwater that falls on a piece of land would stay on-site and be captured by rain gardens and rain barrels.



To determine the optimal size for a rain garden for a single-family home:

- Estimate the amount of impervious surface by multiplying your rooftop width times length, to get square feet; then add the square feet of paved areas.
- Different parts of your roof drain to different downspouts. Determine which part of the roof, and the square footage, will drain to each downspout, that will then drain to the area sited for your rain garden. Ideally, all downspouts and impervious surface runoff from driveways, etc., would be channeled to one or more appropriately sized rain gardens.

(The following formulas are excerpted from www.raingarden.org.)

- For sandy soil, your rain garden should be 20-30% of the drain area. For example, if your roof and driveway measure 1200 square feet and all the rain from them will be used, your rain garden should be 20 to 30% of that, or 240-360 square feet (e.g. 10' X 24').
- For clay soil, your rain garden should be about 60% of the drain area. (Clay absorbs water very poorly; the varieties of rain garden plants that do well in clay take at least three years to get established. Soil replacement may be the best choice in clay soils.)
- If you improve your soil drainage and replace your soil with rain garden mix (50-60% sand, 20-30% topsoil, 20-30% compost), your rain garden should generally be about 20-30% of the square footage of your drain area.

To determine the amount of soil or amendment needed:

- 1 cubic yard = 27 cubic feet (9 bags of 3-cubic feet each or 13.5 bags of 2-cubic feet each).
- A rain garden that is 6 inches deep x 5 feet wide x 10 feet long will need 25 cubic feet of replacement soil, or almost 1 cubic yard (0.925 cubic yards).








3 Rainscaping With Rain Gardens...

Areas where standing water collects and doesn't soak into the ground within a day or two, have poor infiltration. This is likely due to either heavy clay soil or the compaction of soil, for example, during construction. Compaction of building site soils makes the need for your rain garden even more critical.

Soil: As with most gardens, an important first step for rain gardens is to test the soil where you plan to install your garden. Extreme pH, presence of a clay layer, or other surprises may need to be corrected. Amend the soil, only if necessary, based on conditions. If you are landscaping with native plants, this step may not be necessary. Remember, native plants are adapted to local soil conditions, provided the local soil has not been significantly degraded or changed.

It is a good idea to check the percolation of the soil in the area you have chosen for your rain garden. Dig a one-foot deep test hole and fill it with water. If water remains in it for more than 24 hours, you may need to amend the soil or choose another location. If standing water remains in a rain garden for more than a few days, it could become a breeding place for mosquitoes. The fastest breeding mosquitoes take at least four days to reproduce; therefore, this should be the outside range for water to remain standing.

Designing Your Rain Garden

-  Obtain a copy of your plat or survey map that came with the purchase of your home, or draw your own map on graph paper. If possible, have it enlarged to 11" x 17" to make drawing your design easier.
-  Indicate on your plat or map the location of your home and property lines, accessory structures, driveways, paths, existing plants, special use areas, etc. Measure or estimate the dimensions and mark those on your plat or map. Scaled drawings are usually: 1/4 inch = one foot, 1/8 inch = one foot, or 1/16 inch = one foot. Mark "north" on your map.
-  Using removable tape, attach a piece of tracing paper to your plat or map. Don't worry about making mistakes; unleash your creative energy and create as many overlay maps as necessary.
-  Continue assessing your site conditions. Use a colored pencil to circle downspout locations and outflows. When it rains, watch the flow of water on and around your property. Using arrows, draw the movement of water from your house or driveway (both going away from or toward your house.) Circle low-lying wet areas where water ponds after a heavy rain. These may be good areas to locate your rain garden. Notably, if the soil is compacted and water doesn't infiltrate within a couple of days, the soil may need to be loosened and amended. Indicate on the plat or map whether these areas are full sun, part sun/shade, or shady.
-  Native plant selection: After assessing your site conditions, you are ready to select native plants for your rain garden. Site conditions (e.g., size of planting area, amounts of water, shade/sun conditions) are determining factors in choosing the best plants for your site. Rain garden soils are typically wet for just a short time, so choose native plants that are tolerant of drier as well as moist conditions. Remember: "Right Plant, Right Place," for example, a plant that requires dry soil and sun won't thrive in a wet, shady location, and vice versa. Know the site conditions and research the plants you wish to use. You may want to check on-line to find nurseries that sell native plants, and then take your plan to a nursery to seek their advice. It helps to have some flexibility in your plan because certain species may not be readily available. Select plants with consideration to: their mature size and shape; leaf appearance; whether they are evergreen or deciduous; bloom structure, color, time of year, and length; seasonal interest; wildlife value; and features such as erosion control and other restoration landscaping values. Tip: Use odd numbers of plants for a more natural look.
-  Consider the needs of wildlife—water, food, shelter, and space. A wide variety of plants in the landscape will attract the most species. Whenever possible, connect planting beds to create wildlife corridors.
-  Create a garden plan: Using tracing paper and pencil—and after you've designated elements from your input-gathering exercise—begin defining shapes, placing trees, shrubs, and herbaceous perennials, stone, and special features. Sketch natural elements you wish to enhance, such as a swale for a rain garden. You may find it helpful to begin with the shape of your design. Consider a variety of curvilinear forms for a more natural look. Consider emphasizing natural features in your yard, such as existing trees and swales. Go with the flow; work with nature. Add plants using consistent symbols and make a reference chart for

