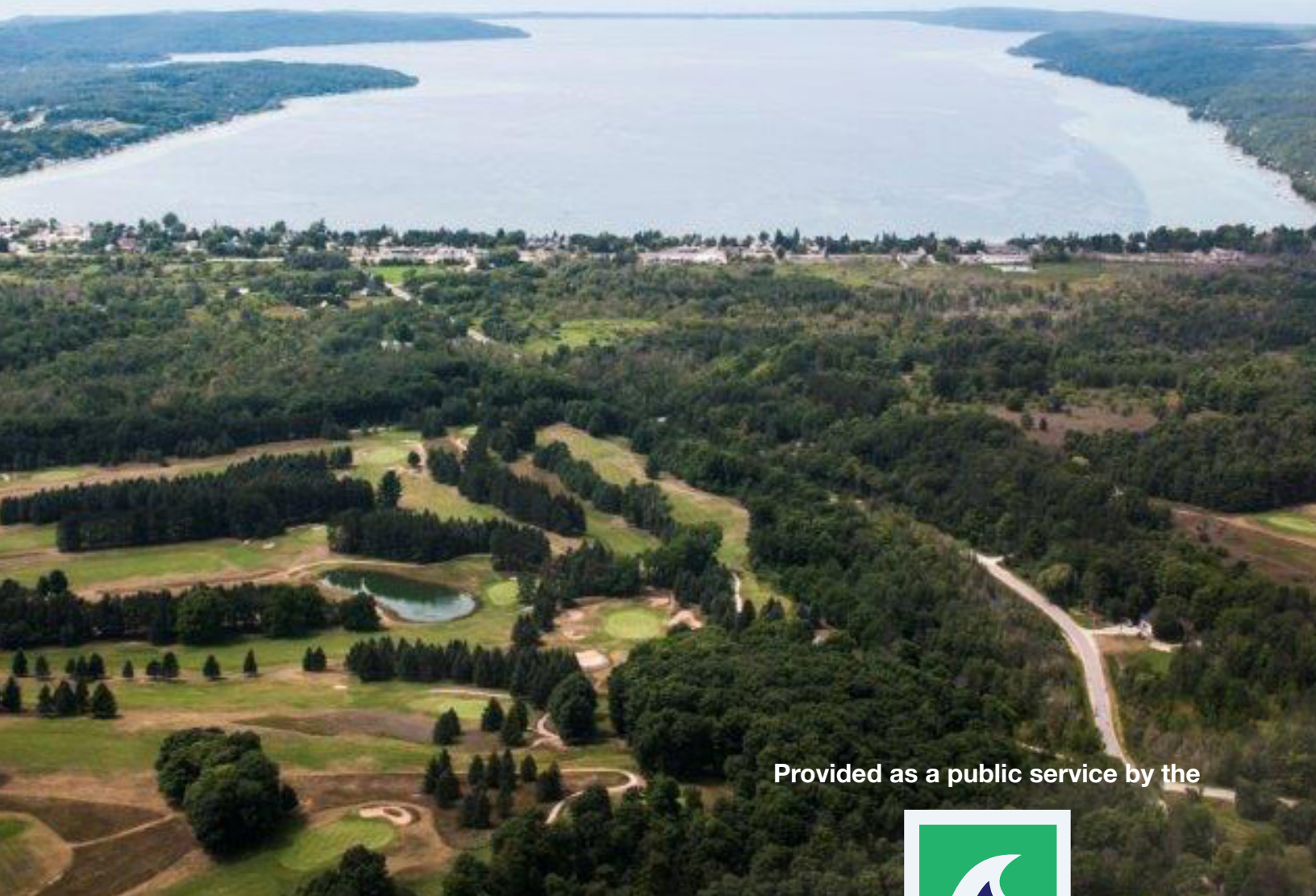


# STEWARDSHIP FOR A HEALTHY WATERSHED



Provided as a public service by the



**Crystal Lake &  
Watershed Association**

*Protecting Crystal Lake now  
for generations to come.*

**This series of articles was prepared by the  
Land Use Committee of the Crystal Lake & Watershed Association.  
They were first published in the Benzie County Record Patriot  
during the summer of 2020.**

*Photo Courtesy of Steve Stephens  
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# KEEPING OUR LAKES AND STREAMS HEALTHY

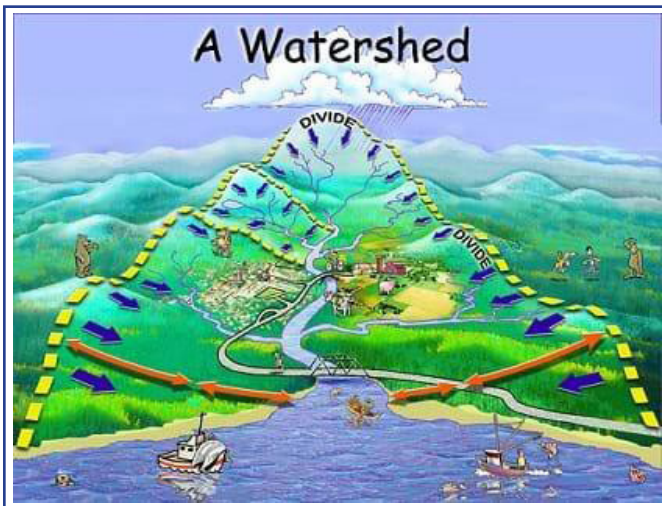
## Part 1 of a Series

As you get your yards and gardens fixed-up for the summer, it's a good time to consider how your yard affects the health of the watershed in which it resides. As everyone's property is part of a watershed, how you maintain your property has a direct effect on that watershed, and consequently, an impact on the quality of the water that runs off the watershed and into nearby streams, lakes, or wetlands.

In northwest Michigan we are lucky to have some of the cleanest and most beautiful rivers, lakes, and wetlands in the country right in our backyards. But are our rivers, lakes and wetlands lucky to have our yards in their watersheds?

### Healthy Watershed = Healthy Lake

A watershed is an area of land that drains into a single body of water such as a stream, lake, or wetland. Watersheds come in all shapes and sizes but have the same basic form and function. They direct the flow of rain water, snow melt, and ground water from higher elevations down slopes to a common low point, i.e. a stream, lake, or wetland. While topography, geology and climate influence the shape of watersheds, over time removal of vegetation by humans has become a major factor in the health of our watersheds.

