

A Guide to Creating Vegetated Buffers for Lakefront Properties



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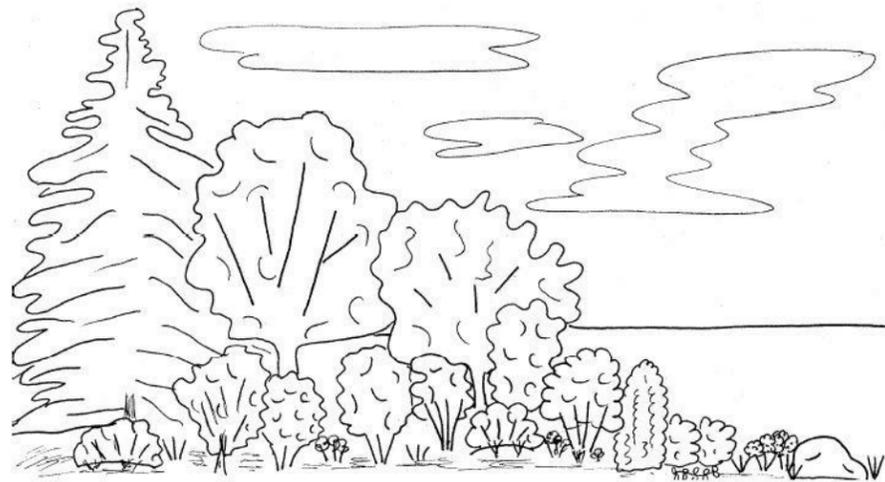
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Introduction

Saratoga County's lakes and streams are among our greatest natural assets. Often, we take for granted the availability of clean waters for fishing, swimming, and escaping from the noise of our daily lives. In fact, as we grow, more and more people are choosing to live on or near the water.

How do population increases in a watershed (Def: finite area of land, draining to a waterbody) put pressure on water quality? As land becomes more developed, trees and shrubs are removed to make room for our homes, businesses, and roads. This causes greater amounts of stormwater runoff. The runoff sweeps the watershed of loose sediment, chemicals and debris, called non-point source pollution, (or *NPS*) and carries the pollution through our wetlands, streams and rivers to our lakes.

Over time, development anywhere within the watershed, whether along a stream or lake, combined with NPS pollution, can have serious effects on the quality of our lakes and streams. Values of shorefront properties are dependent on healthy waters, as are recreational opportunities such as camping, fishing, and boating. Visual signs of NPS pollution include increased weed growth along lake shorelines, reduced water clarity, algal blooms, sediment deltas, and altered wildlife habitats. Since the values of shorefront properties are dependent on healthy waters, it is vital to control NPS pollution.

We, as property owners, can...

- ◆ reduce the effects of polluted runoff,
- ◆ protect the quality of our lakes and streams,
- ◆ and improve property values
- ◆ Increase shoreline and streambank resiliency and resistance to the impact of climate change

...by establishing new buffers or enhancing existing ones!

Buffers, or areas of vegetation situated between the urbanized environment and the water, traps sediment, excess nutrients, and other pollutants, prevents erosion, and helps to stabilize sloped areas and the shoreline.

This handbook will help you get started on planning and planting your shoreline. There are many options for design and plant materials, and we've included information to help you with your planning. Although the primary focus of this handbook is lakefront areas, the same principles apply to all waterfronts throughout a watershed.

What is a Buffer?

Buffers are trees, shrubs, and groundcover that catch sediment and non-point source pollution before they reach the water. Environmental professionals highly recommend creating a vegetative buffer as an effective conservation practice (or Best Management Practice – "BMP") for controlling stormwater pollution and shoreline or streambank erosion.

Lawns alone cannot provide sufficient water quality protection on your shorefront lot. The grasses used in common lawn mixes are shallow-rooted. While they do protect against surface erosion, they do little to trap sediments and absorb pollutants. Lawns are best used as part of an overall landscape design, to provide open space for outdoor activities. To save yourself maintenance time keep lawn areas to a minimum. Avoid use of fertilizers, herbicides, and pesticides; use lime to build a heartier turf. Lime sweetens the soil and makes nutrients available to root systems.



