

Create A Rain Garden

Ready to Make a Rain Garden?

Welcome. We hope the tips and information in this publication will be helpful to you in the process of creating a rain garden.

A “Perfect” Garden?”

First off, we will be describing an “ideal” rain garden. But of course, we recognize that perfection cannot always be achieved—your lot may be too small, contoured oddly or your soil may need major modifications to make a perfect rain garden.

The point is, any rain garden is better than no rain garden. For example, we’ll tell you how to calculate size so that your rain garden can probably handle 100% of the runoff from your property. But if you can’t make a garden that big, a rain garden that can handle any part of your rain runoff will still be a great contribution to restoring clean water in your neighborhood, your city, and your region. Similarly, we’ll recommend plants native to Michigan as being the most suitable, but if your budget is tight or the plants are not readily available, you may be able use some existing plants from your yard and add the superb native species later.



If you don’t have a rain garden, runoff from your rooftops, lawns, and driveways will continue, with rain and snow melt, contributing to water pollution rather than curing it, as nature intended. Every little bit that you can keep on your property helps!

Remember, rain gardens can be an integral part of our stormwater management and environmental approach. Their use doesn’t involve a lot of centralized planning. They don’t require much space, can be fitted into oddball shapes, and can readily added to existing buildings. They look nice, and you don’t need to be an engineer to build one. Anyone can make a rain garden -- including you!

Ready to begin your garden?

Before Starting

Choose The Right Place for Your Rain Garden

A rain garden is one type of “bioretention”—a system of pond area, soil, plants and mulch that will retain water and soak it up instead of letting it run off of your property (even though your “pond” will be dry most of the time). So the most basic things are the “pond,” or depression into which water will flow, and the soils that will absorb the water.

Your property has an existing drainage pattern (even though it may not be very noticeable), and it will usually be easiest to take advantage of that. Note the direction of runoff and low spots where water collects. If you are not sure where these are, and it’s not raining, find them by running hose water on the ground. If these spots are away and downhill from your building foundations, they will be good places for your rain garden.

If there is a spot on your property where standing water collects, this area has poor infiltration. You may think it is thus the wrong spot for your rain garden. However, if you could collect water anywhere on your property, these areas would likely have poor infiltration also. This is because



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soil is compacted during construction in order to prevent sinkholes and to support building foundations and other structures. This general compaction of building site soils makes the need for your rain garden even more critical.

If you have many low spots, you can choose those that are closest to the downspouts from your roof or nearest to a paved driveway.

If the layout of your land is such that you don't like the natural low spots (or they are not very low), you can create your own by excavating earth—anywhere that you can get rainwater to flow, either directly or even by installing piping. For preparing large gardens or in very hard soil, it may be worth your while to hire an excavator to bring in a machine for a few hours. Have the excavator use the removed soil to create a knoll or other pleasing contour to your property. Be aware that driving any kind of heavy equipment on your land will compact the soil, and reduce its ability to absorb water.

If your land is sloped and all the water drains away, you can still build a rain garden by designing a level "scallop" or small terrace in your slope, and creating a rain garden there.

A few hints for choosing a spot:

Avoid creating a rain garden too close to building foundations; this may lead to a leaky basement. If you can locate it at least 10 feet and downslope from the building, that should be good. Also, you must stay away from the drainfield if you have a septic system. They don't need any added water.

Be aware of rights of way and underground service lines or utilities. Avoid excavating or planting in these areas (this includes the drainage ditch in front of your house). You don't want to accidentally dig up your phone line, and there may be restrictions to activities in rights of way. Before you dig, call "Miss Dig", and have the area flagged. Hint: take pictures of the flagged areas so you have a record of underground utility locations.

Re-directing the rain--there are a number of creative and attractive solutions if the rain doesn't flow naturally to your chosen spot. You can install piping underground or send the rain along a constructed channel or swale. Treat these as part of your landscaping—they can be beautiful additions. You can also incorporate a rain barrel into the feature, and direct the overflow hose into your rain garden (this way, you can save your rain for a sunny day!). We will feature examples in our demonstration site area.

