How Do You Know If There Is A Serious Erosion Problem On Or Near Your Shoreline?

Signs of serious problem situations include:

- A large area of bare soil on a steep, high shoreline bank.
- A noticeable recession of the shoreline over a period of time.
- Numerous leaning or downed trees with exposed roots on the shoreline.
- Large patches of muddy water near a lakeshore, or unusually muddy streams during periods of high water or following a rainstorm.
- Excessive deposits of sand or other sediments on the stream bed, or very wide, shallow areas in a stream.
- Undercut banks.
- Buckled or "ice shoved" shoreline banks.

Planning An Erosion Control Project

Before beginning any actions to correct erosion, determine why the erosion is occurring. Without understanding the problem, any actions may be a waste of time and money. Decide if the problem is serious enough to warrant correcting. How is the habitat or water quality of a lake or stream being degraded? What are the threats to private property?

Even though there have been numerous studies and publications on this topic, each problem is unique and there are no manuals with generic plans for bank protection projects which are guaranteed to work. Although it may be possible to install a simple erosion control structure by yourself, most techniques have technical standards for size, height, shape, underlayment, and placement of structures. It is best to consult with a resource professional familiar with geotechnical engineering when planning the installation of erosion control structures.

IMPORTANT

State and local permits will be required for most erosion control projects, and federal permits may be required as well. Please comply with the permit process for all erosion control projects.

For More Information

Contact:
Tip of the Mitt Watershed Council
426 Bay Street
Petoskey, MI 49770-2498
231-347-1181

The Watershed Council offers a technical consulting service for lakeshore and streambank erosion control. We have other written materials on this topic available, including a 97-page guidebook titled *Understanding, Living With, and Controlling Shoreline Erosion: A Guidebook for Shoreline Property Owners*, which explores this topic in much greater detail. The guidebook costs $5.00 per copy plus postage and handling costs of $5.00 for a single copy. We offer on-site assessments of shoreline properties to determine the extent, severity, and causes of erosion problems; and recommend practical, effective solutions. In addition, the Watershed Council designs, installs, and consults on the installation of BEC projects, and has several BEC demonstration projects available for public viewing by appointment.

Tip of the Mitt Watershed Council

Helping You Protect Your Vital Resources

The Tip of the Mitt Watershed Council was formed in 1979 by local lake associations with assistance from the University of Michigan Biological Station. The Tip of the Mitt Watershed Council is the voice for Northern Michigan's waters. We are dedicated to protecting our lakes, streams, wetlands, and ground water through respected advocacy, innovative education, technically sound water quality monitoring, and thorough research. We achieve our mission by empowering others and we believe in the capacity to make a positive difference. We work locally, regionally and throughout the Great Lakes Basin to achieve our goals.

The Watershed Council is a nonprofit organization supported primarily through private donations. Please join our efforts.

Yes! I want to support the Tip of the Mitt Watershed Council's work to protect Northern Michigan's valuable water resources!

Here is my tax deductible contribution of:

☐ $35 Subscriber ☐ $300 Key Sponsor
☐ $50 Supporter ☐ $500 Guardian
☐ $100 Friend ☐ $1,000 Benefactor

Name _____

Address _____

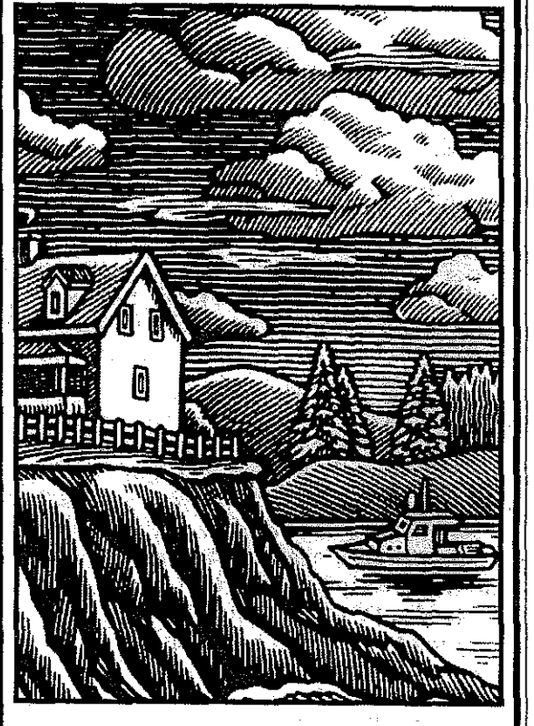
_____

Please make checks payable to "TOMWC" and mail to the address below.

