

## Gardening for Water Quality Additional Resources

### **Michigan State University Extension Smart Gardening Program**

[Smart Gardening](#) is MSU Extension's campaign using earth-friendly messages to help gardeners make smart choices in their own backyards. The team recently developed six new factsheets focused on landscaping and protecting water. Topics include [rain gardens](#), [stormwater](#), [protecting frogs](#), [gardening into the water](#), [lakeshore gardening](#) and [preventing aquatic invasive species](#). The factsheets can be found at [www.canr.msu.edu/smartshorelands](http://www.canr.msu.edu/smartshorelands) and are available download for free.

### **Michigan State University Extension Horticulture Resources**

MSU Extension has a wide variety of resources online regarding pollinators, trees and shrubs, flowers, soils, vegetables, fruit, and more! Learn about the latest research and tried and true best gardening practices at [www.migarden.msu.edu](http://www.migarden.msu.edu).

### **Ask Extension**

Ask Extension offers one-to-one answers from MSU Extension experts and Extension Master Gardener volunteers on topics such as lawns, gardening, agriculture, food safety, food preservation, natural resources, community development, youth programming and more. Call our gardening hotline at 1-888-678-3464 (Monday, Wednesday and Friday 9am to noon) or use our online Ask an Expert [portal](#).

### **Michigan State University Extension Water Programs**

MSU Extension teaches a variety of programs about lakes, streams, and watersheds. One of the most popular programs is a six-week online [Introduction to Lakes](#) course. Check out our water programs catalog for a summary of our classes [canr.msu.edu/watercatalog](http://canr.msu.edu/watercatalog)

### **Michigan Natural Shoreline Partnership**

Learn about gardening along shorelines, native plants for shoreline areas, and find a certified natural shoreline landscaper at <http://www.mishorelinepartnership.org/>

### **Washtenaw County Rain Garden Resources**

Washtenaw County has an online Master Rain Garden course and a variety of rain garden resources. Learn more at <https://www.washtenaw.org/647/Rain-Gardens>

### **Rain Gardens: A Guide for Homeowners and Landscapers**

This Wisconsin Department of Natural Resources book is an excellent resource about sizing, constructing, planting, and maintain rain gardens:

<https://dnr.wi.gov/topic/Stormwater/documents/RainGardenManual.pdf>

# Smart Gardening: Prevent the spread of aquatic invasive species

Paige Filice, Michigan State University Extension

Adapted from Jane Herbert and Linda Whitlock, Michigan State University Extension

Does your landscape contain a water garden or ornamental pond? Some water garden plants and animals have the potential to become invasive—outcompeting and diminishing Michigan’s rich diversity of native aquatic species.

When non-native plants or animals escape or are intentionally introduced into lakes, streams and wetlands, they can become invasive due to an absence of natural population controls, such as predators and disease, that would normally keep them in check. Although winter temperatures may prevent some plants and animals from growing and reproducing in Michigan, this is not always the case. Some species may survive and thrive, which can negatively impact the environment, decrease recreational opportunities and cause severe economic consequences.

## Disposing of aquatic plants and animals

The State of Michigan’s [Reduce Invasive Pet and Plant Escapes](#) (RIPPLE) program encourages enjoyment of your water features and protection of the natural environment by offering responsible tips and solutions for disposing of dead, dying or unwanted aquatic plants and animals. Popular water garden plants and animals are known for their vigorous growth and rapid reproduction, and as a water gardener, you’ve likely experienced having too many to care for. If this occurs, remember it is never safe to release water garden plants and animals into the natural environment, even if they appear to be dead. It is extremely difficult to eradicate a species once it is established in the wild.



Paige Filice, MSU Extension

Safe and proper disposal of plants and animals you have purchased at a garden center early in the summer and nurtured throughout the season can be emotionally difficult. Caution and careful thought are needed in deciding what to do with unwanted plants and animals. Releasing any aquatic organism into the environment is not an accepted practice and is punishable by law.

Be aware the state and federal government regulates the sale of some plants and animals due to their invasive potential. It is illegal to be in possession of, sell, offer to sell or introduce into the environment prohibited and restricted plants and animals. Regulated water garden species include European frogbit (*Hydrocharis morsus-ranae*), yellow floating-heart (*Nymphoides peltata*) and parrot feather (*Myriophyllum aquaticum*), among many other plants and animals.

### Recommended RIPPLE disposal options:

- Seal aquatic plants in a plastic bag and dispose in the trash.
- Contact a retailer for returns or surrender.
- Give or trade with another responsible water gardener.
- Donate to an aquarium society, school or environmental learning center.
- Contact a veterinarian or retailer for guidance on humane disposal of animals.



