

## The Importance of Healthy Shorelines

Healthy shorelines are vital to maintaining the overall health of lakes and other bodies of water. Shorelines help filter pollutants, protect against erosion and provide habitat for fish and other forms of wildlife.

Shorelines are some of the most ecologically productive places on Earth. They support plants, microorganisms, insects, amphibians, birds, mammals and fish. The first 10-15 metres of land that surround lakes and rivers is responsible for 90% of lake life which are born, raised and fed in these areas. In addition, these areas are up to 500% more diverse than other areas upland from lakes and rivers.

## The Functions of a Healthy Shoreline

### 1. Help Maintain Clean Water/Water Quality

The shoreline vegetation that is present on your property is vital in retaining, treating, and filtering surface runoff before it can reach the water. Runoff can contain pollutants such as fertilizers, pesticides, sediment, manure, pet feces, trash, motor fluids (oil, grease, gas), and road salt. These various pollutants have negative effects on our waterways with nutrients acting as fertilizers and stimulating algae and plant growth; pathogens can contaminate your drinking water and sediment impacts fish habitat and nursery areas.

### 2. Prevent Soil Erosion

Shoreline vegetation and plants help keep soil in place with their underground root systems and prevent topsoil from being exposed and washed away.

### 3. Reduce Impacts of Flooding

Well-vegetated shorelines provide barriers against moving water by slowing the movement of water downstream, and by reducing the force, height, and volume of floodwaters. This allows them to spread out horizontally across the floodplain therefore reducing the potential of damage to your property.

### 4. Provide Wildlife with Food and Habitat

As mentioned above, shorelines are vital to many different animals throughout their development and life. Shorelines protect wildlife from weather and predators; woody debris, such as tree trunks or roots in the water provide cover for fish to hide, basking areas for turtles, and resting sites for waterfowl.

## Shoreline Ecosystems – What You Should Know

Within a shoreline there are three overlapping, but distinct zones that contribute to the overall health of a property.

### 1. Upland Zone

Generally, higher and drier ground which will be home to various trees and shrubs along with animals that prefer shoreline habitat. This area, depending on when your home or cottage was built is often the zone where the residence is located.

### 2. Riparian Zone

This zone is the transitional area between dry land and water. Here you will find a wide variety of plants and wildlife species because of the presence of water which provides these organisms with food and excellent shelter. The vegetation in this area of your property is responsible for helping with the reduction of runoff, soil erosion and shades and cools shallow water.

### 3. Littoral Zone

The littoral zone extends from the water's edge to the area in the lake where sunlight no longer penetrates and is home to organisms such as algae and aquatic plants, as well as aquatic organisms such as fish, amphibians and waterfowl.

### **Common Signs of a Healthy Shoreline**

- Lots of native vegetation
- Different levels of vegetation
- Dead snags and stones
- Birds, fish and other wildlife are present

### **Unhealthy Shorelines**

An unhealthy shoreline can result in accelerated runoff and an increase in erosion and the amount of nutrients entering the water, particularly nitrates and phosphates. Large amounts of these nutrients are harmful to aquatic environments triggering a process known as cultural eutrophication. Cultural eutrophication works as follows:

1. Large nitrate and phosphate supplies stimulate massive algae blooms. The result is algae so thick that it competes with other plankton species and blocks light to bottom-dwelling plants.
2. As the algae blooms die, the bacteria that break it down multiply and consume large amounts of oxygen in the water body.
3. Without oxygen the remaining animal species die off (sometimes spectacularly – for this reason, some newly eutrophic lakes have many floating fish carcasses).
4. The final result is a water body that is polluted, impoverished, and capable of supporting very few types of plants and animals.

### **Common Signs of an Unhealthy Shoreline**

- An area has been cleared of all or most vegetation
- Lawn that extended right to the water's edge
- The natural shoreline has been replaced by a hardened structure such as a breakwall or gabion baskets
- Problems such as shoreline erosion and poor water quality are visible
- Algae blooms and excessive weed growth are prominent

## Erosion

Shoreline erosion is a common and natural process that many waterfront properties encounter. There are various causes for shoreline erosion that all have the same outcome: a loss of valuable waterfront property that can result in unsafe shorelines and a deterioration of the natural shoreline environment.

The process of erosion is natural, but occurs at a very slow rate, for the most part, the rate of erosion is much slower than we would ever notice. Lakes naturally accumulate sediment at an average rate of about 1mm/yr. With the use of waterfront at cottages and homes this rate is sometimes dramatically increased and is harmful to your property and the waterbody.