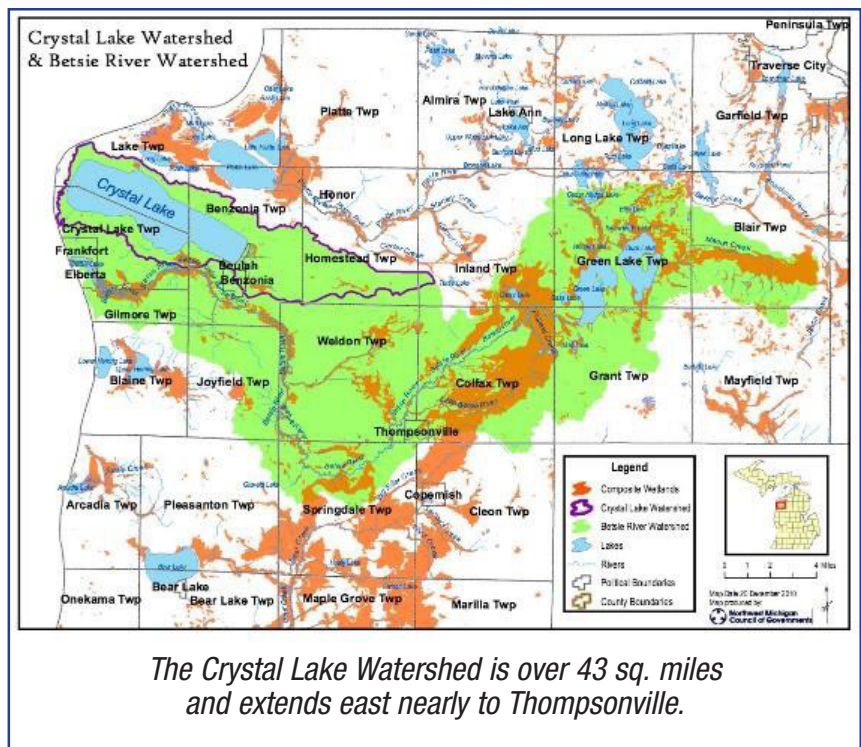


Vegetative cover (trees, plants, flowers and shrubs) with well-established root systems functions as a watershed filter, removing toxic pollutants (fertilizers, oil, pesticides) and nutrient-laden sediments from rain and storm water runoff before it enters a stream, lake, or wetland. In fact, wetlands are created by the presence of vegetative cover. By slowing runoff, vegetation also helps replenish groundwater and prevent erosion. When vegetation is removed for construction, pavement, or to establish mowed lawns, the watershed's ability to perform the functions that are critical to maintaining water quality is diminished.

### A Little Prevention = Years of Cure

Experts from Michigan's Department of Environment, Great Lakes, and Energy (EGLE) and others agree that the best strategy is to vigilantly protect our waterways from getting polluted in the first place, since it is almost impossible to restore a lake or river once it has been degraded. For example, it takes 30 to 60 years for the water in Crystal Lake to completely turn over naturally. This means once pollutants have entered the lake, it could take generations for the lake to recover after the source of the pollution is mitigated.

Recognizing the importance of watersheds on the health of lakes, streams, and wetlands, more local governments are beginning to adopt Zoning Overlay Ordinances designed to protect their watersheds. An overlay is an ordinance that defines requirements unique to a specific area, in this case the watershed. A watershed overlay generally imposes special conditions on land use and development on top of existing county zoning regulations, as a means of preserving watershed health and preventing water degradation. For example, all of the Townships surrounding Crystal Lake and the Village of Beulah have Overlay Ordinances for the Crystal Lake Watershed.



## Individuals Can Make a Difference

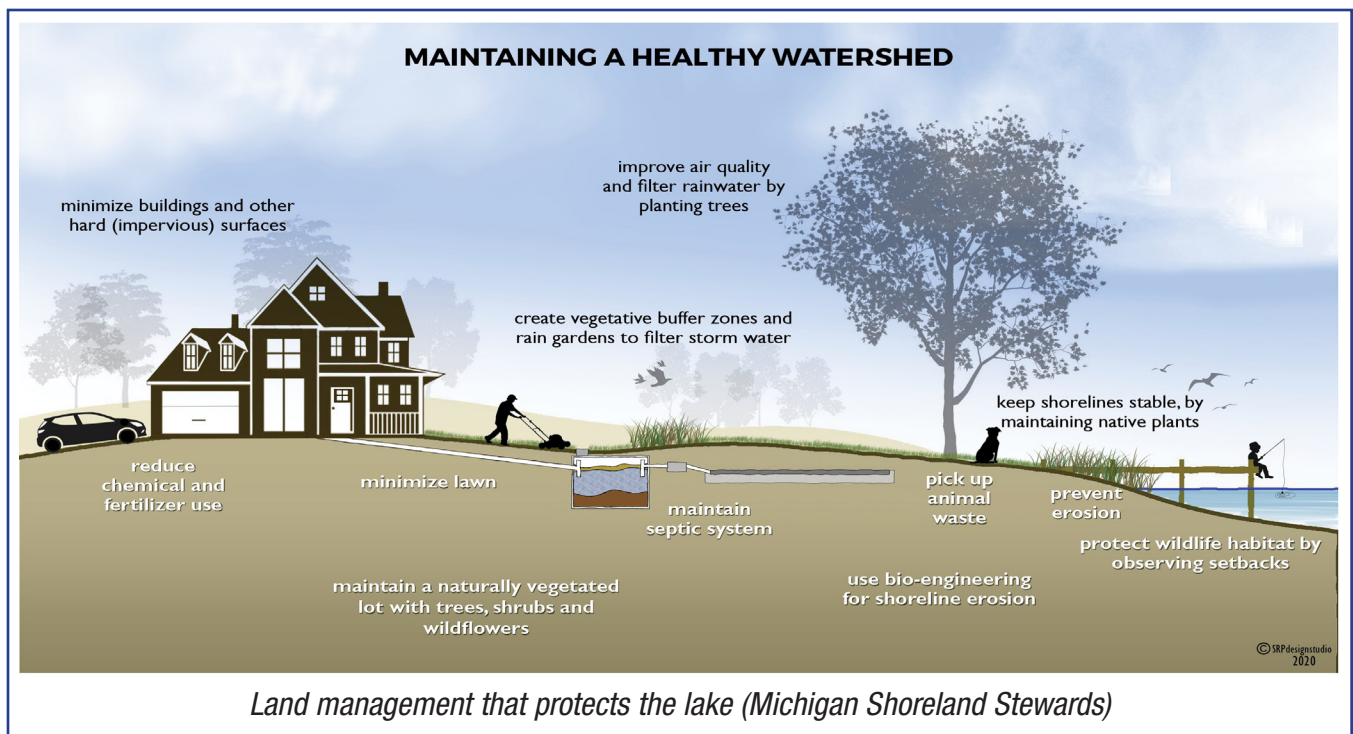
*Maybe you've noticed areas in a lake where the sand feels somewhat harder or crusty, or you've seen algae growing near the beach in Beulah that you didn't see 10 or 20 years ago. Maybe you've seen that green mossy stuff on rocks in the water near a beach or river bank. It may seem like nothing, but these small changes add up and are early signs of increased nutrients in the water and the associated water quality degradation. Common sources of these nutrients include deficient septic systems, fertilizer and pesticide runoff, plant and animal debris, and nutrient-laden sediments carried by runoff – most of which literally reside in our backyards.*