Image courtesy of The FUND for Lake George/Lake George Waterkeeper

The image on the left is a typical lake front cabin with hardly any buffer. The owners are growing a lawn on the space between the cabin and the lake. The image on the right is the same cabin with a buffer strip added. Note the increased privacy!

How do buffers work?

The tree and shrub canopy intercepts raindrops and reduces their impact on the soil.

Leaf surfaces collect rain and allow for evaporation.

Low herbaceous plants and the duff layer filter sediment and pollutants from runoff.

Root systems hold soil in place and absorb water and nutrients.

An uneven soil surface (with hummocks and depressions) allows rain and snowmelt to puddle and soak into the ground (infiltrate).

Conservationists noted long ago that lakes with pristine shorelines suffered few of the water quality problems seen in more developed watersheds. In an ideal world, vegetation along a shoreline would be left undisturbed for distances of 50-250 feet, measured inland from the shoreline, depending on the degree of slope of the terrain. Settlement patterns in many of our lake watersheds are such that houses and camps have traditionally been situated very close to the shoreline, and ideal conditions no longer exist. Properties without vegetation have no barrier against sediments and pollution. Therefore it is very important to create and maintain a buffer strip on your property.

Elements of a good buffer

To be effective, buffers need to be situated between the lake and the developed area of your property. Remember, the purpose of buffers is to slow down runoff so that water and nutrients can filter slowly into the ground.

Buffers should not have straight pathways through them, but winding pathways made of stable, non-erodible material. Straight pathways of bare soil act as channels for pollutants, and are easily eroded. Uneven ground surfaces, with hummocks and depressions, also help to slow down runoff, so that water can filter into the ground. Buffers should be as deep as possible, and span the entire length or width of the developed area you are shielding.

A good buffer should have 3 zones and a variety of plants to maximize the benefit of each type.

Trees. . .whether evergreen or deciduous, break up the impact of rain and wind, provide shade and habitat, and are long-lived. Their deep root systems absorb water and nutrients while holding the land firm.

Shrubs. . .including flowering or non-flowering species, also deflect wind and rain, and are attractive to people and wildlife. Their medium-depth root systems readily absorb water and nutrients.

Groundcovers. . .such as vines, ornamental grasses, flowers and herbs, slow down surface water flow, absorb nutrients and water, and trap sediment and organic debris. Their many forms are attractive, and their shallow root systems hold the soil...

...and the duff layer. The accumulated leaves, pine needles, and other plant matter that collect under trees & shrubs. This layer acts like a sponge, to absorb water, trap sediment, and prevent erosion. Duff is a host to microorganisms that break down plant material and recycle nutrients.



Image courtesy of The FUND for Lake George/Lake George Waterkeeper

Benefits of Buffers

The mixed root systems of tree, shrub, perennials, and groundcovers help to protect the aquatic shoreline environment (the littoral zone).

Reducing overland flow of water helps to prevent siltation of shoreline areas. An overabundance of silts and sediments make the lake bottom mucky, the rocks slippery, and destroys fish spawning areas. Excess sediments from eroded banks and pathways forever alter the shoreline, allowing unwanted plants to take root, further altering the shoreline ecology. Many times, such changes conflict with recreational activities like fishing, swimming and boating.

Buffers protect against noise and enhance privacy for lakefront residents.

Dense plantings of shrubs and trees dampen noise levels from boats and neighborhood traffic. Mixed plantings also furnish an attractive living screen against visual intrusion, and if carefully placed, can actually refine waterfront views. The lower branches of trees can be pruned, framing lakeside views from your home and shoreline.

Buffers can be a deterrent to migratory waterfowl such as Canada geese.