If your land slopes, you can create a flat area for your rain garden in several ways. You can create a "weep" rain garden by building a small retaining wall and filling in behind it. The water will soak into the garden, filter through, and weep out the retaining wall. You can also dig out a "scallop" in the side of a hill for your rain garden.

Black walnut trees growing by the garden may spell trouble, due to juglone, a chemical exuded from their roots. Some plants are sensitive to juglone and will not grow well near walnut trees. If possible, locate your rain garden away from these trees. If you can't, we have a list of juglone-resistant plants.

Don't excavate an extensive rain garden under large trees. Trees have root systems that would have to be dug out in the excavation, and the health of the trees may be affected by damaging the roots. If the trees are not species that are adapted to rain garden conditions, directing ponds of water to their roots may also weaken or kill them. Trees enhance our communities and are very good at absorbing rain; protect them.

The next step is to evaluate your soil.



Evaluate the Soil

Soils vary greatly in fertility, drainage, and “pH” rating. It is best if you understand what kind of soils you are working with, and put in a garden suitable to the conditions you already have.

Drainage is important

Your rain garden needs to be able to absorb the water coming off your roof and driveway. In West Michigan, soils tend to be predominantly sand or clay. Sandy soils drain well, while clay soils may become waterlogged. If your soil is sandy, you may be able to simply loosen the soil and improve it with some compost to prepare your rain garden for planting. If your soil is clay, you will have more work to do. Even light clay soils may create very soggy problems if a lot of rain is directed to the rain garden. Soil removal and replacement are often needed if your soil is clay. The recommended soil replacement mix is 50-60% sand, 20-30% topsoil, and 20-30% compost. *Be sure no clay is in your replacement soil.*

Test your drainage!

You can test your soil’s infiltration rate by digging a hole 8 inches wide and 8 inches deep. Pour a bucket of water into it and see how long it takes to sink in. The water needs to go down an inch per hour. If it takes longer than that, you will need to do additional site preparation to improve infiltration.

Design the Pond Area

When you prepare the garden for planting, you must create a dip in the middle where water will collect as it sinks into the soil. There are various zones in a rain garden (very wet, wet to dry, and dry) and different kinds of plants will thrive at different zones.

You may also adjust the depth of the depression to the infiltration rate. The standard depth for the ponding area is six inches. If you have very poor drainage in your existing soils, and your garden preparations still leave you with slow absorption rates, make your depression shallower to reduce the water that gets trapped there. If your soil sucks up water, make your garden deeper to increase its storage capacity. It’s generally best to keep the bottom of your rain garden’s depression flat; saucer-shaped rather than bowl shaped. That way, the rainwater will always spread out as much as possible.



To be certain that your rain garden will function properly, simply replace the soil with the recommended rain garden mix: 50-60% sand, 20-30% topsoil (no clay), and 20-30% compost. This mix allows water to soak in and supports the growth of healthy plants.

Drain Systems

If the soil is very heavy and/or a lot of water will need to be infiltrated, an under-drain system of gravel and perforated pipe (French drain) may be helpful. This will enable the garden to absorb more rain. Sometimes a rain garden is constructed to absorb and filter a certain amount of rain, and the filtered water is then piped to another location through the underdrain system.

Compacted Soils

Soils on developed land have been compacted by heavy construction equipment. Packing soil down is actually part of the construction site plan, to avoid the formation of sinkholes and to stabilize building foundations. Even sandy soils are often much reduced in their capacity to absorb rain after trucks and bulldozers have run over them. To make a properly functioning rain garden, these soils will need to be dug up and loosened to a depth of two feet, not only to prepare for planting the garden but so rain can soak in. If you have extra soil left over after this loosening process, use it in another part of your yard.

pH and Other Qualities

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Uncertain about kind of soil you have? To know how to prepare your rain garden and which plants will work best in your situation, you should have your soil tested. In Michigan, this can be done for a small fee by your local Michigan State University Extension office. They will also advise you on how to improve your soils. In Grand Rapids, call 616-336-3265 for soil testing information and fees. Other offices can be found here:

[Michigan State University Extension Directory](#).