By taking preventative measures you can help prevent or control erosion on your property, helping to create and maintain a strong and healthy shoreline.

### Natural Causes of Erosion

- **Wind** – Wind can pick up loose soil particles that have been exposed after the removal of vegetation and blow them away
- **Ice** – As ice shifts and expands over a watercourse, it can displace shoreline soil
- **Water** – Wave energy, currents, fluctuating water levels and runoff can wash away soil along the shoreline; runoff is defined as rain and melted snow that runs along the surface of the ground
- **Gravity** – It can move loose soils down a slope or pull them through sink holes

### Human Disturbances

In addition to natural erosion, there are a number of different human disturbances that can greatly accelerate the rate of shoreline erosion. Some of these activities are as follows:

- **Removal of Shoreline Vegetation** – Plants and other vegetation have roots which grip the soil while the plants themselves protect the soil from erosive forces such as the wind, rain and waves
- **Runoff** – When the vegetation of a shoreline is replaced by a hard surface like patio stones, or pavement; water flows along these surfaces as opposed to soaking into the ground
- **Boat Wake** – Motorized watercraft create waves which wash onto the shoreline and eat away at the soil bit by bit
- **Construction** – Construction along or near the shoreline can be a large contributor to erosion if the proper precautions aren't taken; cleared lots and freshly exposed soil are very susceptible to erosion
- **Foot Traffic** – When you travel the same routes on your property to access an area, the vegetation ends up trampled and creates areas of bare soil. If the soil isn't covered up by gravel, mulch or wood chips it becomes very susceptible to wind, rain and other causes of erosion
- **Shoreline Alterations** – Alterations to a watercourse can cause significant erosion problems; when vegetation along the shoreline is replaced by hard structures such as break walls, wave energy is no longer absorbed and the wave energy is deflected onto neighbouring shorelines where it can cause erosion

## Impacts of Erosion

Sediments are considered a pollutant when excessive levels occur due to human activities; by volume it is the greatest water pollutant in North America. Most of this comes from overland erosion, but some of this comes from shoreline erosion and has these negative effects on your property:

- **Loss of Property** – Gradually the shoreline of your property can erode into the water
- **Unsafe Areas** – Erosion can cause or aggravate unstable slopes
- **Loss of Habitat for Wildlife** – With the loss of vegetation along the shoreline there is also a loss of habitat and food sources for shoreline creatures
- **Change Characteristics of Water Bottom** – As soil erodes into a waterbody, the water bottom becomes covered in a layer of soft sediment
- **Reduces Water Clarity** – Erosion impacts water clarity since water becomes cloudy when soil washes into it; this means that less light penetrates the water and the aquatic plants end up with less than ideal growing conditions
- **Increases Water Temperature** – Water from overland runoff picks up a significant amount of heat which subsequently raises the temperature of any waterbody it flows into
- **Chemicals** – Soil that erodes into the water often has harmful chemicals or heavy metals bound to it
- **Increased Nutrient Input** – Soil particles often have chemically bound nutrients attached to them and once suspended in water, the chemical bond is broken and the nutrient becomes available for uptake by algae and rooted aquatic plants
- **Stresses Fish and Wildlife Problems** – Turbid water may hinder the ability of fish to catch prey by reducing their sight, thereby lowering feeding rates and slowing growth

## Signs of Erosion

Here are some signs to watch for to determine whether erosion is occurring on your property:

- **Exposed Soil** – Large areas of exposed soil, especially on steep slopes and high banks, are vulnerable to rill and sheet erosion
- **Rills and Gullies** – Rills and gullies are narrow channels carved by overland runoff
- **Slumping, Undercut Banks** – Undercut and slumping banks show that soil is being washed away by water movement (wave action or energy from currents)
- **Cloudy Water** – Extremely cloudy or turbid water can also be an indicator of excess sediment entering the water
- **Receding Shorelines** – The recessions of shorelines are evidence of soil erosion. This is more obvious to landowners on their own properties where they can see the shoreline receding past familiar landmarks
- **Leaning or Downed Trees, and Exposed Roots** – Trees along the shoreline do fall naturally as a result of storm winds and decay. But sometimes healthy trees will fall along the shoreline because there is not enough soil for their roots. In these cases, the entire tree can lean or fall over, exposing its root mass

## **How to Prevent Erosion**

Erosion is a complex problem that can occur because of a number or combination of factors that are listed throughout this report. When trying to protect and prevent erosion on your property there are a number of steps and activities that you can take:

### **Protect the Natural Shoreline**

The best insurance policy against erosion is to keep the natural characteristics of the shoreline intact. This means keeping lots of vegetation, keeping a good buffer strip (no mowing up to the water's edge), and leaving in place all of the stones, boulders, snags and dead branches that are found along the shoreline. These materials combine to absorb the energy from erosive forces and keep the shoreline glued together.