Which brings us back to our original question: Are our streams and lakes lucky to have our yards in their watersheds? The answer depends in large part on how businesses and homeowners care for their property.

Here are seven easy and inexpensive recommendations for making your property more watershed friendly:

1. **Reconsider your lawn.** The problem with grassy lawns is that the grass is non-native to our region, has shallow roots, is often treated with environmentally harmful chemicals, and requires frequent watering and mowing. Runoff water carrying nutrients and toxins sweeps across mowed lawns with minimal filtering and most people don't realize that gas-powered mowers can emit the same amount of pollution in one hour as 34 cars. Lawns also attract waterfowl such as geese, whose droppings then seep into the lake. Consider replacing at least part of your turf grass with native grasses and plants and leave the manicured lawns in suburbia where they belong (although they're not really healthy anywhere).

2. **Create buffer zones.** A buffer (also called a riparian buffer area or zone) is a strip of natural vegetation along the bank of a stream, lake or other water body that separates the water from developed areas such as lawns, buildings, roads, driveways, etc. Strategically placed strips of vegetative cover, especially within a riparian zone and near ditches or culverts, can effectively mitigate the movement of sediment, nutrients, and pesticides into a body of water. Buffers also help prevent property loss due to erosion. Recognizing the importance of buffer zones, many township overlays require a 35 foot vegetative buffer zone between buildings and a body of water.
3. **Ditch the fertilizer, pesticides, and herbicides.** Fertilizers, pesticides, and herbicides may make your yard and flower beds look better in the short term, but over the long term they kill the birds, and bees and other insects that are critical to your yard and garden. Natural alternatives such as mulch and composts are a much better choice.
4. **Go native.** Native plants are those plants that have been “at home” here for thousands of years and are integral links in the natural food chain of insects, birds and other animals. Native plants know how to flourish in their natural areas without a lot of watering and fertilization. There are many attractive native plants to choose from, including trees, flowers, shrubs, and grasses. They’ll flourish in your yard with a lot less care while helping to protect lake and stream water quality.
5. **Plant a tree.** Trees are especially effective in reducing storm water runoff. They capture rainfall in their canopies and release it back to the atmosphere through evaporation. Tree roots slow down runoff, increase the infiltration of water into the soil, and take up nutrients and other pollutants. The USDA Forest Service estimates that just one newly planted tree can capture 76,000 gallons of rainfall over a 40-year life span.
6. **Choose pervious surface materials.** Impervious surfaces are land surfaces that repel rainwater and do not permit it to infiltrate the ground. This inhibits ground water replenishment and filtering of pollutants before water runoff enters a lake or stream. Some natural surfaces can be relatively impervious – for example soil compacted by development can be an impervious surface. However, for the most part this term refers to man-made hard surfaces such as roads, parking lots, driveways, sidewalks and roofs. Adding these surfaces to the landscape can alter the flow of rain water and streams. To limit the effect of impervious surfaces on the health of watersheds, most watershed zoning overlays limit the lot percentage that may be covered by impervious surfaces. Consider using penetrable materials for driveways, walkways, patios, and other areas that don’t require impervious surfaces.
7. **Maintain your septic system.** Septic systems can create particular problems in a watershed. A properly functioning septic system filters wastewater through the soil, eliminating most bacteria, viruses, and some nutrients, but it is not effective at removing things such as medicines, cleaning products, and other potentially harmful chemicals. Consider using household cleaning products that are phosphate-free, throwing out or composting food waste instead of putting it through a garbage disposal, and never flushing medicines or other chemical products down the drain or toilet. You’ll be protecting the watershed as well as extending the life of your septic system. An improperly functioning septic system, one with a leaking tank or clogged drain field, can cause sewage to surface in your yard and be swept into waterways. Regularly inspecting your system and pumping your septic tank will minimize the risk of failure.



### **For More Information:**

**Benzie Conservation District**

[BenzieCD.org](http://BenzieCD.org)

**The Crystal Lake & Watershed Association**

[CrystalLakeWatershed.org](http://CrystalLakeWatershed.org)

**Michigan Department of Environment, Great Lakes, and Energy**

[Michigan.gov/egle](http://Michigan.gov/egle)

**Michigan Natural Shoreline Partnership**

[MiShorelinePartnership.org](http://MiShorelinePartnership.org)

**Plant It Wild**

[PlantItWild.net](http://PlantItWild.net)

**U.S. Environmental Protection Agency**

[EPA.gov](http://EPA.gov)

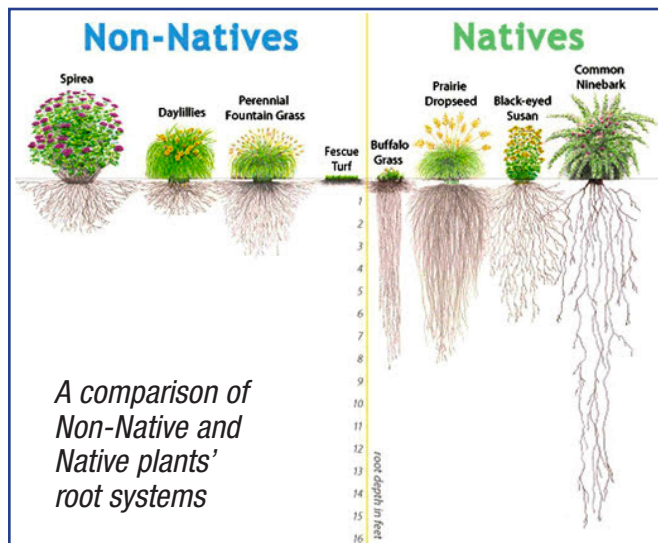
# NATIVE PLANTS

## *Protecting our Fresh Waters*

### Part 2 of a Series

In the first article of the series, native plants were suggested as beneficial to our lakes and streams. In this article we answer the question of why and how native plants help protect our fresh waters.