Now it's time to develop your garden design.

Develop a Design

Even if you choose one of the standard designs that our gifted gardeners have donated, every garden on earth is site specific. The rain garden you have in mind may be a different size or shape than the design provided, or you may want take things out, add things, or design your own. No matter what you choose to do, you must adapt your garden to the local conditions of your site.

Regarding size

You can't have a rain garden that is too large. However, any size garden will make a difference, even a small one. The ideal situation is to create a garden that will absorb all the rain that would otherwise flow away from your yard. To calculate the most useful size of a smaller garden, here's how:

- Figure out what kind of soil you have.
- Estimate the area from which your garden will get rain. Multiply width times length of your rooftop, to get square feet. Add the square feet of paved areas. Remember, though, that different parts of your roof drain to different downspouts—you want to estimate only the square footage that will drain into your rain garden. Don't forget roof overhangs.
- For sandy soil, your rain garden should be 20-30% of the drain area. For example, if your roof and driveway measures 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. (ex: 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.



Rain gardens for single-family homes will typically range from 150 to 400 square feet. But remember; any size rain garden, even a small one, will contribute to solving local water pollution problems. It will also be a lovely addition to your landscape.

Now you are ready to prepare your site.

Prepare the Site

Sometimes creating a rain garden is as simple as directing rain to an absorbent swale in your yard and perhaps putting in a few plants. If you have no convenient place to direct your roof runoff, or you want a formal garden design, then it's time to get down and dirty.

Soils on developed land have been compacted by heavy construction equipment. The soils will need to be dug up and loosened to a depth of two feet, or replaced with rain garden soil mix (50-60% sand, 20-30% topsoil, 20-30% compost), not only to prepare for planting the garden but so rain can soak in. If you have extra soil left over after this loosening process, use it in another part of your yard.

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Preparing a rain garden is just as much work as creating any other perennial garden. Get out your shovel and dig to produce beautiful results.

Define the Borders

First, define the borders and shape of your garden at the location you have selected. When we prepare a rain garden, we outline the area to be dug by spraying with non-toxic soccer-field paint. Another method is to lay a hose along the shape of the garden, then dig along the hose. This gives a nice flowing border to the garden area. Or, you could simply choose a rectangle as the shape of your garden.

If the area is lawn, you will have to remove the turf. You can either use this either in another area of your yard, or it can be composted to help improve your soils. There is a special tool for removing turf that can make this task easier.

If you are not replacing your soil, double-digging to a depth of two feet is recommended. Remove the soil from the hole and pile it to the side; then dig and loosen the earth in a new hole, and pile it loosely into the first hole. This is the time to mix compost into the soil, if you are doing soil improvements. Continue until the whole garden is prepared. A great tool for this purpose is a digging fork. Try it, you'll like it!



To be certain that your rain garden will function properly, simply replace the soil with the recommended rain garden mix: 50-60% sand, 20-30% topsoil (no clay), and 20-30% compost. This will give your new plants a great start, and the soil mix is designed to soak up rain.

If your site soils are clay, soil replacement is probably in order. You may also want to add a reservoir of gravel at the bottom of the garden bed, or add tiles or an underdrain that leads to another area. This will avoid having your rain garden become waterlogged. The idea is to create a living sponge of soil, plants, roots and mulch, not a soggy bog.

How much soil is needed for replacement?

1 cubic yard=27 cubic feet.

A rain garden that is 2 feet deep X 5 feet wide X 10 feet long will need 100 cubic feet of replacement soil, or about 3.7 cubic yards.

Improve the Soil

In most of West Michigan, adding compost or other organic matter is the best way to enrich your soil. A compost of decomposed yard waste such as dead leaves and grass clippings is generally the best bet (this is another resource that shouldn't be wasted!). If you do not have your own compost, compost can also be purchased at garden centers and many other retail locations.