Red-eared slider turtles are common water garden companions and often found in the wild after people release them as pets when they can no longer care for them. They are likely not native to Michigan.

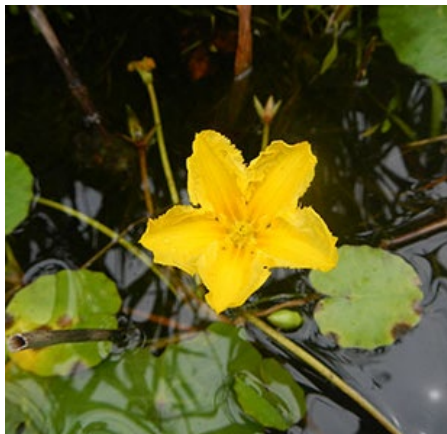


## Be a smart gardener and avoid these invasive plants!



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Parrot feather leaflets have a feather-like arrangement that grow out of the water.



Michigan Department of Natural Resources

Yellow floating-heart has distinct fringes on each flower petal.



Jane Herbert, MSU

Floating mat of European frogbit crowds out native wetland plants.

When making purchases, know which ones are prohibited or restricted. For a complete list, visit [michigan.gov/invasives](http://michigan.gov/invasives). Be aware that retail names and descriptions of plants and animals can be mislabeled and misleading.

### What else can water gardeners do to help prevent the spread of aquatic invasive species?

For starters, never assume a plant or animal is harmless or benign. Just because it is not regulated does not mean it is safe to dispose of in natural waterways. Some popular plants and animals sold in trade can survive in the wild and cause severe environmental harm. Never release anything you've purchased for your water garden into the natural environment.

Thoughtfully plan your water feature to avoid stress, heartache and accidental spread of non-native species. Build water gardens away from other waterways and consider where potential floodwaters may end up. Also, unwanted organisms can hitchhike on water garden plants. To prevent unwanted hitchhikers from appearing in your water garden, inspect and rinse new aquatic plants to rid them of seeds, plant fragments, snails and fish.

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### Together, we can keep Michigan's waterways healthy and pure

Pet and pond retailers, professionals and hobbyists are invited to explore RIPPLE resources and become RIPPLE partners by learning how to prevent invasions and sharing materials and information with their clients and communities. A variety of print and electronic educational resources are available on the RIPPLE website at [canr.msu.edu/ripple](http://canr.msu.edu/ripple).

Learn about invasive species currently found in Michigan, where they are located, how to identify them and report new sightings in the wild through the Midwest Invasive Species Information Network at [misin.msu.edu](http://misin.msu.edu).

Contact your local Cooperative Invasive Species Management Area (CISMA) to become involved in efforts to prevent and control invasive species in your community. CISMAs are groups of non-profit and government agencies, businesses and volunteers that have come together to tackle issues related to invasive species in their regions. CISMAs can offer a range of services including information on preventing, identifying, reporting and managing invasive species. Learn more at [michigan.gov/invasives](http://michigan.gov/invasives).

For more information on a wide variety of Smart Gardening topics, visit [www.migarden.msu.edu](http://www.migarden.msu.edu) or call MSU's Lawn and Garden hotline at 1-888-678-3464.

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**SMART GARDENING FOR SHORELANDS**

# Keep it clean to protect frogs and toads

Paige Filice and Erick Elgin, Michigan State University Extension

There is something magical about hearing the first spring peepers waking up after a long and cold winter. The endless chorus throughout spring and summer is an indication of Michigan’s 13 species of frogs and toads as they wake up from hibernation. Swarming ponds, lakes, streams and wetlands, these precious amphibians are looking for a place to mate and live. Frogs and toads are also great companions for your yard and garden. They eat pests like beetles, cutworms and slugs and are an important food source for a variety of other animals including herons, mink, foxes and fish.

Frogs and toads have highly permeable skin that allows liquids and gases to pass through easily. This makes them particularly sensitive to pollution, especially when developing from tadpoles to adults. Chemicals found in their environment like fertilizers, weed and pest killers, and detergents can be absorbed into their bodies and cause deformities like a lack of eyes, malformed legs and in some cases death. Due to pollution, loss of habitat and disease, amphibians are the most endangered group of wildlife on earth, with one-third to potentially half of amphibian species worldwide at risk of extinction. Michigan has four rare or declining frog and toad species.

**Do your part to protect Michigan’s amphibians**

**Minimize usage of chemicals.** Common garden chemicals like fertilizers and pesticides are designed



Frogs and toads produce a range of sounds during courtship and mating. The callers, typically males, croak to advertise their location, mating readiness and to defend their territory.



A pair of northern leopard frogs meet on a lily pad.