### **Reduce Runoff**

A good way to prevent erosion is by encouraging rainwater to filter through the soil rather than traveling over it. When rainwater travels over the ground, it can wash the soil away. To encourage rain water to infiltrate the soil you can minimize the amount of paved or hard surfaces on their property (i.e. driveways, decks, patios). Runoff from the driveway can be directed into a settling area, and runoff from the roof should go into a rain barrel or soaking area. This will help maintain the natural, gradual water renewal process rather than allowing large volumes of water to enter the river or lake at one time.

### **Minimize the Wake from Boats (and Other Motorized Watercraft)**

Boat wakes not only erode the shoreline, they can disturb aquatic ecosystems, swamp the nests of loons and other waterfowl, damage docks and boats, upset canoes and small boats and create danger to swimmers. The best way to reduce the effects of boat wash and wake on shorelines is simply to slow down. In Ontario, by law, boats must slow down to 10km/hr within 30m of shore. If the boat doesn't have a speedometer, remember that at 10km/hr there will be little or no wake.

### **Take Precautions during Construction**

If you are starting a new building project on your property, plan to control erosion and to keep the disturbed area as small as possible. You can ask your contractor to be aware of potential erosion and provide them with a copy of the protection plans. Strongly recommend the use of erosion control equipment such as filter cloths, hay bales, and silt fences. Fill piles should be covered with tarps to prevent soil from being carried away by runoff. If possible, construction should be avoided during wet seasons as the softer soil will be more prone to damage by heavy equipment.

### **Limit Impacts of Foot Traffic**

Foot traffic can trample vegetation – especially on steep slopes – cause soils to loosen and fall away from the shore. Depending on the degree of the problem, you may want to omit access entirely to that portion of the shoreline or simply control the access. Barricades like fences, hedges, or brush can prevent access to certain areas, while the use of terraces, boardwalks, or stairs can help control access and reduce the impact.

### **Contour & Cover Pathways**

Pathways that extend from a building to the water's edge generally tend to take the shortest route to the water, which is often a direct downward route. This encourages erosion, since the gravity can pull soils and runoff straight down the path toward the water. A better option is to position (or if necessary,

re-route) pathways to follow the contours of the slope from the building to the water, meaning they follow an 'S' curve pattern. Any exposed soil on pathways and heavy traffic areas should be covered up. Mulched wood chips, straw, and pine needles make good material for covering up bare patches. This prevents the soil from being blown away or being washed away by rain.

## **Dealing with Erosion**

If there is, or you believe, that there is some erosion of your property there are several steps that you can take to help determine what is the best course of action to deal with this problem.

- 1. Identify Areas of Erosion**

Examine your property to see if there are areas of erosion

- 2. Identify the Cause**

It is crucial to try and identify the cause of the problem – trying to fix an erosion problem may be a waste if the cause of the problem is not dealt with – take a look around your property and see if there are any of the factors mentioned earlier that could be causing the erosion of your property. This may also include looking beyond your property, consider the natural forces and human disturbances that were discussed earlier when identifying the cause of the problem and remember that it could be a combination of factors that is causing your problem

- 3. The Type of Erosion**

The type of erosion that is occurring may provide you with clues as to the source of the problem and effective solution

- 4. The Extent of the Problem**

The extent of the problem will also help you to determine the best course of action

- 5. Site Conditions**

There are certain site conditions such as slope and water movement that have a great influence on what will work and what won't work to stop erosion; situations with steep slopes and aggressive water movement will require more aggressive control measures; sites that are environmentally sensitive require extra consideration and care during project work

## **Control Methods**

There are many methods that can be used to control soil erosion. Some are more effective than others depending on the situation. Sometimes the best course of action is to use a combination of these methods. Basically there are three erosion control methods to consider.

- 1. Allow natural vegetation to grow (the 'buffer' technique)**
- 2. Apply soil bioengineering technique**
- 3. Use hard structural controls**

### **Natural Buffers**

Allowing natural vegetation to grow along upland slopes and shorelines is a great way to control soil erosion and is the number one best defense against most erosion problems. As mentioned earlier vegetation grips the soil with its roots and keeps soil from blowing or falling away.