Grading the pond area

Grade the surface of your prepared rain garden bed in such a way that the water entering it can spread out over a large flat area and soak into the soil. This may involve removing a lot of soil.

The depth of the dip should be about six inches. The depth can be graduated from the edges of the garden to the middle. This avoids creating a crater that people can trip and fall into.

When your pond area is ready and the soil is nice and loose, it's time to plant. You can prepare a rain garden bed and then cover it with mulch until later; then, plant through the mulch. Or, you can plant immediately, then mulch the plants. The choice is yours. The sooner the plants are in, the faster your rain garden will get established.

Next, select the right plants for your garden.

Select the Plants

Why use native plants in rain gardens?

We recommend using native plants in your rain garden for a number of reasons. Our garden designs are a combination of native species and of non-native plants (for example, daylilies do very well in rain gardens). Although many non-natives also do well, there are some unique benefits to using natives that you should consider.

Native plants can tough it out

Plants that are native to your area are uniquely adapted to thriving in the local weather, soils, and ecosystems. They have been working at it for years (thousands, in fact). They live through droughts and downpours, and survive the winters without special care. Fertilizer will make them grow bigger, but they grow beautifully without it. Pests munch on them and the plants bounce right back without chemical pesticide sprays. Just think of the reduced chemical load in your yard! Much healthier for you, children and pets.

Native plants attract beautiful creatures

Native plants also have relationships with local butterflies, insects, birds, animals and other plants that they have developed by living together over thousands of years. Planting natives in your landscape helps provide habitat for local wildlife. How long has it been since your yard was decorated by butterflies and birds?



Native plants have deep roots

Native plants are great helpers for protecting water quality in your neighborhood. The deep roots of many established native plants increase the ability of soil to hold water. For example, Blue False Indigo, *Baptisia australis*, grows only 3-5 feet tall, but the roots may go down 25 feet! These fantastic roots create deep channels in the soil for rain to soak into. Some of the roots die each year, and new roots grow. The decomposing roots enrich soil, making it more fertile and absorbant. The root systems also hold soil together and help prevent erosion.

Where can native plants be obtained?

Many of the native plants that do well in rain gardens are not available from traditional plant nurseries and retailers. One must instead contact certified, inspected professional nurseries that specialize in native species, such as the [Michigan Native Plant Producers Association](#).

Wherever you get them, verify that the native plants you purchase are not collected from the wild, reducing local populations, but are instead produced in a sustainable way by the nursery.



Please do not take your plants from the wild. Doing so disturbs local plant ecosystems and is often illegal. The plants you want may indeed now "grow everywhere", but they soon won't be if people start removing them from native populations.

If there is a local [Wild Ones chapter](#), or a nearby garden club, they often hold plant exchanges or sales. Plant rescue is another option; get permission to remove plants from a site where construction will soon destroy them and their habitat. Or, if you want to wait that long, you can grow plants from seed.

We are currently updating a downloadable list of retail and wholesale sources for native plants and seeds, for Michigan and surrounding regions. This list is not an endorsement of these suppliers, but is



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merely listed for your convenience. It is important that anyone purchasing from any of these suppliers understand that it is their own responsibility to ensure that they are getting a reliable and quality product.

Plan Ahead for Plant Needs

Timing is extremely important in obtaining plants for your rain garden or bioretention project. It is virtually impossible for suppliers to keep a giant inventory of native plants and seeds on hand at all times. Suppliers try to anticipate needs for native plants and seeds, but it is not economically practical for them to grow plants they do not have a ready market for. Many of them grow plants to order, but it can take several years to grow plant material or collect seed for a specific project. Keep this in mind when you are searching for particular plants or large quantities of plants.

One solution to the plant availability problem is to start your own native plant nursery to provide for your own project needs. This does take time, effort and money to establish.

We wish you good fortune in your plant-seeking ventures.

Now that you have your plants selected, it's time to plant the garden.

Plant the Garden

If you improve the soil before planting, your plants will have a healthy start.