symbols. Common scales used for indicating plant placement are generally: 1/4 inch = one foot, 1/8 inch = one foot, or 1/16 inch = one foot.



Check reference guides for spacing guidelines for different types of plants. Use this simple formula as a general guide to calculate the number of plants needed for your design:

A = Area to be planted (total square feet)

D = Distance plants are spaced apart in feet

N = Number of plants needed

Distance plants are to be spaced apart guidelines:

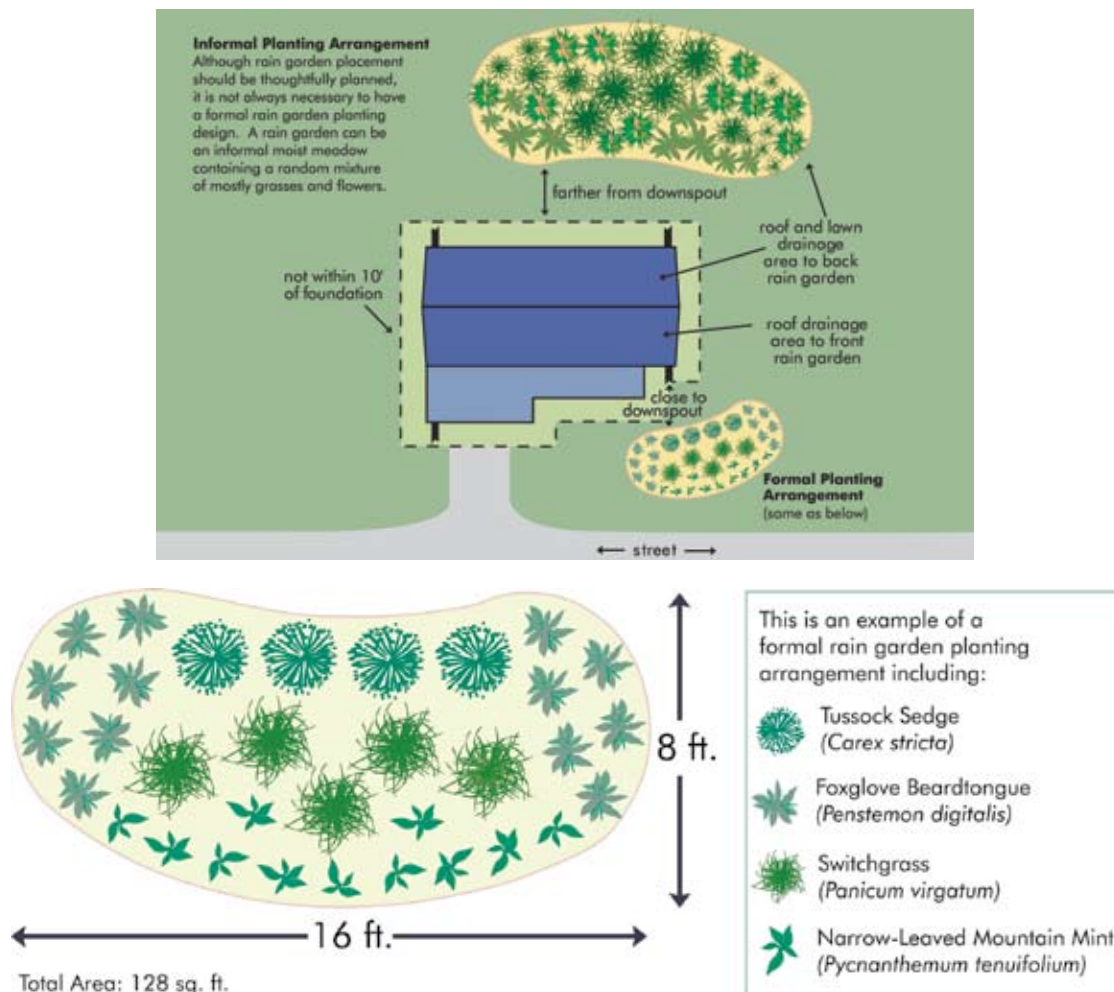
- For perennials, use $D = 2$ feet (use 1.5 feet for slow spreaders, 3 feet for faster spreaders)
- For shrubs, use $D = 5$ - to 7-feet (based on mature size)
- For a mixture of trees and shrubs, use $D = 10$ feet for a naturalistic planting
- For ornamental trees, use $D =$ crown spread