### **Soil Bioengineering**

In areas where the erosion problem requires a more active approach, a control measure that can be used is soil bioengineering. This approach uses erosion control structure that usually constructed with living plant material which eventually takes root. Soil bioengineering works immediately to control erosion and becomes more effective over time as plants take root.

Soil bioengineering often uses native plants collected/purchased within the immediate area of a project site. This ensures that the plant material will be well adapted to site conditions and have better growing success. While a few selected species may be installed for immediate protection, the ultimate goal is for the natural invasion of a diverse plant community to stabilize the site through development of a vegetative cover and a reinforcing root matrix. Plants that are most often used in soil bioengineering are willow species, dogwood species, and other plants with extensive root systems.

### **Bioengineering Techniques for Above Water**

**Live Staking** – Willows, dogwoods, viburnums, and poplars can be established with cuttings taken from new growth. The minimum size for cuttings should be at least a foot long and a half-inch in diameter. Bigger cuttings will work very well; the extra height gives them an advantage over competing plant species.

**Fascines** – Fascines are made out of live plant material and are sometimes referred to as wattles or bundles. Fascines are bundles of branch cuttings tied together in a roll. Once they are placed along the ground the cuttings will begin to root and take hold of the soil.

**Brush Layers** – Brush layers are similar to fascines in that cuttings are used and trenches are dug. However, instead of tying the cuttings together, they are placed loose in the trench with the bottom end pointed into the ground and the top (the growing end) sticking out of the trench.

**Brush Mattresses** – Brush mattresses are used to cover large open soil areas. With a secure, firmly anchored base (toe), they can withstand considerable waves or current energy. The shoreline armouring effects of brush mattresses make them the natural equivalent to riprap.

### **Maintenance of Bioengineering Structures**

In the case of all of these living structures, the brush or live cuttings should start to root within 6 weeks. The first year of growth is a very critical time. The vegetation is just getting established and is subject to many different stresses. The soil should be kept moist while the brush starts to take root. The structures need to be carefully monitored and repaired as needed. In particular, you need to watch fluctuations in water levels. High water can uproot and kill new plantings. It may be necessary to place hay-bales or fascines in front of plantings to protect them from high water and wave action until they can get established.

### **Bioengineering Techniques in the Water**

**Fiber Rolls** - Fibre rolls (also known as fibre bundles or fibre logs) are a common material used in soil bioengineering. Fibre rolls are simply rolled up mats made up of coir (the fibre from the outer husk of coconuts) or jute. These rolls are generally staked into the toe of the slope or slightly off shore. They absorb and deflect wave and current energy, sheltering a vulnerable shoreline.

**Brush Bundles** - Another way to reduce wave energy before it hits the shore is the use of bundled brush. Like the fibre rolls, the idea behind the brush is to create pool areas where vegetation can grow and eventually form a barrier against erosion. Brush bundles are easy to make.

**Plant Anchors** - When planting in the water, it is necessary to anchor new plants until they take root and can hold them in place – otherwise, the wave energy can scour them away. In some cases, you may need to use both wave breaking devices and plant anchors to successfully establish vegetation in the water. There are two main methods to anchoring aquatic plants: fibre mats & fibre bags

**Fibre Mats** - The same fibres (coir and jute) used to make fibre rolls are also woven into mats or blankets. These can be rolled out, staked in the water, and then planted with native aquatic plants like cattails, bulrushes and water lilies.

**Note: This method will not work with aquatic plants that require a great deal of sunlight**

**Fibre Bags** - Some aquatic plants can be anchored to the bottom by placing a rooting plant in a fabric bag weighted with rocks. The roots are able to grow through the fabric and into the soil. The fabric biodegrades and eventually the plants hold themselves in place.

## **Hardened Surfaces**

Structures made out of rock, concrete, metal and other materials have been commonly used in the past, when it was thought that the only way to combat erosion was to take a hard and aggressive approach. People began putting in concrete break walls, gabion baskets (large stones contained in wire baskets), and riprap (loose stones along the shore). These structures do work well in the short term to prevent erosion – but a further look reveals that ultimately they often do much more harm than good.

### **What Happens when you Harden your Shoreline?**

Hardened shorelines deflects wave energy instead of absorbing it – the energy is deflected to the sides, passing the erosion problem on to neighbouring sites and down, scouring away any sediment or plant life near the base of the wall. The installation of these structures completely obliterates the natural shoreline environment – eliminating food and habitat for all kinds of creatures in the water and out. Installing these structures requires the use of heavy machinery; both costly and environmentally damaging. Worst of all, these structures will eventually fail.