Tip of the Mitt Watershed Council
426 Bay Street • Petoskey, MI 49770-2498
Phone: 231.347.1181 Fax: 231.347.5928
E-mail: info@watershedcouncil.org
Website: www.watershedcouncil.org

3/05

Lakeshore & Streambank Erosion Control



Vital Resources Series

Tip of the Mitt Watershed Council

What Causes Lakeshore And Streambank Erosion?

Lakeshores and streambanks are areas of dynamic energy. The powerful forces of waves, currents, and ice move soil particles causing erosion or deposition.

Streams are continually downcutting into their valleys, carrying sediment downstream particle by particle. The current moves from side to side, undercutting banks and causing the stream channel to meander.

The ice of frozen lakes can expand towards the shoreline with a force of many tons per square foot, moving most obstacles in its path (including shoreline soil). Masses of ice put in motion by winds or currents can scour the banks of lakes and streams.

In a lake, the strength of erosive forces depends on its size, the size and direction of waves and currents, ice characteristics, water depth near shore, and the shape and composition of the shoreline. Although erosive forces and processes are greatest on very large water bodies, they occur even on the smallest of inland lakes.

Erosion and the transport and deposition of sediments is a natural process along shorelines. Typically, natural erosional processes proceed very slowly, and the plants and animals that live along the shoreline can adjust to these slow changes, maintaining a stable, healthy, productive ecosystem. When some catastrophic natural or human disturbance causes this equilibrium to be upset, accelerated erosion can result. Examples of natural disturbances include large trees uprooted by a windstorm, or a flood resulting from a torrential rainstorm. Human disturbances include powerboat wakes, foot traffic, vegetation removal, dredging, filling, or construction on or near the shoreline.

What Are The Impacts Of Shoreline Erosion?

Eroded soils are, by volume, the greatest pollutant of lakes and streams in the United States. Although most sediment comes from overland erosion throughout a watershed, shoreline erosion contributes its share. In aquatic environments, sediment pollution:

- Degrades wildlife habitats, killing aquatic organisms and negatively impacting birds and animals which depend on aquatic habitats.
- Reduces water clarity, light penetration, and plant productivity.
- Causes warming (which is most serious in cold water trout streams).
- Releases nutrients stimulating undesirable plant and algae growth.
- Affects angling success and fish feeding, spawning, and gill function.
- Changes bottom substrate, reduces channel capacities, and increases flooding.
- Shoreline erosion can also cause the loss of valuable waterfront property, including nearshore buildings and other structures.

How Can Shoreline Erosion Be Controlled?

One of the best ways to control shoreline erosion is through preventative measures. Some basic **preventive guidelines** include:

- Preserving the rocks and vegetation which naturally occur along the shoreline.
- Preventing impervious surface (i.e. roofs, driveways) runoff from flowing to the shoreline, especially in bluff areas.
- Avoiding major construction within 100 feet of the shoreline or the edge of nearshore bluffs.
- Protecting nearshore berms pushed up by ice action along lakeshores. They prevent excessive surface runoff and store sand for future beach nourishment.
- Limiting the amount of foot traffic and other recreational activities in erosion prone-areas.

Regardless of preventative measures, the right combination of conditions (such as high water level, violent windstorms, drastic ice movement, and certain shoreline configurations) may result in serious erosion.