A plant is considered native if it has occurred naturally in a particular region, ecosystem, or habitat without human introduction. We humans have brought non-native plants from all over the world, learned to modify them genetically and to cultivate them. They are generally not adapted to our northern Michigan region. Occasionally, they can even escape into the wild and become invasive exotics that destroy natural habitat.



Native plants thrive in the soils, moisture, and climate of their home habitat. That means that with native plants you'll find yourself needing to water less, you'll have fewer pest problems that might require toxic chemicals, and you will not need to augment the soil with "black dirt" or fertilizers that are damaging to lakes and streams.

Unchecked water runoff carries sediments right into our lakes and streams whether over land or through ditches and culverts. Plants assist in managing water runoff and, because native plants have deeper root networks than non-natives, they do a better job of purifying and reducing the volume of surface water runoff.

Where planted to intercept runoff, natives slow its velocity, remove nutrients and toxins, and filter out sediments that can smother aquatic organisms. They recharge the groundwater and their deep root systems maintain healthy, non-compacted soil.

Over thousands of years native plants have formed mutually beneficial relationships with native wildlife. This is a wonderful bonus if you want to enjoy butterflies and birds in your yard while benefitting from all of the practical, functional virtues of natives. Non-native plants don't offer this bonus because they haven't the host-invertebrate relationship that the natives have. Native plants are essential links in the food web, producing through their hosting of native insects the preponderance of the protein vital to birds and other wildlife. Without native plants, your yard becomes a "food desert" for Michigan's birds and other creatures. You will indeed bring your yard and garden to life with native plants!

Native trees, shrubs, grasses, mosses, ground covers, and hundreds of different flowering plants have been clothing our watersheds and protecting our streams and lakes for thousands of years. They know how to do it in the most efficient and most beautiful way possible. It behooves us to pay attention, to learn from them, and to support them as we learn about how they support us.

For more information on native plants and sources for healthy diverse specimens, visit Plant It Wild, [PlantItWild.net](http://PlantItWild.net).



*There are hundreds of beautiful native flowering plants to choose from.*

The Benzie Conservation District sells them at its Spring and Fall seedling sales, [BenzieCD.org](http://BenzieCD.org).

# TREES

## *Nature's Engineers*

### Part 3 of a Series

*In the first article of the series, trees were cited as an important tool for keeping our lakes and streams healthy. In this article, we answer the question of why and how trees help protect our fresh waters.*

Trees are like our oldest friends. They are loyal and dependable, working hard for us, so effeciently we sometimes forget how essential they are to our way of life! They find their way into paintings, photographs, and poems. Trees and forested lands provide beauty and character to our landscapes and communities. They offer food and habitat to the plant and animal world. They offer us shade for cooling down; they stabilize the soils in our yards, gardens, and shorelines; and they give us life, literally, when they remove carbon dioxide from the atmosphere and release the oxygen we need to breathe.

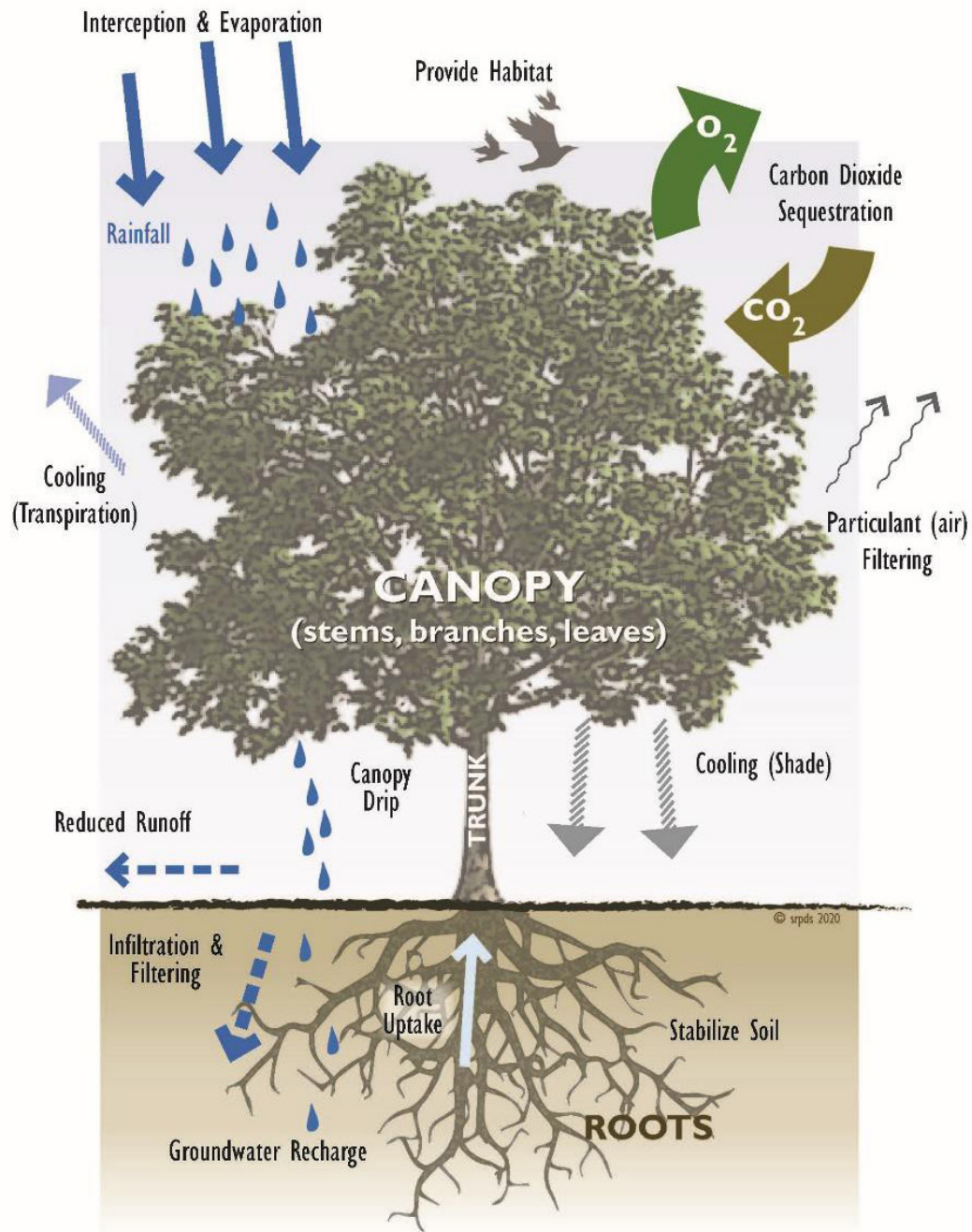
Trees are one of nature's important tools for maintaining the health of our watersheds and the quality of our streams and lakes. When it rains, water that isn't captured by trees and other vegetation flows very quickly downward toward the streams and lakes of a watershed, taking with it contaminants such as topsoil, herbicides, pesticides, gasoline, oil and animal waste and sometimes, with a leaky septic, human waste. Trees use their extensive root systems to draw water from rain or snow melt deep into the ground, forcing it to move more slowly through a watershed. In this way, they recharge the groundwater. Through the storage capacity of their canopies, trees capture rainfall, holding it in their leaves and branches then slowly releasing it to the ground through dripping that continues hours after a storm.