### **Types of Hardened Structures**

Breakwalls are also known as bulkheads, retaining walls or seawalls. They are completely solid structures that are generally made of concrete, metal or wood. Breakwalls are built to prevent the sliding of soil or to protect against wave action. No breakwall will last in the long term because it, in effect, self-destructs by promoting erosion of the very soil that supports it. The vertical breakwalls deflect waves, which end up scouring the bottom right in front of the wall, undercutting it and causing it to eventually fail. Also, the flat rigid face of the wall is hammered by each wave impacting it. One wave slap may not feel like much, but over time, enough of them cause cracks and fractures in the wall. In addition, the inside (landward) face of a breakwall is very vulnerable to surface erosion. Any overland runoff will carry away soil from the inner face, digging channels and robbing the wall of support.

### **Retiring a Breakwall**

If there is currently a breakwall on your property that is beginning to fail, there are several steps you can take to retire your breakwall.



1. First dig out the soil from behind the wall
2. Re-grade the slope of the shoreline to a slope of 25 degrees or less
3. Place a geotextile filter cloth along the slope
4. Tear down the wall in sections so that the pieces of the wall lies back on the slope, this can be done with the use of a sledge or jack hammer
5. The gaps should then be filled with cobble-sized stones or riprap
6. The final step is to plant some native vegetation to help hold the soil together, plants such as willows or dogwoods are good choices

**Note: You will need to obtain a permit to retire your breakwall**

This will provide you with a much better solution for erosion control on your property – not to mention a much more visually appealing shoreline.

### **Softening a Breakwall**

If your shoreline has been hardened with a breakwall that is in good condition there are various things that you can do to soften your breakwall and reduce the erosion effect of the breakwall.

- Restore or plant a strip of deep-rooted vegetation along the retaining wall; this will help filter runoff before it enters the water, and reduce the risk of erosion by holding the soil together.
- Plant overhanging native shrubs to help provide shade and keep water cool. You can also drill planting holes into the wall and plant cuttings or container plants.
- In riprap, plant shrubs in open spaces among the rocks; move rocks if necessary to create space.

With approval, there are several things you can do below high water mark:

- Anchor a log or two against a retaining wall to provide some wildlife habitat and help break the force of waves and undercurrents. This will help reduce the scouring action of waves breaking against the wall.
- Add rock riprap to the base of a retaining wall at a forty-five degree angle, to help break the force of waves and improve habitat for fish and wildlife. Gradually sediment may start to deposit among rocks, and aquatic plants may grow.
- Create shore ladders of riprap from the base of the wall to the top. These will help provide wildlife, such as amphibians, access from the water to the land.

### **Gabion Baskets**

Gabion baskets are another erosion control structure that you may see along the shores or rivers along urban waterways. They are essentially wire baskets filled with large stones. The wire baskets are linked together to form a wall along the shoreline. Like concrete retaining walls, this erosion control technique works well in the short term and is often used in high-energy situations or when erosion needs to be stopped immediately.

### **Riprap**

Riprap is one of the most common techniques that are used for controlling erosion along the shoreline. Riprap consists of large stones placed in the water and up the slope of the shoreline. Of all the hardened control structures, riprap is probably the most economical, as well as the most effective.

Riprap works well in areas of high water and aggressive water movement. It is also effective against ice movement. Because riprap is made up of many smaller pieces, the movement of a few pieces does not

compromise the effectiveness of the overall structure. If the shoreline or bottom soils shift, the main structure will still work (this feature is not shared with the other hard control techniques). The rough surface of the riprap breaks up wave action so waves don't run up as high on the slope as they do on smooth concrete faces and exposed soil. Riprap can be an effective solution for undercut banks because it provides protection at the toe where water action erodes the soil. However, like with the other hardened control structures (although to a lesser degree than retaining walls) riprap still deflects wave energy causing erosion problems for neighbouring properties and elsewhere. It also replaces vegetation along the shoreline, taking away natural habitat. The rocks on their own do not provide food or shelter for most wildlife. And, in addition to creating a rather unnatural looking shoreline, the rough surfaces of the rocks also make it hard to access the water for recreation.

If you have riprap along your property, adding vegetation above or between the rocks where possible will help create a more natural environment and will help further control erosion. If you are thinking of installing riprap on your property, it is recommended that you complement it with other bioengineering techniques and plantings.

### **Approvals**

Before beginning any restoration work, you will need to look into permits and approvals required for your project.