Geese congregate and nest in areas where there is little to no shoreline vegetation. It is thought that this habitat-preference is a predator-avoidance strategy. Having a broad, vegetated buffer from the shoreline into your property/lawn-area will deter their congregation on your property.

Buffers help prevent the spread of invasive species by maintaining a competitive advantage for native species. Restoration provides an opportunity to identify and develop management and control action plans.

Buffers can be designed to provide protection against the effects of wind and sun.

Properly placed vegetation can divert chilling winds and provide shade, allowing the "living space" to remain more comfortable. Groundcover protects bare soil and deflects heat.

Buffers are attractive, long-lived, easily maintained, and can be created at low costs.

Many design options exist for buffers. A little time spent in planning can have big payoffs later in up-keep. Just think -- less lawn to mow! Choose a plan that fits your lifestyle, and remember that you do not have to complete your buffer in one season.

Whether we live at the water's edge, or elsewhere in the watershed, all of us want the lake to be clean when we get there. Vegetation along the shoreline benefits everyone!

Understanding Your House Lot

To get started, you need to make a careful assessment of your property. The physical characteristics of your present landscape will provide you with a framework for your buffer design. Understanding the character of your lot is vital, so that you can put the right plants in the right places. Careful planning will save time and money and yield the desired results.

Site characteristics you must consider:

Location of buildings: As you develop your buffer design, take into account the size of your lot and how the buildings and driveway are laid out. If your lot is small or your buildings are set close to the water's edge, you may not be able to have a 100- or even a 75-foot buffer, but any buffer is better than none at all. Today, as a result of many studies, we understand that building close to a lake or stream significantly increases the pollution load going into the lake. Buffers help reduce this pollution load. Since the objective of the buffer is to prevent erosion and filter pollutants, planting buffers above your home or below the road will also help. The goal is always to prevent erosion and intercept water flow before it reaches the lake.

Soil types and condition: It's very important to understand your site's soil type(s), since good soil is the foundation for healthy plants. There must be a good match between the soil and the plants chosen for the buffer. Soil types vary from place to place. For example, one section may be low and remain wet throughout much of the growing season, while another area may be sandy, rocky, shallow, or dry. Look at the plants that are growing there now, or in similar conditions off-site; they will give you good clues about the soil conditions. If you are planning to purchase material for your buffer, keep these varying conditions in mind. Soils with little organic matter -- often found in densely developed areas -- can be improved with the addition of compost and lime. Additional information on how to assess your soil for plant needs is available through the Cornell Cooperative Extension Master Gardener's Office.

Degree of slope: ... or more simply put, is your lot steep or flat? Runoff moves more rapidly over steeper areas making them more sensitive to erosion and will require a variety of plant types for permanent stabilization. If your house or camp is located on a hillside, try to develop as deep a buffer as possible in order to absorb runoff from roofs, driveways, and outbuildings.

Exposure: Is your property located on a north-facing slope, and therefore subject to cooler temperatures and higher winds? Does it face south, with elevated temperatures or little air movement? Is your site partially protected by a hill? Does it jut out on a point

of land? Taking note of exposure will help you select the appropriate plants and create a design that can provide shade on hot days or protection from high winds.

Sunlight: How much sunlight does your buffer site receive? Watch the shadows caused by trees and buildings as the sun moves across the sky, noting areas of deep shade or those that are in full sunlight. This information will also help you choose appropriate plants.

Plant zones: Using plants that are hardy in your temperature zone is important. Generally, the plants selected should be best suited for zones 4b to 5b. If you suspect you are in a marginal area, generally select plants for the cooler zone (4b). Plants from a warmer zone may do well in protected areas of your property, but check with a reputable local nursery, landscaping business, or the Cornell Cooperative Extension Master Gardener for advice. If you have questions about plant materials not covered in this handbook, those same experts can provide answers.