Jim Harding

to alter the environment (e.g., kill insects or weeds, encourage growth). Unfortunately, research has found they can also harm amphibians like frogs and toads. When managing weeds, consider hand pulling, digging up or cutting them instead of applying chemicals. Preventing weeds and other pests is the easiest and cheapest way to limit your reliance on chemicals. Consider planting native species that do not need extra fertilization and are less affected by disease. Native plants also attract insects typically not harmful to your garden that are a food source for frogs and toads.

**Timing is everything.** If you do need to apply fertilizers or pesticides, spot treat during sunny, non-windy and dry days and when animals are the least active. Apply chemicals when rain is not expected for a few days. If applying herbicides is necessary, use caution as some herbicides persist in the soil for long periods of time. If applied late in the growing season, they can impact eggs and tadpoles the following spring.

**Control rainwater runoff.** The more rainwater that can be filtered through vegetation and soil as opposed to entering a storm drain, the healthier our water is. Consider installing a rain barrel at the end of a gutter or direct your gutters into a rain garden to capture runoff. Rain gardens add beauty and habitat to your yard while also helping the environment.



**Create habitat and avoid barriers.** Frogs and toads do not like wide open sunny places like grassy lawns. During the day, they prefer to stay damp in shady areas away from heat and direct sunlight. Consider replacing parts of your lawn with a diverse mix of native plant species that can provide ample food and protection. Or, on a smaller scale, create shelter for them by building a brush or rock pile, or leave a layer of leaves for them to hide in. Another popular gardener trick is to turn over a clay or ceramic flowerpot and prop it up with rocks, making it easy for a frog or toad to slip inside for an afternoon nap. Shelters should be placed in quiet and shady areas, which are not mowed frequently.

Shoreline habitats are also very important to amphibians, as some species like the green frog require plants near the water for survival. Common development practices like removing shoreline plants and installing seawalls and rock rip rap make it nearly impossible for frogs or toads to reach and use shorelines to rest and feed. If you live on a lake, pond or river, be sure frogs and toads have easy access into and out of the water. You can do this by simply extending a downed tree or log into the water or planting native plants along the shoreline. These practices also reduce erosion, eliminating the need to install a seawall or rock rip rap.



Green frog



Wood frog



American toad



Gray tree frog

**Handle with care.** If you are lucky enough to have a frog or toad visitor in your garden, never handle them or other amphibians when you have insect repellent, sunscreen or soap on your hands. They can be harmed or killed by chemicals we consider harmless. Keep hands moist or wear clean garden gloves when handling if possible.

See more Smart Gardening for Shorelands tip sheets: [canr.msu.edu/smart-shorelands](http://canr.msu.edu/smart-shorelands)



Paige Filice, MSU Extension

If you'd like to handle frogs or toads, be sure to wash your hands to remove any insect repellent, sunscreen or soap.



Mark Bugnaski Photography

If you are lucky enough to live on a lake or pond, the best way to protect frogs and toads is to provide them with a natural and unmowed area along the shoreline.

**For more information on a wide variety of Smart Gardening topics, visit [www.migarden.msu.edu](http://www.migarden.msu.edu) or call MSU's Lawn and Garden hotline at 1-888-678-3464.**

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**SMART GARDENING FOR SHORELANDS**

**Smart lake gardening: Planning your nearshore garden**

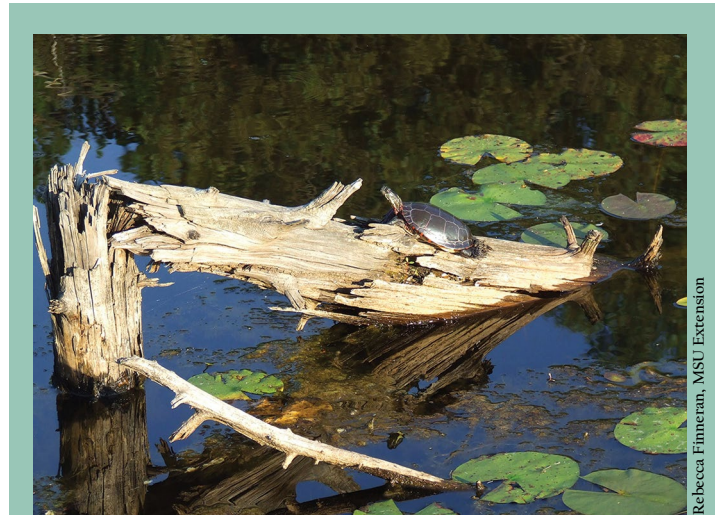
Erick Elgin, MSU Extension

Extending your lakefront garden into the water opens an exciting new opportunity to enhance your property’s beauty and function. Elegant bulrush with pondweeds growing below create interest while providing safe shelter for many of the lakes’ fish, birds and other animals. Placing logs that extend from the shoreline edge out into the lake improves habitat further while also providing an attractive feature from both land and water. The water in front of your shoreline does not need to end your gardening; in fact, it might be one of your most important gardens.