Formula: $A \div D^2 = N$

For example: If you decide to plant an entire 100 square foot area with perennials that are spaced 2 feet apart, then you will need 25 plants, or $100 \text{ feet} \div 4$ (2 feet squared) = 25.

Home Rain Gardens—Overhead View

Rain gardens can be installed in the front, back, or side yard. Design with the end in mind, and consider how the rain garden can be integrated into existing and future landscaping. Locate your rain garden to capture water from your rooftop channeled by downspouts, from other impervious surfaces such as driveways and sidewalks, or to capture runoff from lawn areas. Consider views from different vantage points, including inside the house or, for example, from a patio where you can take advantage of the sights and sounds of a wide variety of songbirds and butterflies attracted to your native plants.



Bay-Wise Rain Garden, a formal arrangement

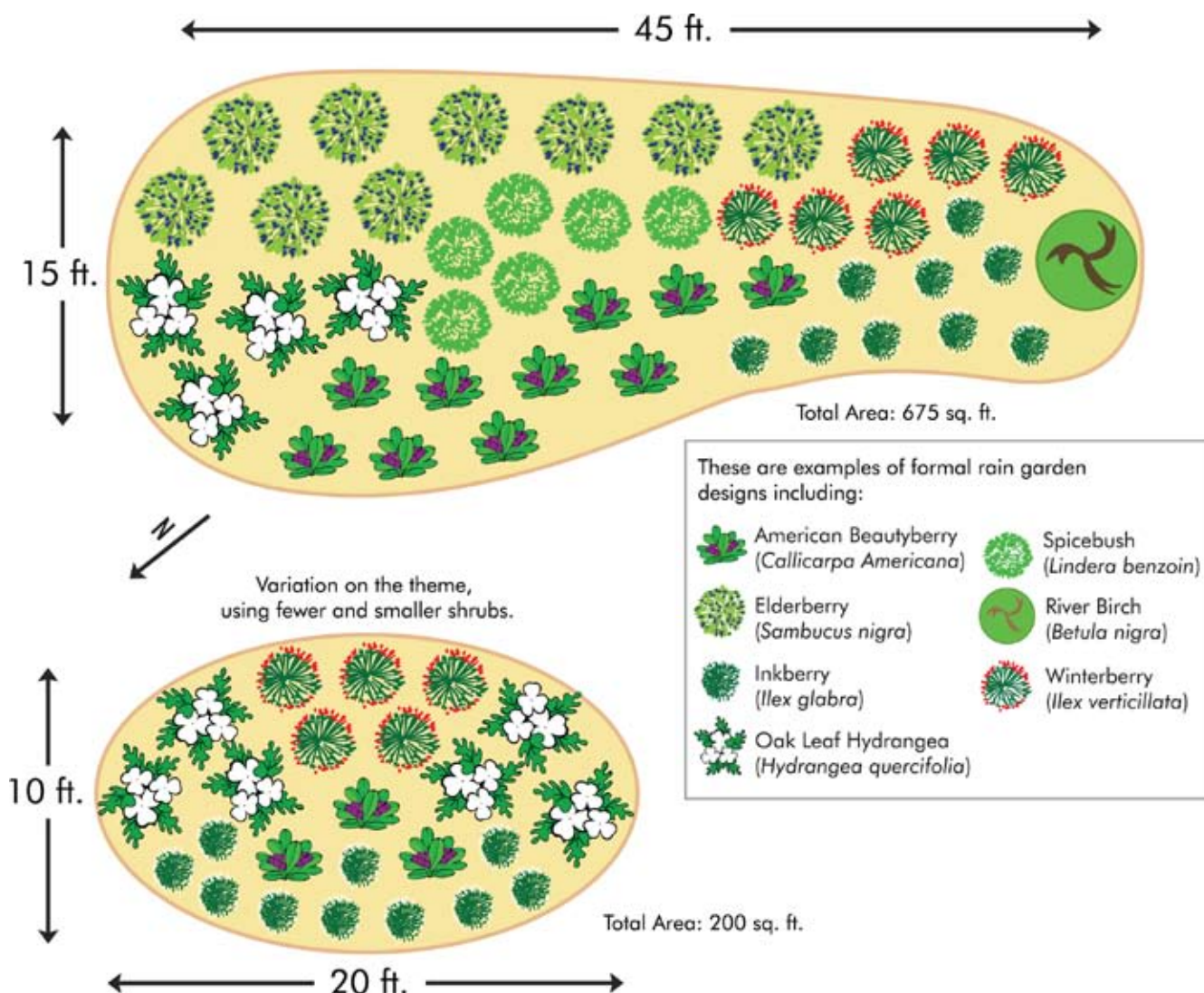
At the Chesapeake Ecology Center



Plant List:

American Beautyberry (*Callicarpa Americana*)
 Elderberry (*Sambucus nigra*)
 Inkberry (*Ilex glabra*)
 Oak Leaf Hydrangea (*Hydrangea quercifolia*)
 Winterberry (*Ilex verticillata*)
 River Birch (*Betula nigra*)

The **Bay-Wise Rain Garden** (675 square feet) is a formal arrangement, planted with a variety of shrubs and a river birch. In the fall of 2006, the Chesapeake Ecology Center partnered with Bay-Wise Master Gardeners (Cooperative Extension, University of Maryland) to hold a workshop and install the rain garden. In the garden design, like shrubs were grouped together for visual impact. It is designed for partial shade.



River Birch Rain Garden, an informal moist meadow

At the Chesapeake Ecology Center

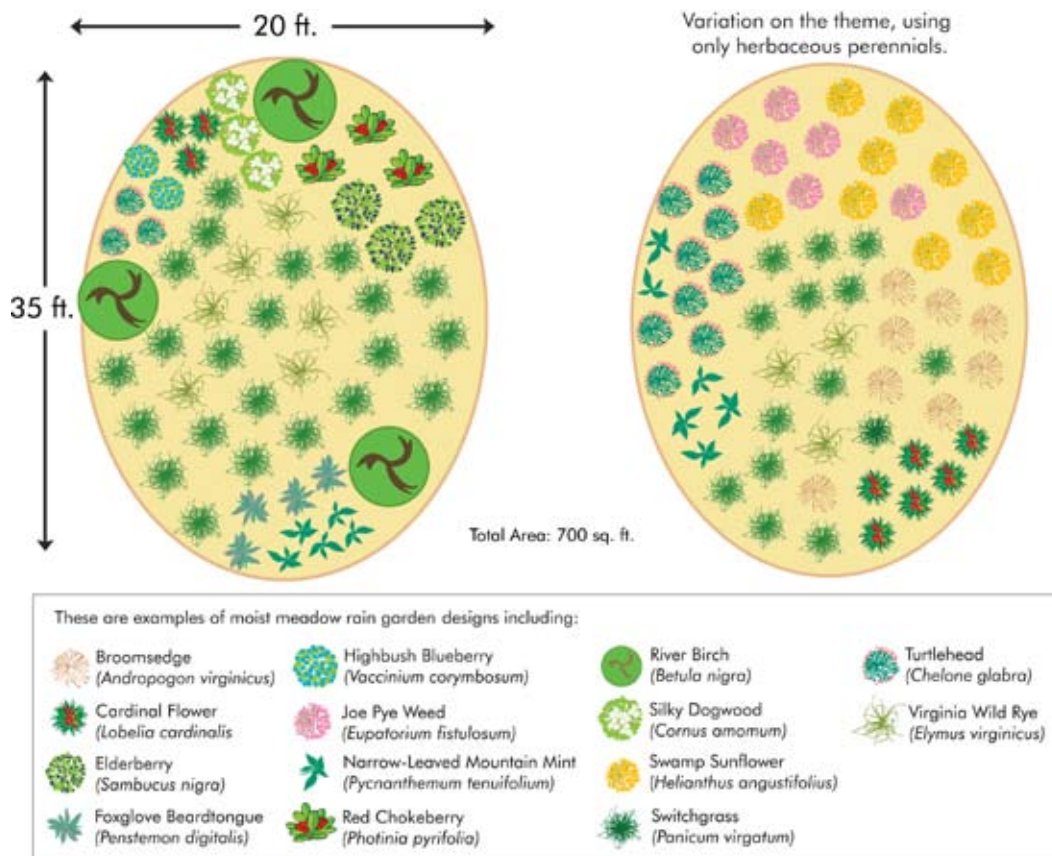


Plant List:

Cardinal Flower (*Lobelia cardinalis*)
 Elderberry (*Sambucus nigra*)
 Foxglove Beardtongue (*Penstemon digitalis*)
 Highbush Blueberry (*Vaccinium corymbosum*)
 Narrow-Leaved Mountain Mint (*Pycnanthemum tenuifolium*)
 Red Chokeberry (*Photinia pyrifolia*)
 River Birch (*Betula nigra*)
 Silky Dogwood (*Cornus amomum*)
 Switchgrass (*Panicum virgatum*)
 Turtlehead (*Chelone glabra*)
 Virginia Wild Rye (*Elymus virginicus*)

The River Birch Rain Garden (700 square feet) is an informal moist meadow and incorporates herbaceous perennials, shrubs, and trees. It showcases one of the most popular medium-sized (50'-75') native trees for wet and moist areas—River Birch (*Betula nigra*). In the spring of 2005, the rain garden was installed by Chesapeake Ecology Center volunteers, Anne Arundel Green Party members, youth and leaders from the Juvenile Drug Court program, Adams Academy students, and Anne Arundel County Master Gardeners. The garden design incorporates both random mixtures as well as drifts of like plants for visual impact. It is designed for full sun.

Notably, informal moist meadows work well for rain gardens by allowing for greater flexibility in the garden design. A precise drawing is optional with meadow arrangements; however, you will need to calculate the number of plants needed based on the square footage of the garden area and the space requirements of the plants you select.



Rain Garden Site Preparation

Site preparation may be a simple process or it can take more effort than planting the garden. Before you dig in any area, be sure to call Miss Utility (1-800-257-7777, from 7 AM to 5 PM, unless it is an emergency, in MD, DE, and DC) a week or so ahead to locate any underground service lines or utilities that may be located where you intend to plant.

First, define the borders and shape of your garden at the location you have selected using non-toxic spray paint or a garden hose. Turf grass usually needs to be removed by hand with a hoe, or with a sod cutter or bobcat. Removing turf grass is a convenient way to start a rain garden, since it will help create a 3- to 6-inch deep depression needed to collect the runoff.



Check the soil for obstructions such as asphalt or large rocks, and to determine soil texture (e.g. clay, sand, excessive compaction). In some cases obstructions need to be removed or curbs need to be cut to allow water to flow into the garden. Heavily compacted soil will need to be dug up and loosened to a depth of two feet, or amended for better drainage. Extra soil left over from creating the depression for the rain garden and amending the soil (only if necessary) can be used in another part of your yard to create a mounded xeriscape garden.



Examine the slopes on your site to insure that any overflow water will be channeled away from structures or other sensitive features. Install rain gardens at least 10 feet from a building foundation to keep basements from getting wet. If you have a septic system, stay away from the drainfield. It doesn't need any added water. Be sure that you consider where excess water will flow out of the garden in a heavy storm. Try not to direct too much water to the roots of trees that don't like to live in wet soil; and don't excavate too close to large trees, or you may damage their root system.

Grade the surface of your rain garden bed to create a level, flat-bottom depression. This will improve the effectiveness of the garden to absorb and treat stormwater runoff as it evenly sheets across the surface of the garden. When preparing large gardens you may want to consider hiring a contractor with a bobcat to remove turf grass and shape the planting beds to create depressions and knolls or other pleasing contours to your property. Remember, driving any kind of heavy equipment on your land will compact the soil and reduce its ability to absorb water. Be aware that extensive grading will require a permit.

If your land is sloped and all the water drains away, create terraces in the slope. Install berms on the down-slope side of each terrace to slow the water down and allow it to weep into the next cell. In larger rain gardens, berms such as biologs, made of coconut fiber, work well. Biologs will slowly decompose over several years and eventually become earthen berms. You may want to enlist the help of an engineer to help determine the number and spacing of the berms needed to control the water flow.