- 💧 *Don't let runoff reach a lake or stream before it is filtered – the deeper the layer of protection, the better the water quality.*
- 💧 *Don't be discouraged if you have a small area to work with.*
- 💧 *Any buffer is better than none at all!*

Other Conservation Practices

Best Management Practices (or *BMPs*) can help you to stabilize areas of minor to moderate erosion on your property and complement the performance of a buffer in controlling runoff. Many practices actually decrease property maintenance costs. Contact the Soil & Water Conservation District for help in identifying those areas which may need some structural attention. A short list of simple BMPs is given below. For information on how to install these practices, call the Saratoga County Soil & Water Conservation District.

Rock-lined drip edges beneath the roof edge drip line (the eaves), are very helpful in controlling erosion. They also lengthen the life of a building's wood finishes by protecting the walls from splash. A trench dug 6-8" in depth is then filled with 3/4-inch stone. This will allow rainwater to collect and slowly dissipate. In areas of clay or heavily-compacted soils, a 2" lining of sand is recommended before stone is added. Use of a stone-lined drip edge behind foundation plantings will also help prevent damage to plants from roof runoff occurring during heavy rains and ice and snow melt.

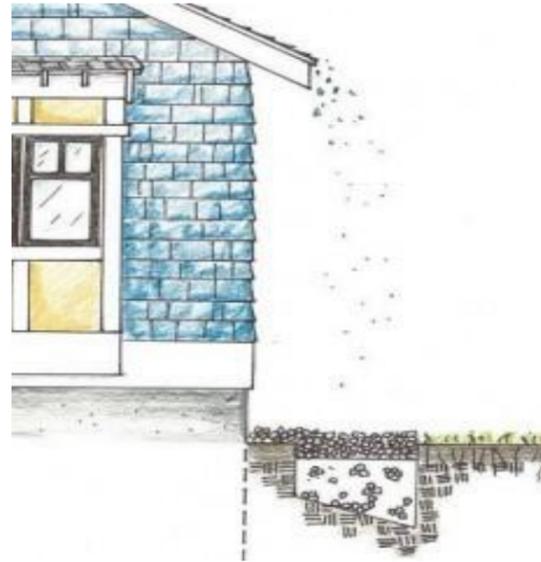


Image courtesy of the New Hampshire DES
Soak Up the Rain Program

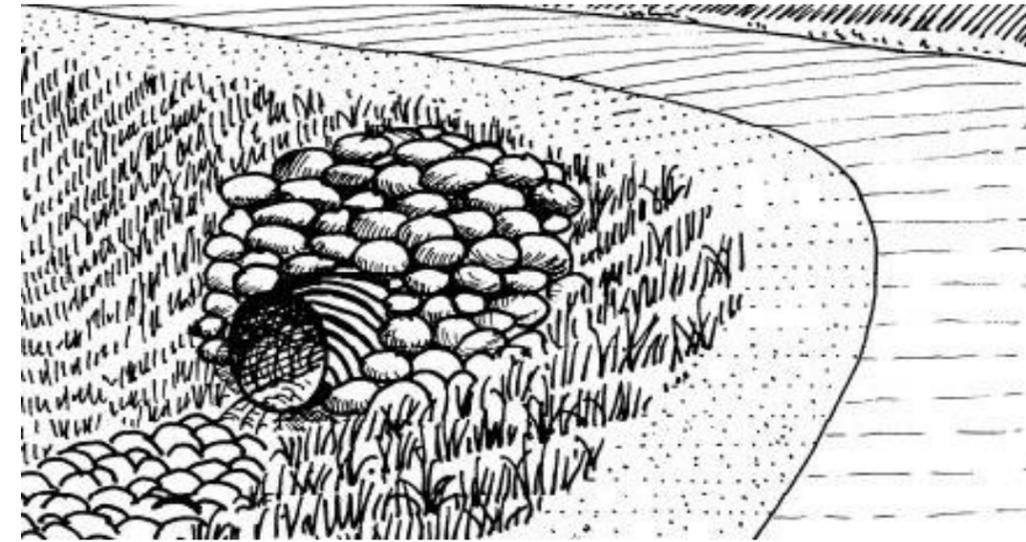


Image courtesy of Maine Department of Environmental Protection

Designing the Buffer

You have several options when designing a buffer.