The near shore or “littoral zone” is the area of a lake that can support rooted aquatic plants. This zone is typically found around the edge of a lake but can also be found wherever water is shallow. The littoral zone provides habitat to a variety of lake wildlife from dragonflies to fish to turtles. In addition, aquatic plants can help reduce shoreline erosion by absorbing and reducing energy from waves before they reach the shoreline. When gardening in the littoral zone, consider whether your desired features will support what is best for the lake. Removing native plants, installing seawalls and building sandy beaches destroys the natural features that protect the lake. Therefore, protect the plants you already have on your shoreline and enhance where you can.

**Plants for your nearshore garden**

Lakes are held in public trust and therefore protected by the laws of the state of Michigan. As a result, there are rules that need to be followed if you want to garden in the lake. One important rule

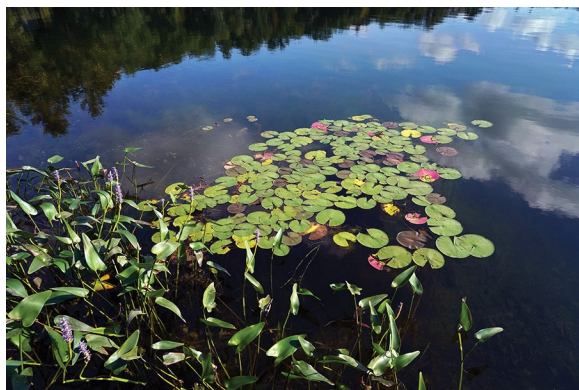


Rebecca Finneran, MSU Extension

“If you look the right way, you can see that the whole world is a garden.” - Frances Hodgson Burnett, *The Secret Garden*

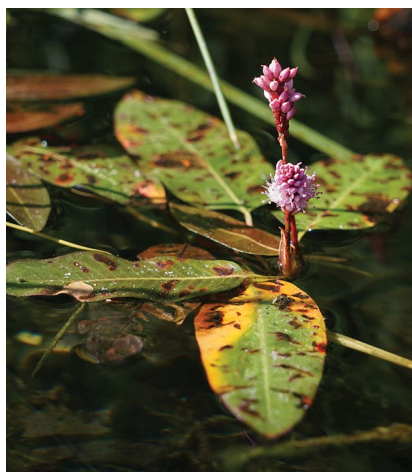
requires using native plants for *all plantings in the littoral zone of lakes*. Native plants are very beneficial to lakes, so be sure you select and plant Michigan native plants.

Native plants that live in the littoral zone of lakes are lumped into three broad categories: emergent, submergent and floating-leaf. Emergent plants, those that extend above the water like hardstem bulrush and pickerelweed, can live in deep water but are best suited for a water depth around 0 to 18 inches. Floating-leaf such as white water lily and submersed plants, those under water like pondweeds, typically grow best between 1.5 feet and 15 feet of water.



Mark Bugnaski Photography

White waterlily and pickerel weed are excellent plants for your lake garden.



Mark Bugnaski Photography

Water smartweed blooming along a shoreline.



Erick Elgin, MSUE

The underwater forest of aquatic plants.



Plant species within each of these groups can bring wonderful texture and color to your lake garden. If you also want to help fish and wildlife, focus on plant species that attract desirable species. For example, you may be able to see northern pike spawning in the spring if you plant hardstem bulrush on which these fish deposit their eggs.

Of the three categories of plants, native emergent species are the easiest to find at local native plant nurseries. Native floating-leaf and submersed species are typically hard to come by. Beware of exotic and invasive aquatic plant species at plant nurseries that are sold for other purposes. Remember, only native plants can be used in lakes. If in doubt, ask an expert before you buy. Luckily, you may not need to plant because native aquatic plants may naturally colonize your lakefront garden if you create the right conditions for them to grow.

### Logs add a beneficial and artistic touch

Placing logs next to the shoreline in the lake can add a great focal point and will protect newly planted or newly colonizing aquatic plants. Historically, Michigan lakes contained many downed trees that fell into the lake through time. These partially submerged logs provided wonderful refuge to fish and resting spots for turtles. The logs also helped slow shoreline erosion and improved conditions for plant growth. Unfortunately, as people built structures along the shoreline, many removed logs from the water. Placing logs back into the water as part of your garden design will benefit the lake and your new plantings.