With their extensive root systems, trees work with other plants to prevent erosion by stabilizing our yards, shorelines, and especially our steep slopes. Soil stabilization protects against many adverse effects of erosion: downslope flooding of yards and beaches, landslides, stormwater redirection, and damage to public property such as roads or hiking and biking trails.

When located along a shoreline, trees help maintain water temperatures that are so important to healthy streams and lakes. Higher temperatures can allow undesirable plant growth. Trees along the shoreline of a lake or stream provide shade and keep water temperatures in shallower waters cool, good for habitat and fish life. For example, trout need water temperatures below 65 degrees Fahrenheit to survive. Not to mention the benefits to us humans of a shady tree at the beach on a hot summer's day!

Trees are old friends. A red maple with a trunk diameter of 16 inches is estimated to be 72 years old. We should all think carefully about cutting down a tree, because its replacement might not be back in our lifetime. Also, the next time we are in our yards and feeling thankful about the screening our trees provide from a noisy neighbor or a rather unattractive garage, let's remember to thank them for ALL of their skills and talents. They are working every moment to improve our lives!

## ECOSYSTEM SERVICES OF A TREE



*Nature's engineers! Every tree is an amazing system that works 24/7, effectively and efficiently moving nutrients and water throughout its structure to fuel itself while improving our air quality by releasing oxygen through its canopy and filtering rainwater and snow melt through its roots.*

# RAIN GARDENS

## *A Beautiful Solution to Water Pollution*

### Part 4 of a Series

Do you ever see rain water flow from your yard into a lake or stream via a ditch or culvert? Or rainfall go right across your mowed lawn and onto a driveway or road, or straight into a lake or stream? These things happen. Damaging materials such as silt, nutrients, oil and gas residues, pesticides, herbicides and fertilizers enter our waterbodies, all causing irreversible harm. When surface runoff enters lakes and streams directly through ditches and culverts without cleansing by natural wetlands, meadows, or forests, it carries these harmful materials with it.

Removing plants for development (e.g., buildings, patios, turf grass) disables their age-old and essential function of keeping our waters cool and clean. So, how can we continue to build cottages and homes near our gorgeous lakes and streams without causing damage? How can we manage runoff from property that is already developed? One solution: adding strategically placed rain gardens to our landscapes.

A rain garden is a bowl-shaped depression or swale designed with plants to capture and absorb rainwater. It can be as deep and wide as required for its function. Rain gardens slow the force of rain water from roofs, sidewalks, roads, driveways, patios, and other impervious surfaces; when they intercept water flow before it enters a ditch or culvert (or a water body), they go a long way toward protecting our waters.

A well-designed rain garden is full of water treatment plants (yes!) and is a particularly effective and beautiful way to mitigate water pollution. By intercepting runoff, the plants filter out silt and other potential contaminants through their roots (native plants do the best job at this), recharge ground water, and release pure water into the air through their leaves. Plant root systems have communities of bacteria, fungi, and other microbes associated with them that are capable of breaking down certain toxins into plant nutrients, or rendering them harmless. Low concentrations of some toxic materials like petroleum residues that are likely to be washed from driveways and roads may be degraded in the root-microbe assemblages of rain gardens.



So, rain gardens are remarkably functional. Following nature's design, they serve us in our effort to keep our waterways pure. We build them to mitigate the loss of protective vegetation that comes with development. Beyond function, they can be absolutely beautiful! You can choose plants from myriad species of trees, shrubs, perennial flowering plants, and others that like to have wet feet every once in a while. Native ones are the best: they've been doing this job for thousands of years and they will increase the diversity of birds, bees, and butterflies in your landscape.



*This beautiful rain garden keeps dirty water runoff from flowing through a culvert into Crystal Lake.*

The rain garden in the photo is planted with a diversity of native plants, a few of which are Prairie Smoke (*Geum triflorum*), Lupine (*Lupinus perennis*), Pale Purple Coneflower (*Echinacea pallida*), Purple Prairie Clover (*Dalea purpurea*), Foxglove Beardtongue (*Penstemon digitalis*), Butterfly Milkweed (*Asclepias tuberosa*), and Cardinal Flower (*Lobelia cardinalis*).