Look carefully at:

Your lot -- bear in mind the site characteristics (see p. 9).

The developed areas you are treating -- include your house and driveway, camp road or public way, pathway to the lake, boathouse, etc.

Your budget -- both for time (how much on-going maintenance do you want to do?) and financial constraints.

Consider:

- *Traffic patterns in your yard* -- Do you wish to direct pedestrian traffic or limit access to the water? Deter wandering pets?
- *Pathways to the shoreline* -- Do you have separate swimming and boating areas?
- *Desire for privacy* -- Do you wish to be shielded from the road? From neighboring lots? From recreationists on the water?
- *Aesthetics* -- Do you like to garden? Wish to improve the looks and value of your lot?

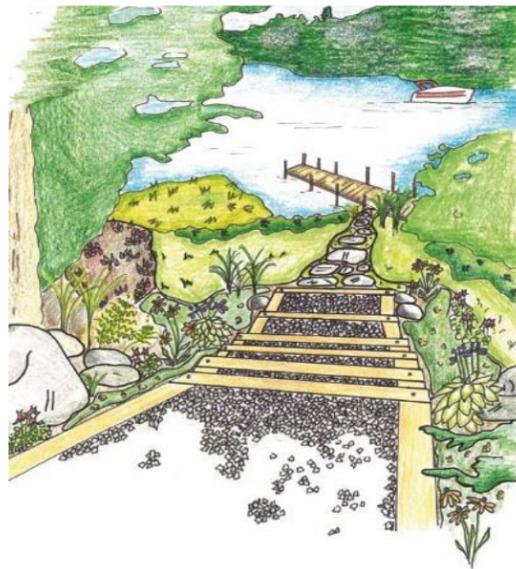


Image courtesy of the New Hampshire DES
Soak Up the Rain Program

Stabilized pathways can be accomplished in a number of ways. The simplest method is to cover the pathway with a 2-inch layer of bark mulch or wood chips. This will have to be renewed periodically, as the material decomposes -- about once every couple of years. Other options include seeding the pathway with an appropriate grass mix; setting paving stones, bricks, cement tiles, or slate in a matrix of mulch, wood chips, or crushed stone; or by creating a boardwalk. Remember that winding pathways are preferred so that moving water is less likely to create channels.

Inlet and outlet protection for culverts: To ensure culvert stability and to prevent erosion, the use of stone for headwall protection is strongly recommended. Larger flat rocks are placed on top and to the side of the pipe, and smaller rocks are used to fill in open spaces. Where there is a drop of 6" or more between the base of the culvert and the bottom of the ditch, additional stone should be added to create a small apron. These practices will greatly lengthen the life of a culvert, and will decrease the frequency of maintenance.

- *Recreation* -- Do you need a play area? Have family barbecues? Enjoy bird watching?
- *Effects* of wind and weather -- Would you like to have a recreation area sheltered from wind or the hot sun?
- *Habitat* -- Is there a species of animal you are fond of and would like to favor them?

Often folks feel that once a buffer is in place, they will lose control of their access to the water – both physical and visual. Not so! Traffic can be directed by the use of appropriately placed shrubs and trees, which can be trimmed so that views of the water are preserved. Trees and shrubs that are pruned in an “open” manner also allow for better air circulation.

Then decide whether you wish to have. . .

. . .a natural buffer. . .

an enhanced buffer. . .

. . .or a landscaped buffer.

A natural buffer is the simplest and least expensive of the three options. To develop this requires only a decision on your part about the size of the vegetated strip you wish to have, a commitment to stop mowing the area, and the patience to allow plant material to become established and grow. Plants establish themselves in succession, and it will probably be several years before shrubs and trees become rooted and thrive. Advantages of this option are that the native plants that *do* become established are tough and resilient and a natural part of the lake ecosystem -- and you've invested no personal funds.