You will need a permit to place a log into the lake along your shoreline. In that permit, there are a few things that need to be planned out including how you will attach the log to your shoreline so that it does not move around. Fortunately, there are many installation designs you can choose from and state agency staff and professionals can help.



Eric Calabro, Michigan EGLE

Logs placed in the water are excellent fish habitat.

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Mark Bugnaski Photography

### Permits: What do I need to know?

Plan ahead to apply for permits. The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) protects Michigan's environment and natural resources by regulating discharges into the environment, and use and development of certain lands and waters. NREPA also protects peoples' right to hunt and fish, and general use of Michigan's natural resources. Michigan law requires that you receive a permit from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) before conducting certain activities in inland lakes and streams. These activities include dredging, filling, constructing or placing a structure on bottomlands, constructing or reconfiguring a marina, interfering with the natural flow of water, or connecting a ditch or similar waterway to an inland lake or stream.

### Additional resources

- Michigan Natural Shoreline Partnership: <https://www.mishorelinepartnership.org/>
- Wisconsin Healthy Lakes Program - Fish Sticks: <https://healthylakeswi.com/best-practices/#fish>
- Joint Permit Application information: [www.mi.gov/jointpermit](http://www.mi.gov/jointpermit)
- More Smart Gardening for Shoreland tip sheets: [canr.msu.edu/smart-shorelands](http://canr.msu.edu/smart-shorelands)



Eric Calabro, Michigan EGLE

Adding logs creates a protected place for your plants to grow.

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**SMART GARDENING FOR SHORELANDS**

# Soak up the rain with a smart rain garden

Paige Filice, Michigan State University Extension

Beautify your yard and neighborhood while helping the environment with a rain garden. Rain gardens are a unique landscaping practice used to filter and absorb rainwater that runs off roofs and driveways, allowing it to be slowly reintroduced into our water system. They help the environment by keeping pollution out of storm drains and instead filter it naturally through the soil. Often planted with deep rooted and lush native plants, rain gardens are also an excellent way to attract birds and butterflies to your yard.

Rain gardens capture and absorb water within a day or two of a rain event and are dry most of the year. They are designed to direct water from gutters or high parts of your yard into shallow depressed garden areas planted with native species. Rain gardens can be a very affordable and attractive option for those interested in protecting water and enhancing their landscape. When considering a rain garden, there are a few factors to keep in mind.

### Place it where the water flows

A rain garden should be installed where it can collect the most rainwater runoff as possible, likely near driveways and downspouts. Capturing rainwater from rooftops is simple if your house has gutters. Depending on the shape of your yard, you can build a stone channel from a downspout or bury a 4-inch plastic downspout extender into the garden bed. The shape and depth of a rain garden can be a natural depression in your landscape or one you create.

While it may be tempting to locate a rain garden in a low, wet spot in your yard, do not place it where water is currently ponding. Standing water indicates soil that is slow to absorb water and the function of a rain garden is to assist with water infiltration. Place rain gardens at least 10 feet away from buildings to



Native plants: Butterfly milkweed, purple coneflower and golden alexanders. This lakeside rain garden includes rocks with native plants.

prevent water seeping into the building. Do not place a rain garden over a septic tank, leach field or drinking water well.

Rain gardens should be as level as possible. Water should not pool at one end or spill over an edge before it has a chance to soak in. Constructing a rain garden on level ground will also make it easier to install since you won't need to remove as much soil.

### Big or small, every little bit helps

Rain gardens are usually a few inches deep (4-8 inches) and can be designed in any shape or size. Generally crescent, kidney and teardrop shapes work well. Typical rain gardens are 100 to 300 square feet. The size and depth depend on soil type.

Gardens placed in sandy, well-draining soil can be much deeper than rain gardens in less permeable clay soil. Depending on the soil type, it may be necessary to replace some soil with an absorbent soil mix to help with water infiltration.

Generally, rain gardens should be about twice as long as they are wide, and the length of the garden perpendicular to where water is entering. During an average rainfall, most of the garden should fill with water and infiltrate within a day.



Rain gardens can be placed anywhere but are most efficient near driveways and other hard surfaces that don't allow rainwater to filter through them.