Native Plants for Rain Gardens

We recommend our beautiful native species for rain gardens, or a combination of cultivated varieties and natives. The advantage of using natives is that they will thrive with little care, once established.

Although native plants species are low maintenance, that doesn't mean NO maintenance. Designing the garden for easy maintenance is part of your planning process. If you use or adapt existing garden site plans, keep the following guidelines in mind:

Put the right plant in the right place. Choose plants or a design suited to the existing conditions of the site. For example; if a garden is in deep shade then plants that require sun are not going to thrive. Some plants are adaptable as to soils, and some are not. Choose with the needs of the plants in mind.



If a plant is not happy, move it. Rain gardens also have three zones; very wet, wet-to-dry, and dry areas at the edges. Our rain garden plant database will let you identify which zone each plant does best in, but you will have to evaluate your own garden to see where in your garden the plants you select will thrive. If a plant is not doing well in one location of the garden, it's a good idea to move it. Sometimes the wettest areas are not where you thought they would be!

If you use a design with tall plants, think about how this will affect the view. Some prairie plants can grow ten feet tall. This could be a good thing, or it could inconveniently block the view of street traffic from your driveway.

Mulch makes things easier. Plan to mulch your rain garden, which will keep it moist, protect your plants, discourage weeds, and make weeds easy to remove. How much mulch? A cubic yard of mulch will cover approximately 100 square feet 3" deep. A 10 X 20 (200 square feet) rain garden will require 2 cubic yards of mulch.

A rain garden is a GARDEN. Remember that a rain garden is not merely a functioning infiltration system. Rain gardens can and should be beautiful—an attractive improvement to your property. Choose your plantings to delight, and arrange them so that they are pleasing to your eye.

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Rain gardens also tend to become wildlife oases—you can expect and should plan for songbirds, butterflies, colors, fragrances, and sounds. And—depending on your neighborhood—you may have squirrels, rabbits, or deer visiting your garden regularly.

Choosing your plants

We recommend native plant species, since they are naturally adapted to the wet and dry cycles and seasons of Michigan weather and will generally require the least maintenance.

Natives will grow bigger with fertilizers, but don't require them. They won't require spraying with pesticides. Just think of the reduced chemical load in your yard! Much healthier for you, children and pets.

Native Michigan species may be available at some local plant retailers, but usually have to be purchased from native plant nurseries. See the navigation or site map for an introduction to our native plants, and information about where to purchase them in our area.

Big Pots Mean Deep Roots

Choose plants that have healthy root systems. Larger plants are more costly, but the bigger pot size allows for more roots. Those roots are very important, as the healthier the root system, the sooner the plants will be established.



If you plant in the fall, some of your plants may be dormant. Do not throw these dormant plants away! They are still alive in their pots, and will sprout up from those healthy, deep, perennial root systems in the spring to dress up your rain garden in a fine fashion.

Planting Day!

Our garden designs are on a grid, which can be transferred to your garden site. We lay out the grid with string or soccer-field marking paint. Then we place the plants, in their pots, at the location on the grid where they are to be planted. If we are working with volunteers, we then instruct them on how to plant.

Plants must be removed from their pots before planting (some people really do need to be told this). Don't pull them out by the stems, or you may damage the plant. Instead, loosen the root ball, then slide the plant gently out of the pot. Break the root ball up slightly, and place the plant in the soil at the same level it was growing in the pot. Generally, it is a good idea to demonstrate this a couple of times before turning your volunteers loose in the garden.

Once the plants are in, give them a good watering to get them settled into their new home.

Once the plants are in, the mulch is applied. A shredded hardwood mulch is best, as it breaks down more slowly and clings to itself and to the soil. Be sure the crowns of the plants are free of mulch.

If there is a specific spot where rain is flowing into your garden, you will have to break up the flow with a few strategically placed rocks. Otherwise the force of the rain entering the garden will cause erosion. This, too can be part of your attractive design.

Now your rain garden is complete, and a celebration is in order!

Next, learn how to care for your rain garden.