Site considerations: If you are mitigating a large area of impervious surface runoff with a rain garden, it may be helpful to channel the water so that it travels across a stone bed before it reaches the plants. The stone bed can help slow the water so that it doesn't wash away the first plants as it reaches the garden. Make adjustments based on site conditions as needed. Installing a rain garden is both a science and art.

Planting Your Rain Garden

No occupation is so delightful to me as the culture of the earth, no culture comparable to that of the garden...But though an old man, I am but a young gardener. –Thomas Jefferson

Enjoy the process, and work in phases if this makes your project more manageable. Develop a planting plan that works best for you.

It is also good to remember that the best planting times are usually fall and spring. If you plant in early spring or late fall, some potted plants may be dormant. Do not mistakenly throw these dormant plants away. They are still alive in their pots, and will green up in the spring. You can plant anytime spring through fall. However, if you plant in the summer, you will need to do more watering.

When removing a plant from a pot, don't pull it out by its stem or you may damage it. Loosen the root ball, then slide the plant out of the pot. If you find the pot "root bound" or tightly wrapped inside with many roots, it is actually helpful to cut through the base of matted roots with a trowel to separate them before planting. Loosen the root ball with your hand or a trowel, and place the plant in the soil at the same level it was growing in the pot. Firmly press or tamp the ground around the plant with your hands or feet to remove air pockets. Once the plants are installed, add a top dressing of mulch, and give them a good watering to get them growing in their new home.

Plant seedlings 1- to 2-feet on center. Small seedlings will not look like much for several months, but if you plant in the spring, you will start to see more definition by the fall (and vice versa), and a year later, they will be noticeably more mature. In fact, one foot on center might be too close, but some may not survive, and you can always transplant plants from crowded areas as they mature. Trees and shrubs will need a good deal more room. Consult planting guides for spacing recommendations.

A technique for achieving curvaceous edges is to use a garden hose or heavy rope to help lay out your garden areas. Marking paint and stone can also be used. Before you plant your garden, you may want to use glyphosate two or three times to kill weeds, with a couple of weeks in between each application to allow for growth of new weeds.

Maintaining Your Rain Garden and Planning for the Long Term

It's hard to imagine the American landscape without St. John's wort, daisies, dandelions, crabgrass, timothy, clover, pigweed, lamb's-quarters, buttercup, mullein, Queen Anne's lace, plantain, or yarrow, but not one of these species grew here before the Puritans landed. America in fact had few indigenous weeds, for the simple reason that it had little disturbed ground. The Indians lived so lightly on the land that they created few habitats for weeds to take hold in. No plow, no bindweed.
–Michael Pollan

Disturbing the soil—creating a haven for weeds—obliges us to maintain it. Develop a regular garden care and maintenance schedule for your garden. Like other types of gardens, the initial needs of native plant gardens will be watering to help plants become established, and weeding to keep down the competition. Take heart; if you maintain your landscape, the amount of weeding needed should lessen each year as more and more weeds are removed and the disturbed area stabilizes. Adding mulch once or twice a year may also be needed because organic mulch (which is the best kind) breaks down over time. Plants may need to be moved, replaced, and thinned as they grow, spread, or die. Figuring out who will complete these tasks for the long term is just as important as the planting of the garden.

Long-term planning is essential before installing trees and shrubs, which should be thoughtfully located in the landscape due to their long life, possible substantial size, and the resulting effects they create in the landscape. Many variables exist that may influence your installation and maintenance plans, including time, available help, budget, and season.

NATIVE PLANTS FOR RAIN GARDENS (a partial list of commonly used native species)

- Choose native species whenever possible; avoid invasive exotics. "Why use native plants? Native plants naturally occur in the region in which they evolved. While non-native plants might provide some ... benefits, native plants have many additional advantages. Because native plants are adapted to local soils and climate conditions, they generally require less watering and fertilizing than non-natives. Natives are often more resistant to insects and disease as well, and so are less likely to need pesticides. Wildlife evolved with plants; therefore, they use native plant communities for food, cover and rearing young. Using native plants helps preserve the balance and beauty of natural ecosystems." —Britt E. Slattery, Kathryn Reshetiloff, and Susan M. Zwicker, *Native Plants for Wildlife Habitat and Conservation Landscaping, Chesapeake Bay Watershed*, U.S. Fish and Wildlife Service, Chesapeake Bay Field Office.
- Ask for plants by their scientific name (many plants have a variety of common names).
- Consult plant guides for additional species and for more detailed information.