## Some common native flowers and shrubs found in rain gardens



New England aster  
*Symphyotrichum novae-angliae*

Black-eyed Susan  
*Rudbeckia hirta*

Butterfly milkweed  
*Asclepias tuberosa*

Fragrant sumac  
*Rhus aromatica*

New Jersey tea  
*Ceanothus americanus*

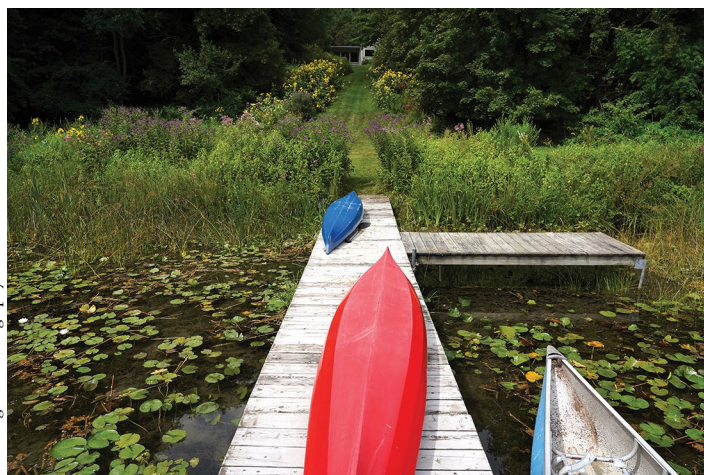
### Fill it with thirsty plants for the biggest impact

Native plants are an easy option for rain gardens because they tolerate short periods of standing water and can deal with drought conditions during hot summer months. Their deep root system also aids in water infiltration. It is best to purchase established plants since seeds can easily be washed away.

Rain gardens are designed to drain within 24 to 48 hours, therefore moisture-loving native plants may not be ideal for all rain gardens. In the deepest part of your rain garden, choose plants that have average to moist water requirements. The outside and edges should be planted with species that thrive in average or even dry conditions. If there are native plants already in your yard that are adapted to both wet and dry conditions, save money and transplant them.

### A little maintenance goes a long way

Similar to other landscaping features, some maintenance is necessary for rain gardens including



Mark Bugnatski Photography

This rain garden creates a beautiful transition to the water.

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### Resources

- Michigan native plant information: [nativeplants.msu.edu](http://nativeplants.msu.edu)
- Rain Gardens: A Guide for Homeowners and Landscapers. Wisconsin Department of Natural Resources: [bit.ly/RainGardenManual](http://bit.ly/RainGardenManual)
- MSU Extension lawn and garden soil test kits: [homesoiltest.msu.edu](http://homesoiltest.msu.edu)
- More Smart Gardening for Shorelands tip sheets: [canr.msu.edu/smart-shorelands](http://canr.msu.edu/smart-shorelands)

mulching, weeding and watering in the first year. Once established, the plants should outcompete most weeds. It may also be necessary to periodically re-mulch and clear dead vegetation and other debris such as sediment and sand. Rain gardens can potentially attract unwanted insects and wildlife. However, they are not a source of mosquitoes, which require a week of standing water to breed.

Native plant photo credits, left to right: Harlan B. Herbert, Bugwood.org; Chris Evans, University of Illinois, Bugwood.org; Doug Landis, MSU Entomology; Rob Routledge, Sault College, Bugwood.org; Rebekah D. Wallace, University of Georgia, Bugwood.org.



Center for Neighborhood Technology

Downspouts diverted to a rain garden can be hidden with rocks and other vegetation to create an attractive landscape.

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**SMART GARDENING FOR SHORELANDS**

# Smart stormwater solutions for protecting your waterfront

Bindu Bhakta, Michigan State University Extension

No matter where you live, stormwater is everyone’s problem. Rain and melting snow that is unable to soak into the soil is called stormwater. When precipitation hits a hard surface such as a rooftop, roadway, concrete patio or even a compacted lawn, it is unable to naturally filter into the ground to recharge groundwater, or the supply of water stored in the cracks and spaces in and around rock and soil particles. Instead, this water travels across the landscape and picks up nutrients, pollutants, and pathogens such as:

- Nitrogen and phosphorus contained in loose soil, fertilizer and yard waste such as leaves and grass clippings.
- Pesticides, oil, gas or road salt.
- Pathogens from pet waste, effluent from failing septic systems and other sources.

## Manage stormwater where it falls

Smart stormwater practices use native plants, soil and natural processes to manage stormwater where it lands. By managing precipitation to slow the flow, it can be promptly collected, filtered and absorbed into the soil. Not only can smart stormwater practices improve water quality, they can also enhance the natural beauty of your landscape, improve wildlife habitat, and conserve water.

## Grab your raincoat and observe your landscape when it rains

Walk your property before, during or after it rains to see where water goes. Note the physical



Extension Lakes/University of Wisconsin- Stephens Point

Good stormwater practices can enhance the beauty of your landscape.



Jennifer Acevedo

A decorative rain barrel collects stormwater for reuse.

characteristics such as slope, soil type, soil erosion, any surface water and location of hard surfaces where water flows rather than absorbs. Look for low spots and heavy soils where water pools after it rains. Look for faster-draining sandy soil locations where water can filter into the ground so quickly that contaminants cannot be naturally filtered by the soil nor nutrients taken up by plants. Also, be sure to properly store chemicals, fertilizers and pesticides so they can be contained and easily cleaned up in case of a spill.