Rain Garden Care

Rain gardens are low maintenance, but not NO maintenance. You worked hard to create your rain garden, and to keep it working well for you and looking its best, some regular care is required.

If it doesn't rain, water your plants until they are established.

Once the deep root system has grown into the soil, they will probably survive a drought. But until then, just like any newly planted perennials, they need water to get started. (Hint--use water from your rain barrel!).

Break strong water flow. The area where water flows into your garden can, during frog-strangling thunder storms, erode soil, mulch, and plants (think of the Grand Canyon--water can do a lot of work). A few strategically placed rocks, boulders, or stone dams in this area of strong water flow can break the force and prevent this from happening.

Mulch your rain garden. If you have a formal rain garden, 3 inches of shredded hardwood mulch should be applied in the spring, or if bare areas appear, more often (*note: take care not to bury plant crowns. Some plants are dormant until late spring*). Chipped bark mulch can also be used, but tends to float. Mulch keeps the garden moist and spongelike, ready to absorb rain. It prevents a hardpan from developing on the surface of the garden. Mulch protects the plants in the garden as they get established and makes it easier to weed. It also gives your garden a formal appearance that many people find very attractive.



Weed regularly. A nicely prepared rain garden is a great place for invasive plants to start growing. Siberian elms, honeysuckle, mulberry seedlings, garlic mustard, and the dreaded purple loosestrife will all take advantage of that nice loose soil you have worked so hard on. This is where mulch comes in handy; it will be simple to just pull those little seedlings out before they get established (If you have trouble identifying weeds, check out the [NPS.Gov alien plant site](#) for assistance).

Don't park or drive on your rain garden. Just like a septic field, it needs to be protected from getting squashed. Otherwise, it will not be able to absorb your rain!

Don't let sediment, soil, sand, or debris flow into your rain garden. It can bury the plants, destroy the absorbancy, and ruin all your efforts.

Keep an eye on the plants. If a plant isn't thriving where you placed it, don't be shy about moving it to another location in the rain garden. A rain garden has different zones of wet, wet to dry, and drier areas, and sometimes it isn't easy to tell exactly where a particular plant will grow best until it has rained a few times. A rain garden is a living system; go with the flow.

Enjoy your rain garden! If you install a rain garden in the West Michigan area, we would like to hear about it. Please let us know!

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This section authored by Ron Dwelle of Grand Valley State University, and Patricia Pennell, Rain Gardens of West Michigan.

About Us

Rain Gardens of West Michigan was born of a deep love of Michigan's rivers, lakes and streams, a love of Michigan's beautiful wild plants and places, and the collaborative talents of many environmental professionals.

Rain is a resource meant to nourish our world, but we build our homes and cities with the concept that rain must be gotten rid of as quickly as possible. Because of the way we traditionally design our communities, rain has been turned into a filthy waste product that turns our streams and rivers into health hazards. Rain gardens are designed to absorb rain and cleanse stormwater runoff naturally. Rain gardens give anyone the ability to do something to help solve stormwater problems, and we think this is very powerful.

Rain Gardens of West Michigan is an environmental education program focused on stormwater education, and on the values of using rain gardens and native plants in the landscape to improve urban and suburban water quality. The project is currently funded from 2002 through 2005 by grants from the Steelcase Foundation, the Grand Rapids Community Foundation, and the Frey Foundation. The City of Grand Rapids has also funded the program as part of their community stormwater education through 2006.



Rain Gardens of West Michigan is one of the many water quality programs of West Michigan Environmental Action Council in Grand Rapids, Michigan. WMEAC is a 35 year old, citizen-based, non-profit environmental advocacy organization. WMEAC's greatest strength is in the hundreds of volunteers who find the education and advocacy programs an opportunity to get personally involved in making our world a better, healthier, and more beautiful place to live.

You can contact WMEAC and the rain gardens program at our websites; <http://www.raingardens.org> or <http://www.wmeac.org> . patricia@raingardens.org . Our phone number is 616-451-3051 or 616-454-RAIN.