# PERVIOUS SURFACES

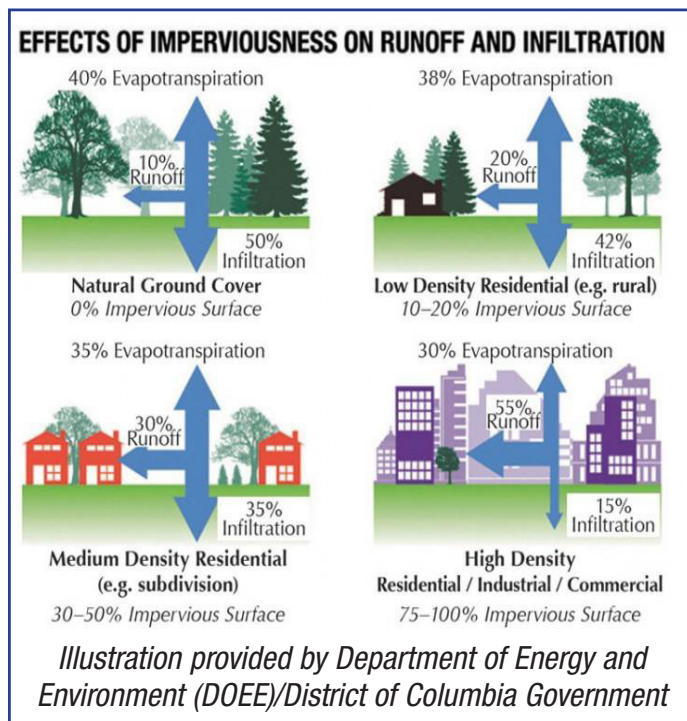
## *Natural Water Treatment Systems*

### Part 5 of a Series

If you're planning on building a new home or just adding a shed, driveway, or patio to your current one, check your local zoning ordinance for limits on impervious surfaces. Many a homeowner has been surprised when their application for a building permit is denied due to restrictions on impervious surfaces. So, what's the problem with impervious surfaces?

Impervious surfaces are land surfaces that repel rainwater or snowmelt and do not permit it to infiltrate the ground. Some natural surfaces can be relatively impervious, for example soil compacted by development can be an impervious surface. However, for the most part this term refers to man-made hard surfaces such as roads, parking lots, driveways, sidewalks and roofs. Adding these surfaces to the landscape will alter the flow of rain water which may then degrade streams and other water bodies.

In a natural watershed with no impervious surfaces, approximately 40% of rainfall and snowmelt will evaporate, 50% will soak into the ground, and only 10% ends up as runoff. Compare this to a high density urban area, where about 30% of rainfall and snowmelt evaporates, only 15% infiltrates the ground, and 55% runs off to the nearest lake, stream, or wetland.



Unlike impervious surfaces, soil and plants are natural water treatment systems which diminish the amount of water runoff and slow its entrance into our waterways. This helps regulate the temperature of the runoff and filters out potential pollutants before rainwater or snowmelt enters our lakes and streams. When rainwater falls on a paved surface like a driveway, much of that water will find its way directly into our lakes and rivers, carrying fertilizers, silt, nutrients, oil and gas residues, and pesticides, herbicides, and other pollutants with it.

The increased volume of runoff caused by impervious surfaces typically increases the velocity of the runoff which can increase erosion. It also makes the area more prone to flooding since larger quantities of water are being dumped into our lakes and rivers instead of soaking into the ground.

Recognizing the adverse impact impervious surfaces have on water quality, many local governments have limited the percentage of a lot's ground surface that may be covered by impervious materials. For example, all of the township zoning ordinances around Crystal Lake limit impervious surface lot coverage to no more than 30% of the entire lot area where that area has little slope; the percentage is less if the area is steeply sloped.

There are many ways to mitigate the effects of impervious surfaces on water quality. One of the most effective ways is to limit the percentage of hard surfaces covering the ground to begin with. For example, attractive alternatives to cement and other hard surfaces are becoming more prevalent. There is a large selection of pervious pavers to choose from that are both attractive and function well in driveways, patios, and walkways. Improving the effectiveness of pervious areas by doing some of the things already discussed in these articles – replacing turf grass with native plants, planting trees, creating buffer zones, and installing rain gardens – will also help mitigate the effect of impervious surfaces on the quality of water in our lakes and streams.

Protecting the health of our watersheds and the quality of water in our lakes and streams should be motivation enough, but if it's not, your local watershed overlay zoning ordinance may provide additional incentive.

# **BUFFER ZONES**

## ***Defending Our Lakes and Streams***

### **Part 6 of a Series**

Do you see slimy stuff on the rocks near your shore? Or a squishier lake bottom in the shallow water than your toes felt years ago? If so, you may be experiencing the effects of the inflow of harmful nutrients from the shore. What causes the increased inflow of nutrients? And how can we stop it?

When the lakes in our region were gouged out by glaciers eleven thousand years or so ago, they were nearly free of organic nutrients. As the sand and rocks wore down, plants took advantage of released minerals and over many years clothed our watershed landscapes with soil and vegetation. The vegetation, in turn, shed materials into our waterbodies in the form of decaying plant parts like leaves and wood. It was these plant parts that slowly released nutrients, or were eaten outright, that formed the basis for a healthy aquatic food web that included fish and their food organisms.

When we remove vegetation from the landscape for dwellings, driveways, decks, patios, and mowed lawns, we not only remove the foundational food required for healthy aquatic plants and animals, we introduce unhealthy, polluting materials into rainwater runoff that degrade aquatic plant and animal habitats, and thus water quality. We also eliminate the cooling capacity of trees and other vegetation so necessary for aquatic life in our region.

If we want to protect our lakes and streams, there are certain areas where we should take extra care to leave the natural landscape and vegetation intact, restore natural vegetation that's been removed, and where we should not build structures.

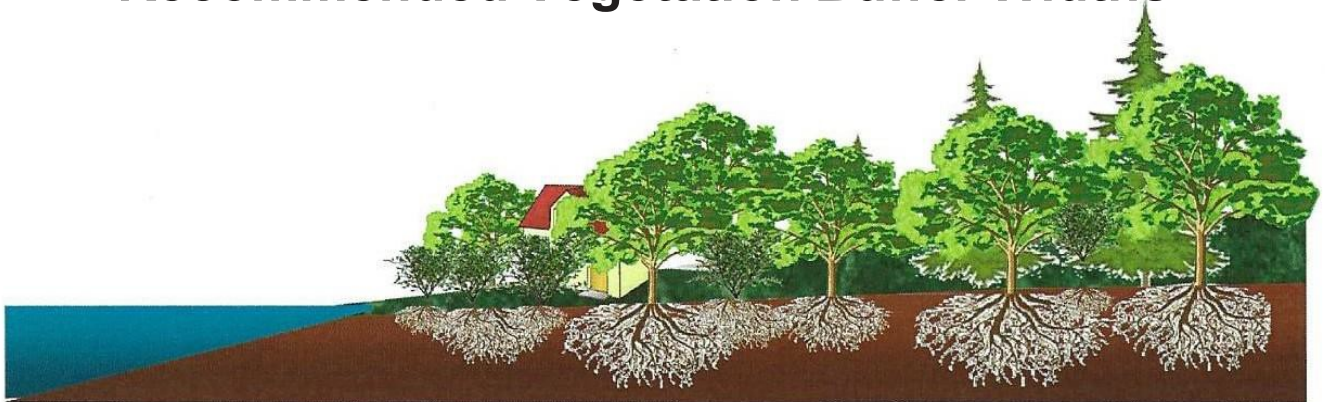
They're the areas adjacent to lakes, streams, wetlands, and hilltop ridges that are called "buffer zones." Maintained with permanent vegetation, buffer zones prevent erosion from rain runoff, filter out silt, and absorb harmful nutrients like phosphorus and nitrogen that come from human habitation. Silt smothers fish food organisms and spawning grounds, and phosphorus and nitrogen promote the growth of undesirable algal species that disrupt a healthy food web. Buffer zones protect a variety of animals, such as birds, that will not flourish elsewhere.