## Shoreline Buffers

A buffer is a permanent strip of trees, shrubs, grasses and ground cover alongside a watercourse that help to protect or 'buffer' the water body from impact, whether the impact stems from human actions or natural processes. The proper size for the buffer strip is unique to each property and is dependent on the property owner's preferences. The best buffer strip is one that is at least 30m wide, extending from the lake and heading upland. A buffer strip of this size is not feasible in all areas; however, any size is better than none at all.

## The Benefits of Buffers

Depending on their design and location, buffers can:

- Protect and improve air and water quality
- Reduce soil erosion caused by wind and rain
- Stabilize the banks of streams, rivers and lakes
- Trap water-borne sediments that pollute streams, rivers and lakes thereby reducing up to 80 per cent of sediment
- Trap fertilizers, pesticides, organic chemicals, heavy metals, salt and other contaminants that pollute ground and surface water (reduces 40 per cent of phosphorous and a significant amount of nitrate)
- Trap bacteria and other pathogens that cause water-borne diseases in people, livestock and wildlife (up to 60 per cent of pathogens removed from runoff)
- Provide habitat for fish and wildlife
- Help prevent flooding
- Make the landscape more beautiful and properties more valuable

## Why Plant Buffers?

By planting and maintaining buffers, you can help to prevent some of our most serious environmental problems.

### Water Pollution

Despite improvements in how we manage chemicals and waste in homes, our ground and surface water remains at risk of being polluted. Harmful viruses, bacteria and other pathogens may migrate into waterways from livestock operations and septic systems that are located too close to waterways. The consequences are deterioration in the quality of drinking water and a degraded, potentially dangerous environment. Some buffers can help by trapping pollutants before they reach waterways.

### Soil Erosion

When soil particles and other sediments are carried by wind and runoff into creeks, rivers and streams, they clog the gills of fish. They may also obscure their vision, making it difficult for them to find food and see predators. Sediments that settle on the bottom cover places where fish feed, hide from predators and lay eggs. By filling water channels, sedimentation also causes permanent physical changes in waterways that affect aquatic life and contribute to flooding problems.

### Destruction of Natural Shorelines

Shoreline development, unnatural approaches to landscaping can harm land and aquatic habitat and reduce the quality of water for human consumption. The destruction of natural shoreline vegetation increases shoreline erosion by eliminating the plant root systems that provide stability. It increases the

risk of pollution and sedimentation by removing natural traps. By reducing shade, it also destroys habitat for trout and other species that need cold water to survive. Buffers planted along waterways can help to reduce these problems by stabilizing soils, trapping pollutants and shading and cooling the water. In addition, they can reduce the risk of flooding.

### **Destruction of Habitat and Loss of Biodiversity**

In southern Ontario, forests now cover only about 20 per cent of the land south and east of the Canadian Shield — and what remains is fragmented into small islands of forest. The result has been a decline in species that depend on forest habitat. The decline in forest along streams, rivers and lakes has also led to the decline of both land and aquatic species. Buffers can help by providing travel corridors between larger areas of natural habitat and protected areas along waterways where wildlife can safely drink and feed.

### **How to Begin a Buffer**

Before beginning a buffer strip, it is important to consider the layout of the lot, how the property is used (e.g. paths, recreation), the budget, how much time you want to spend on it, the look you want to achieve, and privacy issues. There are three options available to establish a buffer:

#### **1. Natural**

- Decide what size buffer you would like – the bigger the better
- Stop mowing and let nature take over. Dormant seeds, as well as seeds brought by birds and other wildlife species, will start to grow
- Leave natural debris such as fallen trees, stumps and boulders in place
- In highly developed areas it is best to weed out invasive species

#### **2. Enhanced**

- Occurs by helping nature along by actively planting a few plants or shrubs
- Requires a bit more time and money
- The buffer will be established more quickly than by natural processes alone

#### **3. Landscaped**

- It combines the important functions of a natural shoreline with visual appeal of flowers, well-defined and pleasing curves, and other accents like benches, stepping stones, etc
- Requires considerably more time and money

### **Sources of Expertise and Assistance**

There are sources of expertise and assistance to help you plan buffers and work them into your farming operation or recreational property. Some of these sources may offer funding support or may be able to direct you to potential funding sources. For more information, contact:

- Your local municipality
- Your local conservation authority
- Your local stewardship council
- The Ontario Environmental Farm Plan
- Local Ontario Ministry of Natural Resources office
- Ducks Unlimited
- Ontario Ministry of Agriculture, Food and Rural Affairs