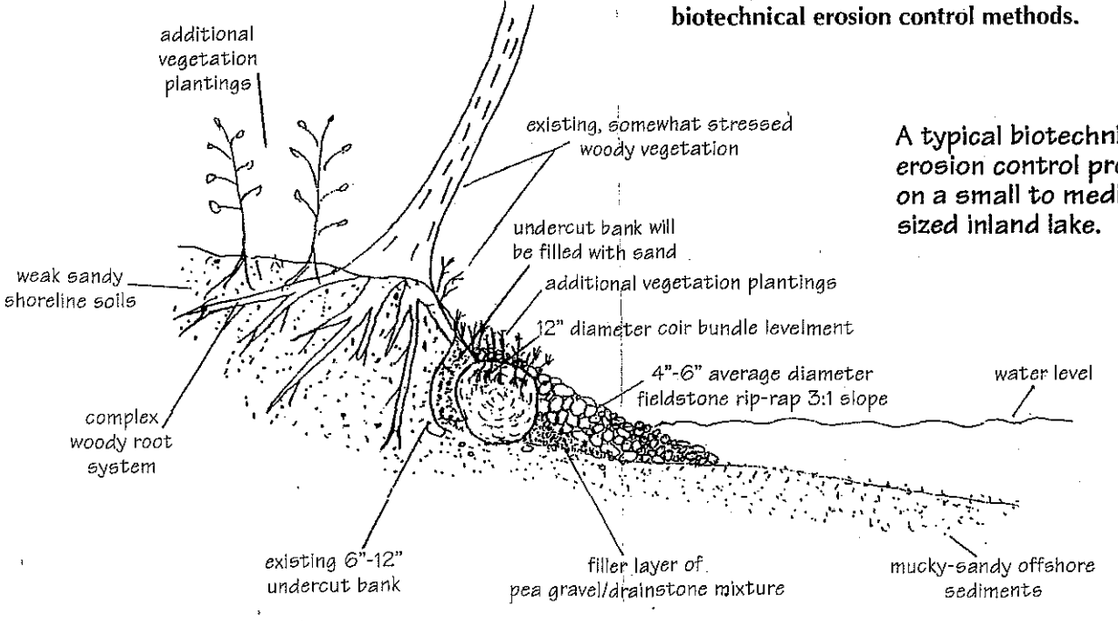
There are three basic types of **corrective shoreline erosion control methods:**

- **Structural** - This includes protective structures. The placement of rock (known as rock revetment or rip-rap) has traditionally been the preferred and most common method. Basic design criteria of rock rip-rap include:
  - Various-sized stones, with average size based on wave size or current velocity
  - Thickness of structure 2.5 times the average rock size
  - Extends to just above high water level or wave run-up distance 3:1 (horizontal : vertical) slope or flatter
  - Filter layer of gravel or geotextile to retain subsoil but allow water drainage
  - Heavier rocks buried at base to increase stability

Other structural methods often attempted include bulkheads (a.k.a. seawalls), boulder or log breakwalls, gabions (rock-filled baskets), sandbags, or groins (pier-like structures). However, these other methods are unattractive, more costly, require more heavy equipment and technical expertise, more prone to failure, and destructive to shoreline wildlife habitat.

- **Manipulative** - Mostly used on streams, this includes removing streamflow obstructions, grading shoreline banks, or in special circumstances, rerouting the stream channel.
- **Vegetative** - This method involves planting trees or woody shrubs for the soil binding properties of their large root systems. Grass and other herbaceous plants help reduce runoff. Aquatic plants help stabilize bottom sediments and dampen wave action.

A method which combines structural and vegetative methods with ecological concepts to arrest and prevent shoreline erosion is called biotechnical erosion control (BEC). BEC is a technique which has recently come in to widespread use with good success. An example is placement of a coir (coconut fiber) bundle along the shoreline, with smallish fieldstones placed on the water side, and plantings of woody shrubs along the land side (see figure). The coir and rock provide immediate resistance to erosion. As the shrubs become established, their roots invade and permeate the coir, rock, and underlying soil, creating a living, self renewing form of shoreline protection. The plantings also impart a natural look to the shoreline, protect water quality in other ways, and provide wildlife habitat. **In most instances, the Watershed Council recommends biotechnical erosion control methods.**



A typical biotechnical erosion control project on a small to medium-sized inland lake.