Create a simple sketch of your property marking the location of contamination risks and drainage issues to determine which smart stormwater practices will best address potential problems.

## Divert or redirect rainwater, then put it to good use

Prevent erosion and encourage water infiltration by collecting rainwater to water plants in other garden areas. Redirect stormwater from rooftops by diverting downspouts or gutters directly into a planted area. Rain barrels, available in a variety of sizes and styles, are a creative and stylish way to capture and store stormwater for use in your gardens. For safety reasons, do not water plants you intend to eat with stormwater.





The design for these stepping stones and plants slows the flow of water toward the lake and creates opportunities for it to filter.

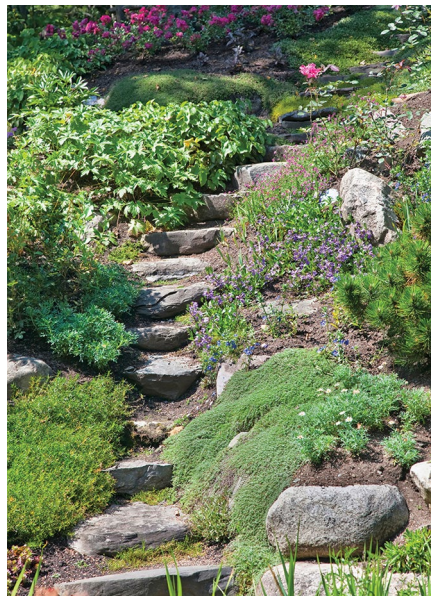
### Combat stormwater and improve water quality with native plants

Add more native plants to your property. Native plants have long, dense root systems that make them both drought tolerant and cold hardy with less need for water, fertilizer and pesticides. These characteristics make them well suited for filtering stormwater and encouraging infiltration while securing the soil to prevent erosion.

Rain gardens are designed to capture stormwater in a shallow depression-shaped garden typically containing native plants and rocks. Water is held for a short period of time in the garden so the plants' deep roots can help filter the water before it adds to the groundwater.

### Earth-friendly hardscape alternatives to encourage infiltration

When choosing new or replacement hardscaping, consider permeable or porous options. Traditional surfaces, like concrete and asphalt, keep water from entering the soil below. Alternatives include porous pavers, stones, gravel and wood chips. A winding path of steppingstones to a waterbody gives stormwater opportunities to be absorbed before reaching the water.



Rock steps with plants and gravel can absorb flowing water.



Shady areas can filter stormwater with rocks and shade-loving plants.

### Let it rain on the rocks

Rock infiltration trenches and pits are a landscaping practice used to capture and soak up rainwater that runs off houses and hardscapes such as paved driveways. This technique simply involves excavating a trench or pit lined in landscaping fabric and first filled with small stones (0.75 – 2 inch) and then topped with larger stone (4-6 inch). When it rains, the spaces between the rocks fill with water, which then slowly releases into the surrounding soil.

Rock infiltration pits should be at least 10 feet away from your house to prevent flooding the structure and 50 feet away from a drinking water well. Do not place it uphill from or over a septic field. On waterfront property, place the trench in the upland portion of your landscape to prevent stormwater from entering the lake, river or stream.

Over time, sediment can accumulate in the pits. Placing landscaping fabric between the layers of small and large stone will prolong the effectiveness of rock infiltration pits. When sediment builds up, lift up the fabric and clean out the sediment.

For more information on how you can protect, lakes, streams and wetlands, see other tip sheets in the MSU Extension Smart Gardening for Shorelands series at: [canr.msu.edu/smart-shorelands](http://canr.msu.edu/smart-shorelands)

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For more information on a wide variety of Smart Gardening topics, visit [www.migarden.msu.edu](http://www.migarden.msu.edu) or call MSU's Lawn and Garden hotline at 1-888-678-3464.

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**SMART GARDENING FOR SHORELANDS****Smart waterfront plants to enhance your shoreline**

Erick Elgin, Michigan State University Extension

Living near water offers moments of serenity and beauty inspired by all aspects of the water's edge. Imagine enjoying the dappled sunlight of a lake shoreline with towering aromatic white pine trees above with delicious blueberries and sparse Pennsylvania sedge below. These plants together with the sounds and cool breeze from the lake can bring a breath of relaxation that Michigan lakes offer. But these plants do a whole lot more than just dazzle our senses. They also protect the water and land.