To develop an enhanced buffer, add to what is already there, or plant a few desirable things and let the rest of the area revert around them. For instance, if you have a number of trees on your lot, in relatively close proximity to the shoreline, you can fill in the spaces between them with shrubs, herbaceous plants, and groundcovers. Following this option generally means it will take fewer years to get the buffer fully established, and will require only a moderate commitment of time and money on your part. Advantages of this option

are that you will have more choices in the plants that you want to have as a part of your landscape, and you will have a head start on getting the buffer in place.

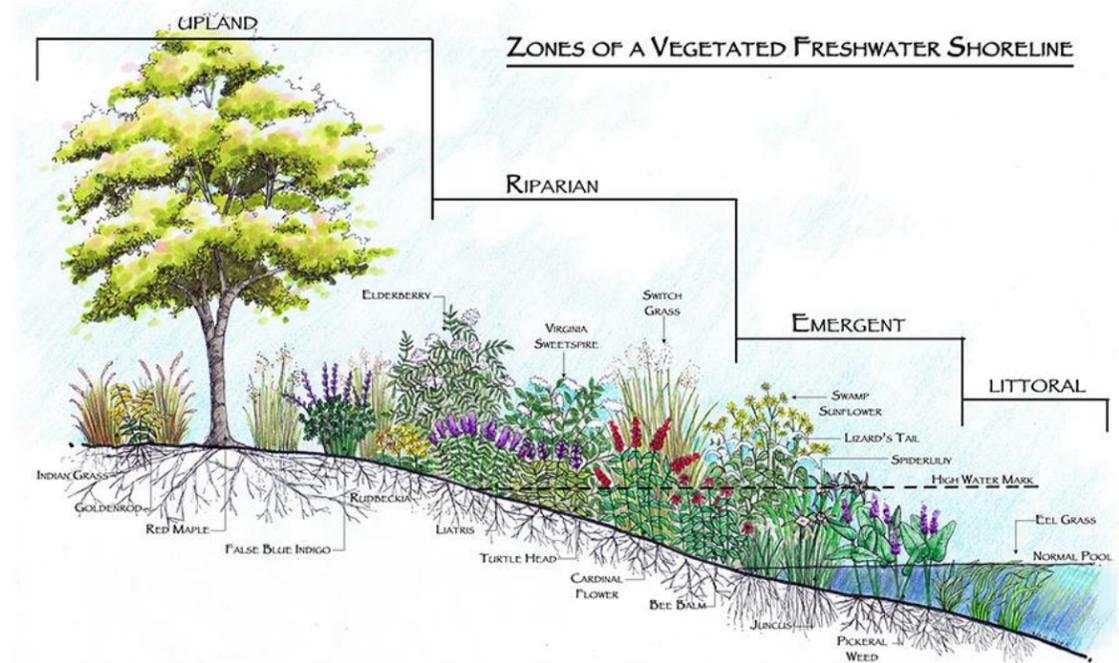


Image courtesy of Renee Byrd, Clemson Cooperative Extension

Choosing a landscaped buffer generally means that it will take a lot less time to establish a protective strip, but will require a more concentrated effort and generally more money. You can spread out your planting over several seasons or several years; an example might be to plant trees the first year, followed by shrubs, and groundcover the second year. This way, you will have absolute control over the design.

Or, combine the options to accommodate your needs as well as those of the buffer strip. For example, abandon mowing along the immediate shoreline, and install a landscaped design to the landward side of that strip for you and your family to enjoy. Whichever option you choose, try to visualize what you want the buffer to look like in five, ten, or more years.

Choose plant material appropriate for your plan. Don't, for instance, plant trees that grow tall naturally and then try to prune them heavily, instead, opt for a tall shrub.