Effective buffer vegetation is comprised of grasses, shrubs, trees, and other plants (preferably native) in any combination. Mowed grass does not function as a buffer: a significant percentage of runoff volume sweeps across a mowed lawn, carrying pollutants with it into the water.

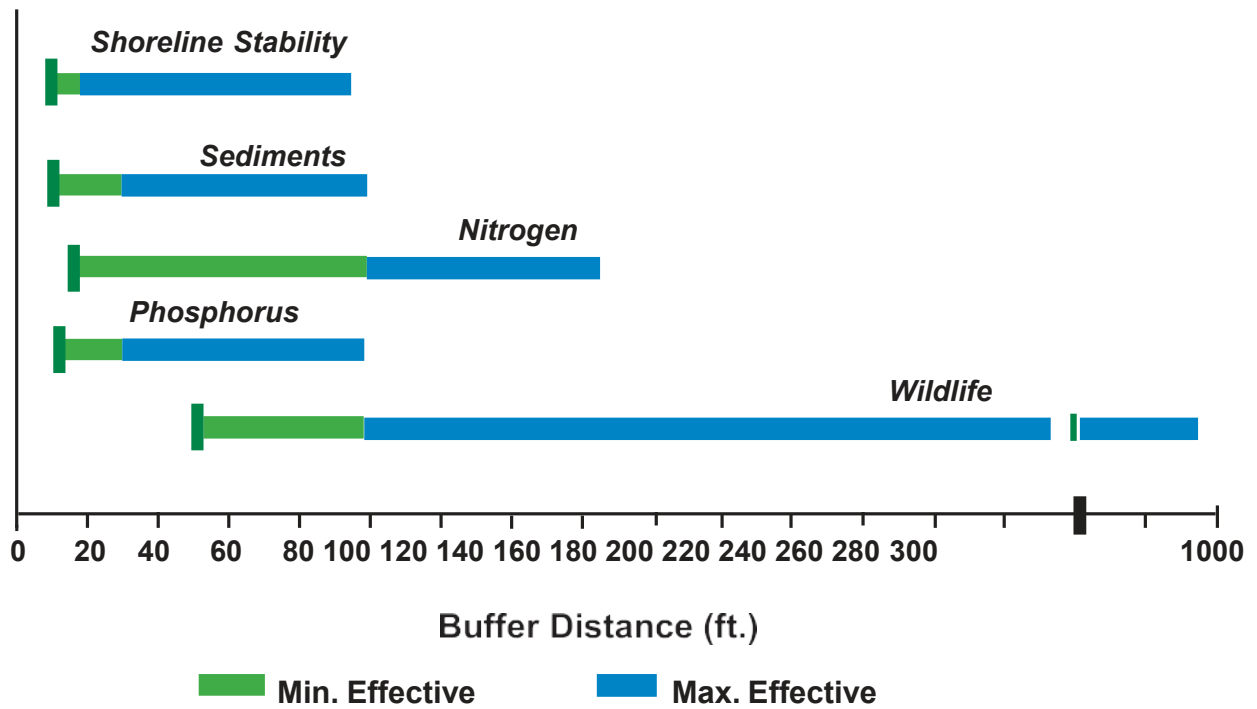
How wide should a buffer zone be? Many local watershed zoning ordinances set a minimum requirement of 35 feet or more for the width of any buffer zones. But the real answer is: as wide as possible. The closer we can come to restoring the vegetation lost in building our dwellings and other structures, the better. Maintaining buffer zones is really mitigation for vegetation removal, and one of the best things we can do to protect our watersheds and their lakes and streams.

See the chart for an idea of how much natural vegetation is necessary for lake and stream protection.

# Recommended Vegetation Buffer Widths



Buffer Distance by Function



# SEPTIC SYSTEMS

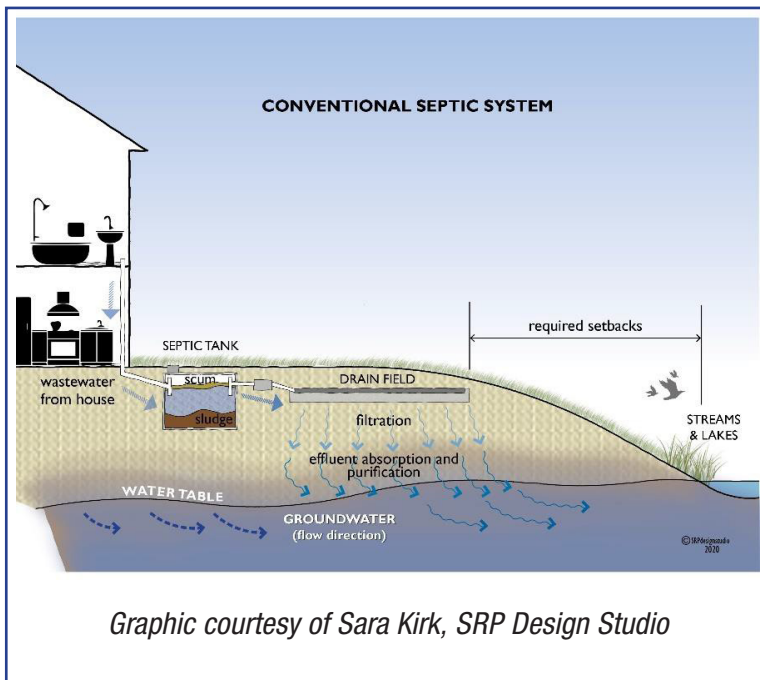
## *Where Does the Flush Go?*

### Part 7 of a Series

This is the last article in the series “Stewardship for a Healthy Watershed.” Instead of gardens and forests, this time we discuss a topic that most of us prefer to keep out of sight: septic systems.