Common Name	Scientific Name	Basic Growing Requirements	Average Size At Maturity
Ferns			
Cinnamon Fern	<i>Osmunda cinnamomea</i>	Sun to shade; wet to moist soil	2-5'
Royal Fern	<i>Osmunda regalis</i>	Sun to shade; wet to moist soil	1.5-6'
Grasses and sedges			
Broomsedge	<i>Andropogon virginicus</i>	Sun; wet to dry soil	1-3'
Switchgrass	<i>Panicum virgatum</i>	Sun; wet to dry soil	3-6'
Tussock Sedge	<i>Carex stricta</i>	Sun; wet to moist soil	1-3.5'
Virginia Wild Rye	<i>Elymus virginicus</i>	Sun to shade; moist to dry soil	1.5-5'
Herbaceous flowering perennials			
Beebalm	<i>Monarda didyma</i>	Sun to partial shade; wet to moist soil	2-5'
Blue Flag Iris	<i>Iris versicolor</i>	Sun to partial shade; wet to moist soil	3'
Cardinal Flower	<i>Lobelia cardinalis</i>	Sun to partial shade; wet to moist soil	2-4'
Foxglove Beardtongue	<i>Penstemon digitalis</i>	Sun to partial shade; moist to dry soil	2-5'
Joe Pye Weed	<i>Eupatorium fistulosum</i>	Sun to partial shade; wet to moist soil	1.5-10'
Mistflower	<i>Conoclinium coelestinum</i>	Sun to shade; wet to moist soil	1.3-5'
Narrow-Leaved Mountain Mint	<i>Pycnanthemum tenuifolium</i>	Sun to partial shade; moist to dry soil	1.5-2.5'
New York Ironweed	<i>Vernonia noveboracensis</i>	Sun to partial shade; wet to moist soil	3.5-8'
Swamp Milkweed	<i>Asclepias incarnata</i>	Sun to partial shade; wet to moist soil	4-6'
Swamp Sunflower	<i>Helianthus angustifolius</i>	Sun; wet to moist soil	1.5-5.5'
Turtlehead	<i>Chelone glabra</i>	Sun to partial shade; wet to moist soil	1.5-6.5'
Shrubs			
American Beautyberry	<i>Callicarpa americana</i>	Sun to partial shade; moist to dry soil	6'
Black Chokeberry	<i>Photinia melanocarpa</i>	Sun to partial shade; wet to dry soil	3-6'
Buttonbush	<i>Cephalanthus occidentalis</i>	Sun to shade; wet to moist soil	6-12'
Elderberry	<i>Sambucus nigra</i>	Sun to shade; wet to dry soil	6-12'
Highbush Blueberry	<i>Vaccinium corymbosum</i>	Sun to partial shade; wet to dry soil	6-12'
Inkberry	<i>Ilex glabra</i>	Sun to shade; moist to dry soil	6-10'
Northern Bayberry	<i>Morella pensylvanica</i>	Sun to partial shade; wet to dry soil	5-10'
Oak Leaf Hydrangea	<i>Hydrangea quercifolia</i>	Sun to partial shade; moist soil	4-6'
Red Chokeberry	<i>Photinia pyrifolia</i>	Sun to partial shade; wet to dry soil	1.5-13'
Silky Dogwood	<i>Cornus amomum</i>	Sun to partial shade; wet to moist soil	6-12'
Spicebush	<i>Lindera benzoin</i>	Partial shade to shade; wet to moist soil	6.5-16'
Southern Arrowwood	<i>Viburnum dentatum</i>	Sun to shade; wet to dry soil	10-15'
Sweet Pepperbush	<i>Clethra alnifolia</i>	Partial shade to shade; wet to moist soil	6-12'
Virginia Sweetspire	<i>Itea virginica</i>	Sun to shade; wet to moist soil	6-10'
Wax Myrtle, Southern bayberry	<i>Morella cerifera</i>	Sun to partial shade; wet to dry soil	6-15'
Winterberry	<i>Ilex verticillata</i>	Sun to shade; wet to moist soil	6-12'
Trees			
American Holly	<i>Ilex opaca</i>	Sun to shade; moist soil	15-50'
Red Maple	<i>Acer rubrum</i>	Sun to partial shade; wet to moist soil	40-100'
River Birch	<i>Betula nigra</i>	Sun to partial shade; wet to moist soil	50-75'
Sweetbay Magnolia	<i>Magnolia virginiana</i>	Sun to shade; wet to moist soil	12-30'

RAIN GARDEN AND RAIN BARREL RESOURCES (a partial list)

Publications:

- *Ecoscaping Back to the Future. . . Restoring Chesapeake Landscapes: Native Plant Rain Gardens and Xeriscapes*, by Zora Lathan and Thistle A. Cone. With its emphasis on native plants, rain gardens, and xeriscapes, this inspiring guide provides clear advice and practical tips on conservation landscaping in the Chesapeake Bay watershed. To order a copy or for on-line information, visit: www.ChesapeakeEcologyCenter.org
- *Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed*, by Britt E. Slattery, Kathryn Reshetiloff, and Susan M. Zwicker, U.S. Fish and Wildlife Service, Chesapeake Bay Field Office. This publication includes pictures as well as user-friendly information on 400 native species appropriate for planting in the Chesapeake Bay watershed and adjacent coastal regions. For print copies, contact USFWS, 177 Admiral Cochrane Drive, Annapolis, MD 21401, or call 410-573-4591 to check on availability. To access the on-line version, visit: www.nps.gov/plants/pubs/chesapeake/

Resources provided by organizations and government agencies:

- Arlington Echo Outdoor Education Center, 975 Indian Landing Road, Millersville, MD 21108. Phone: 410-222-1688 or 410-222-3822. Download instructions on how to obtain and construct a rain barrel at: www.arlingtonecho.net/rainbarrel.htm
- Chesapeake Bay Foundation, Merrill Center, 6 Herndon Avenue, Annapolis, MD 21403. Phone: 410-268-8816. For rain barrel and rain garden publications to download, visit: www.cbf.org/site/PageServer?pagename=resources_pubs_index
- Chesapeake Ecology Center, at Adams Academy at Adams Park, 245 Clay Street, Annapolis, MD 21401. Phone: 410-212-4506. Features 20 Native Plant Demonstration Gardens and Sites, including six rain gardens. For on-line information including rain garden publications, visit: www.ChesapeakeEcologyCenter.org
- Low Impact Development Center, 4600 Powder Mill Road, Suite 200, Beltsville, MD 20705. Phone: 301-982-5559. Focuses on the design and planning of development sites to reduce environmental and water quality impacts, through runoff retention, grading, planting and stormwater management. For a wealth of rain garden information, including designs and publications, visit: www.lowimpactdevelopment.org/raingarden_design/
- Montgomery County Maryland, Department of Environmental Protection, 255 Rockville Pike, Suite 120, Rockville, MD 20850, Phone: 240-777-7720; and the Potomac Conservancy, 8601 Georgia Avenue, Suite 612, Silver Spring, MD 20910, Phone: 301-608-1188 — a joint regional project. For information on rain gardens, rain barrels, photos of projects, native plant suppliers, etc., visit: www.rainscapes.org
- Pennsylvania Audubon Society, 100 Wildwood Way, Harrisburg, PA 17110, Phone: 717-213-6880; and the Alliance for the Chesapeake Bay, 3310 Market Street, Suite A, Camp Hill, PA 17011, Phone: 717-737-8622. For a wealth of conservation landscaping information and on-line videos, visit: www.envirolandscaping.org/webcasts.htm
- Prince George's County Maryland, Department of Environmental Resources, 9400 Peppercorn Place, Suite 500, Largo, MD 20774. Phone: 301-883-5801. For extensive bioretention information, visit: [www.goprincegeorgescounty.com/Government/AgencyIndex/DER/ESD/Bioretention/bioretention.asp?nivel=foldmenu\(7\)](http://www.goprincegeorgescounty.com/Government/AgencyIndex/DER/ESD/Bioretention/bioretention.asp?nivel=foldmenu(7))

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*One day we'll say in the region of the Chesapeake Bay,
"What falls on site, stays on site."*

FLOWERING HERBACEOUS PERENNIALS



Narrow-leaved Mountain Mint
(*Pycnanthemum tenuifolium*)



Swamp Sunflower (*Helianthus angustifolius*)



Foxglove Beardtongue (*Penstemon digitalis*)



Joe Pye Weed (*Eupatorium fistulosum*)



Highbush Blueberry (*Vaccinium corymbosum*)

GRASS



Switchgrass (*Panicum virgatum*)

SHRUBS



Virginia Sweetspire (*Itea virginica*)



Inkberry (*Ilex glabra*)



Northern Bayberry (*Morella pensylvanica*)



Oak Leaf Hydrangea (*Hydrangea quercifolia*)

TREES



River Birch (*Betula nigra*)



Sweetbay Magnolia (*Magnolia virginiana*)

Ecoscaping back to the future...