Make use of hardy species that require little maintenance, and no fertilizers.

If you are purchasing plants, deal with a reputable, local firm that can help you select the healthiest plant material available, and who can answer questions on planting considerations.

Using Native Plants in Vegetated Buffers

Native plants are defined as those that were observed in the natural landscape at the time of contact between Europeans and indigenous peoples (about 1450 A.D.). Use of native plants in landscaping, particularly in vegetated buffers, are of value for the following reasons:

*The plants are **appropriate for our regional climate**. They have adapted to this area over time; therefore, there is less maintenance required for these plants.*

*Native plants **have significant wildlife value**, as they are used by many birds and animals for food sources, and for breeding habitat.*

*Use of native plant materials allows us to **celebrate our regional differences**.*

***There are many beautiful native plants**. Many local nurseries carry such material, and can provide specific recommendations for appropriate siting.*

-From a presentation given by Jeff Horton, Shaker Hill Nursery, Poland, ME

Planting Your Buffer

Before you start work on your project, you will have to decide whether to create beds or add point plantings. There are advantages and disadvantages to both methods.

Utilizing point plantings means that you install individual plants at specific locations. The grass around the new plants can be mowed until the plants are large enough to shade out surrounding grasses, or the grasses can be left to grow up. Either way is okay for the plants, but this is a question of aesthetics and time-management. Choose a maintenance program that you can live with.

Developing a buffer strip by digging beds requires more up-front work. This method involves removing sod from the entire area you are going to plant and replacing it with plants and additional soil. Once all plants are in place, the whole bed should be mulched with at least four inches of well-rotted bark, mulch or compost. The mulch will absorb moisture, discourage weeds, and eventually decompose into the foundation of the duff layer.

Remember to keep new plants watered throughout their *first and second* seasons. Once the root systems are well-established, the plants can survive with little attention, except in times of extreme drought. Give them a little "TLC" to get them started.

If the soil in your area is lacking in organic matter, is clayey, or is heavily-compacted, you will want to add compost to your plantings for the first few years in order to build a healthy soil. Keep in mind that a healthy soil supports small organisms that help to break down nutrients and pollutants for uptake by plants.

Mulching your buffer plants

In undisturbed wooded areas, a natural duff layer builds up over time. Duff is an important part of the ecosystem for a number of reasons. Plant waste (fallen leaves and branches) decompose over time and provide a natural fertilizer for living plants -- this is nature's way of recycling nutrients. Duff also holds quantities of water in reserve, by soaking up runoff and allowing the moisture to be slowly absorbed by plants and underlying soils.

Mulch, such as composted wood fiber or composted yard wastes, mimics natural systems. Newly-planted shrubs and perennials (or herbaceous plants) will benefit from this added layer of protection. Mulch protects areas of bare soil and will also deter unwanted "weeds" in the more formally-designed buffer systems. Be sure to use mulch that has been composted for six months to a year so that nutrients are not leached from the soil. Use about four inches of the material around plants and on any area of bare soil. Remember though, to give plants about an inch of "breathing room" around their bases so that the plants aren't smothered. After planting, allow leaves and evergreen needles to accumulate.

Use of fertilizer and pesticides

One of the most important roles of buffers is the uptake of excess nutrients; in lake watersheds, phosphorus is the nutrient of greatest concern. When planting your buffer, choose species that will not require constant feeding and are naturally resistant to insects and disease. Keep air circulation open to avoid fungal diseases. If plants still appear sick, remove and destroy them to prevent spread of the disease among adjacent plants.

If you really feel that you must use a fertilizer, use it sparingly! Apply a liquid that will immediately soak in and will not sit on the surface to be washed into the water by heavy rains.