Septic systems are underground wastewater treatment installations commonly used in rural areas without centralized sewer systems. They use a combination of nature and technology to treat wastewater from household plumbing produced by bathrooms, kitchen drains, and laundry. The system is relatively simple, consisting of a drainage pipe, holding tank and a drain field. It is designed solely to clean wastewater before it enters our groundwater, lakes, streams or wetlands.

Wastewater generated in your home exits through the drainage pipe and into the septic tank, then travels through the drain field, through the soil, and finally into our groundwater. The septic tank is a buried, watertight container that holds wastewater for separation and treatment. The solids settle to the bottom (sludge) and fats, oil and grease float to the top (scum). Microorganisms act to break down the sludge and destroy some of the contaminants in the wastewater. Soil-based systems discharge the liquid (known as effluent) from the septic tank into a series of perforated pipes buried in a drainage field or other special units designed to slowly release the effluent into the soil. The effluent then filters down through the soil, eventually entering the groundwater.



If your septic system is too close to a body of water or malfunctioning, the effluent may enter the lake or stream with insufficient filtering, carrying with it contaminants that degrade water quality and promote the growth of undesirable plants and algae. This is why most local governments require a specific horizontal distance (or setback) between a septic system and surface water bodies.

A septic system with a leaking tank or clogged drain field can cause sewage to surface in your yard and be swept into waterways. An improperly functioning system also makes it more likely that contaminated water may seep into groundwater, or into your drinking water if it comes from a well.

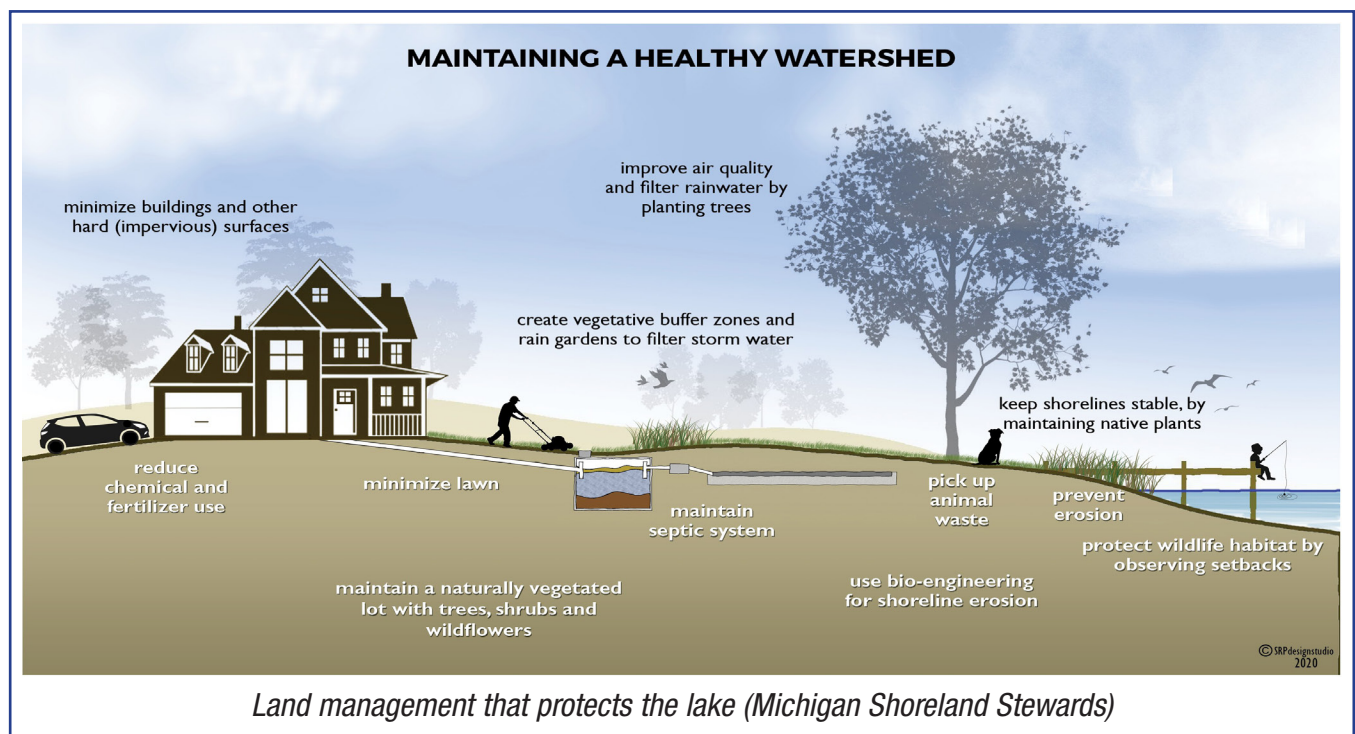
A properly functioning septic system is generally effective at filtering wastewater, eliminating most bacteria, viruses, and some nutrients before it enters our groundwater, lakes, streams, or wetlands.

However, septic systems are not effective at removing things such as medicines, cleaning products, and other potentially harmful chemicals. If your home has a septic system, the U.S. Environmental Protection Agency recommends using household cleaning products that are phosphate-free, throwing out or composting food waste instead of putting it through a garbage disposal, and never flushing medicines, chemical products or insoluble sanitary items down the drain or toilet. You'll be protecting the watershed as well as extending the life of your septic system.

Regularly inspecting your system and pumping your septic tank will minimize the risk of failure. Recommendations on how often your system should be inspected or pumped out vary based on the age of the system, the capacity of the tank and the size of the household it supports. Check with [EPA.gov/septic/how-care-your-septic-system#inspect](https://www.epa.gov/septic/how-care-your-septic-system#inspect) for the most up to date recommendation.

We end this series hoping that readers have a little better understanding of the things they can do to help keep our lakes and streams as clean and beautiful as they are today in the years to come.

For more on what the Crystal Lake & Watershed Association is doing to protect our watershed, see [CrystalLakeWatershed.org](https://www.crystallakewatershed.org).



# **ABOUT THE CRYSTAL LAKE & WATERSHED ASSOCIATION**

Please visit our website to see a schedule of upcoming events,  
the latest news on our current programs and projects,  
detailed information about our organization, and more.

## **Web:**

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