Plants that grow in, along, and just outside water play an important role in protecting water quality and providing habitat for many water loving critters. This is especially true of native plant species. Native plants have extensive root systems that have adapted to living in and around water. The roots and stems minimize erosion and buffer the water from pollutants like phosphorus and nitrogen that may runoff yards. Importantly, they also provide necessary habitat for a variety of animals. For example, common arrowhead, a popular and beautiful shoreline plant, provides a high-energy food for migrating waterfowl and small fish may use big arrowhead beds as shelter.

Native plants along water:

- Hold soil in place with either deep or laterally extensive roots systems
- Absorb and lessen energy from waves created by wind and boats
- Slow down water runoff from a sloping yard or landscape to allow pollutants such as sediments and contaminants to absorb before they reach the water
- Absorb nutrient runoff which helps keep the water clear of algae
- Provide key habitat for fish and wildlife

**Planning your waterfront garden**

When landscaping around water, it is important to balance your needs with the protection of the waterbody. A well-designed waterfront landscape will maintain access, views and aesthetics along with stabilizing soil, protecting water quality and enhancing habitat for fish and wildlife. When choosing native plants for your waterfront garden consider: (1) how high does it grow, (2) how much will it spread, and (3) when will it bloom.



Mark Bugnaski Photography

It is also critical to plant trees, shrubs, flowers, grasses and sedges in areas where they will have the greatest success. There is often a gradual change in wetness along creek, lake, and pond shorelines. Typically, there is an aquatic zone that is almost always under water, a transition zone with consistently moist soil and an upland zone that is mostly dry. It is very important to plant the right species in the right location so that your plants survive.

For example, plants that grow well in the aquatic zone will typically not do well in dry conditions. Table 1 has a brief list of hardy species that do very well in each zone. When putting the right plant in the right place, you can better assure beautiful blooms and a hardy root mass that slows erosion.



Mark Bugnaski Photography



**Table 1. Short list of native plants that have high success on shorelines and are commonly available in native plant nurseries.**

Species derived from Vanderbosch and Galatxitch 2010. For a more extensive plant list, check out the Michigan Natural Shoreline Partnership’s website: <https://www.mishorelinepartnership.org/>

Zone	Species
<b>Aquatic</b>	• River bulrush ( <i>Bolboschoenus fluviatilis</i> )
	• Blue flag Iris ( <i>Iris versicolor</i> )
	• Hardstem bulrush ( <i>Schoenoplectus acutus</i> )
	• Common arrowhead ( <i>Sagittaria latifolia</i> )
	• Giant Bur reed ( <i>Sparaganium eurycarpum</i> )
<b>Transition</b>	• Three square bulrush ( <i>Schoenoplectus pungens</i> )
	• Porcupine sedge ( <i>Carex hystericina</i> )
	• Joe-pye weed ( <i>Eupatorium maculatum</i> )
	• Swamp milkweed ( <i>Asclepias incarnate</i> )
	• Blue vervain ( <i>Verbena hastata</i> )
<b>Upland</b>	• Black-eyed susan ( <i>Rudbeckia hirta</i> )
	• Little bluestem ( <i>Schizachyrium scoparium</i> )
	• Native sunflowers (multiple species in the genus <i>Helianthus</i> )
	• Wild bergamot ( <i>Monarda fistulosa</i> )
	• Pennsylvania sedge ( <i>Carex pennsylvanica</i> )



Blue flag Iris (*Iris versicolor*)



Common arrowhead (*Sagittaria latifolia*)



Wild bergamot (*Monarda fistulosa*)

Planting and maintaining a lawn along the water’s edge can be uninspiring and more importantly damaging to your lake or stream. The root system of lawn species are not deep or dense enough to protect the soil from the erosive nature of moving water. In addition, fertilizers and pesticides commonly used on lawns may enter the waterbody causing damage to fish and wildlife. Keep in mind, it is important to balance your needs with protecting the waterbody. Replacing lawn along your water’s edge with a native plant garden is a great way to accomplish this. Any addition of a native tree, flowering shrub, or a handful of wildflowers can make a difference. Already have some landscaping that isn’t native? No need to remove it, just incorporate native species when you can.

For more information on waterfront landscaping design and plant species best suited for each zone of a waterfront, check out the Michigan Natural Shoreline Partnership:

[www.mishorelinepartnership.org](http://www.mishorelinepartnership.org)

**Additional resources**

- Michigan Shoreland Stewards Program: [www.mishorelandstewards.org](http://www.mishorelandstewards.org)
- Michigan State University Native Plants and Ecosystem Services: [www.nativeplants.msu.edu](http://www.nativeplants.msu.edu)
- Wildflower Association of Michigan: [www.wildflowersmich.org](http://www.wildflowersmich.org)
- More Smart Gardening for Shoreland tip sheets: [canr.msu.edu/smart-shorelands](http://canr.msu.edu/smart-shorelands)

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