Be stingy -- apply fertilizer only during the growing season so that it is taken up immediately. If you must spray for pests or disease, start treatments with the most benign method of control possible, such as baking soda combined with water and a small amount of horticultural oil or a non-phosphate dish soap and water. Use pesticides as a last resort; they are harmful to aquatic life and beneficial insects. Selecting plants that will attract a variety of birds provides the added benefit of an effective means of bug control. Information on safe means of pest and disease control is available from Saratoga County Cornell Cooperative Extension, from organic gardening references, and from many reputable nurseries.

Improving soil health

Where soils have been highly disturbed as a result of construction, or have become heavily compacted as a result of years of foot traffic, it is recommended that well-rotted compost be added when plants are introduced. Mulch plants well and water thoroughly until the plants are established. Most shrubs, once established, are actually best left to fend for themselves. Remember that phosphorus and nitrogen will be supplied by runoff, and will be recycled from fallen plant wastes.

Soil pH testing can help determine how much of your soil's nutrients your plants are able to use. Soil pH is the measurement of the degree of acidity (sourness) or alkalinity (sweetness) of soil. It is measured on a scale of 0 to 14, with lower numbers indicating more acidic and higher numbers more alkaline. The value of 7.0 is neutral—i.e., neither acidic nor alkaline. When pH levels are too high or too low, minerals are bound to soil particles and thus, unavailable to the plants. In general, most plants grow best in a neutral soil pH, although there are important exceptions. For example, blueberries, azaleas and rhododendrons do well in soil pH between 4.5 and 5.5. Lawns favor a pH of 5.5 to 6, while roses do best in soils with a pH of 6.5 to 7.

Adding lime to raise the soil pH can help deter the spread of many weeds. Additional information on soils types, testing, and how to amend the soil is available through the Cornell Cooperative Extension Master Gardener's Office.

Hand digging weeds is another "environmentally friendly" way of controlling unwanted species. Set your lawn mower high enough so that grass length is two to three inches or more. If you don't use a mulching mower and need to rake the lawn, save those clippings for your compost pile!

Work to improve soil health. Compost and mulch will help to provide a beneficial environment for soil organisms and will also help to make the soil more absorbent because of the addition of organic matter. **Providing a healthy soil for your plants will help to keep pests to a minimum.**

Summary

Planting a vegetated buffer between your house and the lake or stream is one very positive step you can take to protect water quality.

The steps you follow to get started are these:

(1) Survey your property for storm water runoff, preferably following a rainstorm. The Soil & Water Conservation District can help you to identify some of the areas of erosion that exist on site. Take notes.

Tools: survey brochure, pencil, notepad.



Image courtesy of CCE Onondaga County
Sample sketch plan of a housing lot.

(2) Develop a sketch plan of your lot; it is useful in organizing your work. It is helpful to make the drawing to scale if you can manage it. Include features such as your house, outbuildings, driveway, boat launch, utility and recreation areas, swimming access points, and pathways. Also include landscape and topographic details such as areas of slope, existing vegetation, stone walls, ledge outcrops, and wet and dry areas. Make note of your lot's orientation (N-S-E-W) as well as where shadows are cast by buildings.

Tools: graph or drawing paper, pencil, tape measure, ruler, compass, and photographs of your property if you have them.

(3) List your objectives for the project. Examples might be: adding vegetation near the shoreline, stabilizing pathways, directing traffic to a single access point for swimming, catching runoff from roofs and driveways, and the level of maintenance you are willing to perform once the buffer has been established. Make a realistic estimate of your time frame and budget for project completion. If you are unsure or need advice on species, design, and up-keep contact the Master Gardener's office or a reputable Commercial nursery.

(4) Implement your plan! The work you do now will prevent erosion, increase water quality, and enhance the value of your property

The most important decision to make about your buffer is when to get started. A good design and action plan are vital for sustainability, but do not delay your project. Vegetated buffer strips are a proven means of controlling erosion and other sources of non-point source pollution. Help to protect the water quality of your favorite lake or stream by starting your vegetated buffer project as soon as possible. Your efforts are an investment in the future...for you and the generations to follow!

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*References for plant materials will be found in the [Plant List](#).