Shoreline Erosion

How Erosion Occurs

When a 3 metre (10 feet) high shoreline bank erodes, it may look as if the entire height of bank is eroding. In reality, it is only the "toe" of the bank – that is, the bottom 0.6 to 1.2 metres (2-4 feet) – which bears the brunt of the erosional forces. As this section of the bank is eroded away, it reaches a point where it can no longer support the weight of the existing bank overhead. As a result, the overhanging portion of the bank gives way in what is known as "slumping." This "slumped" material usually ends up at the bottom of the bank where it is quickly washed away, giving the false impression that the entire bank is being eroded at once.

If the "toe" of the existing bank can be protected, then the erosion rate will be significantly reduced. Over time, the remaining portion of the bank will stabilize itself. Over a three-year to four-year time period little or no erosion of the existing bank may take place. However, due to the combination of time and the ever constant natural forces of erosion it is a common occurrence to witness two to three feet disappear from the bank during a single storm event.

Alternatives

The Department of Environment, Energy and Forestry acknowledges that shoreline erosion is an inherent process of nature. While development does occur in the shore zone, problems can be reduced by using setback limits and regulations, diminishing the need for shoreline stabilization projects in the future.

However, in the past, development often took place in the shore zone with little consideration given to bank erosion. As a result, today in Prince Edward Island there are waterfront property owners faced with severe erosion problems. They are confronted with the following alternatives:

- Move the cottage or house and let nature take its course.
- Reduce the erosion rate through the use of a shoreline stabilization method.
- Do nothing and risk the loss of property and existing structures.

The Department of Environment, Energy and Forestry recommends against the use of shoreline stabilization methods on the perimeter coastline due to the high construction cost, severe weather conditions experienced here, and the possible negative implications to adjacent properties and the immediate coastal area. That may include increased erosion of neighbouring properties which have not been protected, starvation of down shore beaches when sediment movement along the shore has been blocked, and the replacement of pristine shorelines with the not so aesthetically pleasing construction works.

If room on the property exists, the best long-term solution to the erosion problem is moving the structure. Shoreline protection materials must be constantly upgraded and maintained to ensure their effectiveness. And no construction works, no matter how elaborate or expensive, can be guaranteed to stand up to the extreme forces of erosion.

If the cottage or house cannot be moved and shoreline stabilization is necessary to protect the property, it is essential that stabilization projects be conducted in an environmentally sensitive manner. Any of the techniques outlined below can be used to carry out shoreline stabilization projects. No work can be done without first obtaining a permit from the Department of Environment, Energy and Forestry.

Permits and Approvals

Under Section 6 of the *Environmental Protection Act*, Watercourse and Wetland Protection Regulations, you are required to obtain a Watercourse, Wetland and Buffer Zone Activity Permit before proceeding with any work. Approval will be granted provided there is sufficient justification for the project and no adverse environmental effects will result from the work. A permit is not required if using a Licensed Contractor to complete the work.

All permits are issued with a set of terms and conditions. These must be strictly adhered to in order to protect the environment. You must ensure that all contractors have a copy of the permit and are familiar with the terms and conditions. If you have a problem, please contact the Department of Environment, Energy and Forestry at (902)368-5000.

It is the responsibility of the landowner to pay for any and all shoreline stabilization work. The government does not allocate funds to help finance private individuals involved in such work. The landowner is also responsible for maintaining the shoreline stabilization work and repairing any slumping of shoreline stabilization material or other storm-related damage. A Watercourse, Wetland and Buffer Zone Activity Permit is required prior to carrying out any repair work or other modifications to the structure.

Planning a Shoreline Stabilization Project

There are factors property owners should consider when planning a shoreline stabilization project:

- Long-term erosion rate at that location.
- Type of structure best suited for the location.
- Initial installation and the long-term maintenance costs of a control structure versus other options such as moving the cottage or house.
- Possible impact on adjacent shorelines.
- Seasonal changes in beach structure.
- Aesthetic look of the property and shoreline.
- Design and construction of the structure to withstand the worst weather conditions.
- In the case of inland bays and estuaries, long-term protection such as vegetative erosion controls (grass, shrubs, trees) should be used whenever possible in preference to building structures with a limited lifespan.

Common Methods of Shoreline Erosion Control

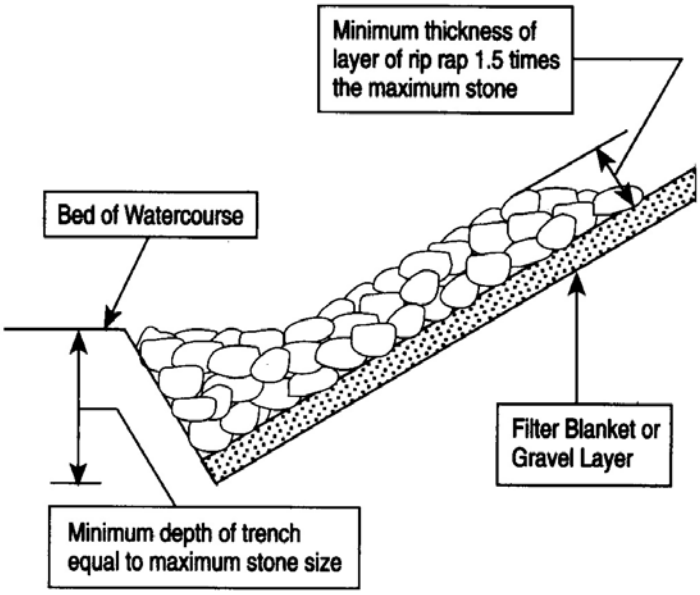
There are three common methods of shoreline erosion control in Prince Edward Island:

- Placement of riprap material – rock (sandstone or granite) and concrete (slabs or rubble)
- Construction of a retaining wall (the majority are built using timbers)
- Placement of gabion baskets

These methods are not the only alternatives available for shoreline protection but they are the most common. Each property along Prince Edward Island's coast is unique in its own way and the choice of the right shoreline protection method is not an easy task. One method may be quite acceptable for one property owner while their neighbour might prefer another.
It is important to realize that these methods are not solutions to shoreline erosion, they are only measures which will help slow down or significantly limit the amount of erosion. Even if all the work is done properly and at great expense, the site will still have to be maintained and/or improved in the future to keep up with the forces of natural erosion.

Placement of Riprap Material

In this method, layers of rock are placed at the toe and on the slope of the eroding bank. Depending upon the type of riprap material selected and whether filter fabric (mechanically woven geotextile blanket which prevents soil suspension and movement) is used in conjunction with the riprap, this method generally proves to be the least expensive. However, this method may not be aesthetically pleasing to some waterfront property owners if materials such as broken concrete are used. Large Island sandstone generally best simulates natural shoreline conditions but imported stone such as granite is the most durable material available.



Construction of a Retaining Wall

With a retaining wall, vertically oriented support posts are placed below the existing sediment at regular intervals. Other timbers are placed perpendicular to the support posts. Tie back supports are installed behind the wall to prevent it from pushing out over time. The area behind the wall is usually then backfilled with rock and earthen material. Filter fabric should be installed between the inner wall boundary and the backfill material to prevent the backfill from escaping between the timbers. Depending upon the availability and cost of materials used, this method can be quite reasonably priced.

Placement of Gabion Baskets

In this method, wire mesh baskets (galvanized or plastic coated) are filled with rocks and placed at the base of the eroding slope. Granite rock is recommended as a filler in the baskets as opposed to Island stone because sedimentary Island stone erodes quicker, requiring frequent maintenance. This method is generally the most expensive and usually requires an experienced contractor to perform the work.