# NATURAL SHORELINES for Inland Lakes

*Before*

**A SIMPLE SOLUTION FOR LAKEFRONT PROPERTY OWNERS**

*After*

# Natural Shorelines

**By using a softshore approach to landscaping your waterfront property, you can help preserve the very things that likely attracted you to lakefront living in the first place – clean water, abundant wildlife, good fishing and access to recreation.**

Homeowners and lake stewards can help keep their lakes healthy by using ecological principles to assess, design, construct and maintain natural shorelines. This publication explains why lakeshore property owners should consider natural shorelines and ways they can incorporate sound bioengineering practices into the landscape.

## WHAT IS BIOENGINEERING?

Bioengineering, often called softshore engineering or lakescaping, is a method of using native plants, biodegradable products and other natural materials to provide a stable shoreline. The goal is to protect the property from waves and erosion, while improving ecological features and the integrity of the shoreline. Bioengineering methods are often used when creating a natural shoreline – which acts as a living buffer that changes throughout the seasons and years.

## WHY CONSIDER A NATURAL SHORELINE?

The primary purpose of a buffer at the shoreline is to protect the property from erosion. Erosion may result in loss of shoreline property and increased sediment in the water – leading to poor water quality. Seawalls and natural shorelines are two types of buffers.

Seawalls are in use all over Michigan. A seawall is any hard-surfaced wall installed along the shore to block the waves from reaching the land. The walls are typically parallel to the shore with a vertical surface facing the water. They are made out of many

materials, including concrete, steel sheet pile, wood and rock-filled wood structures.

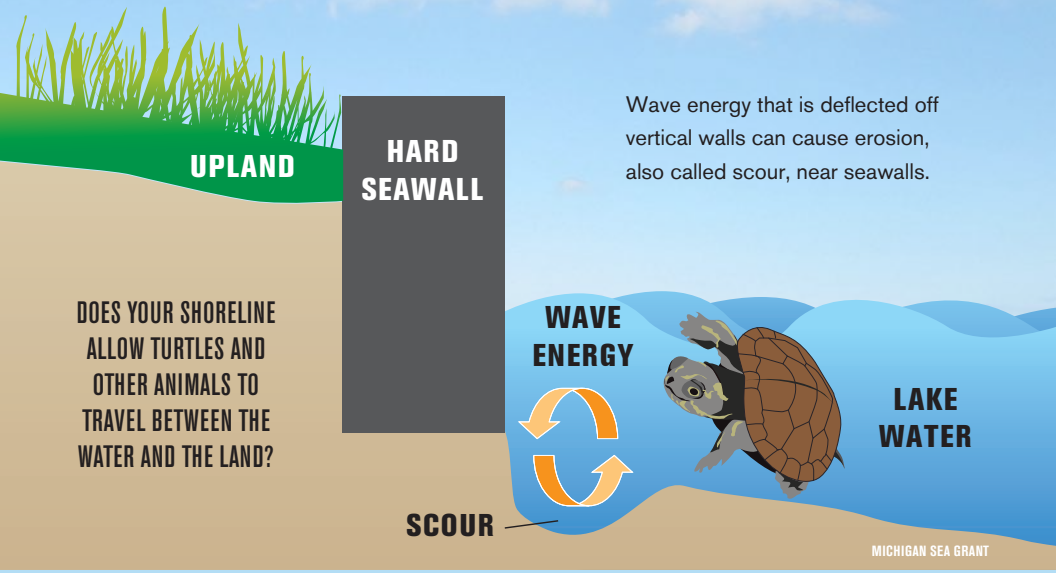
Natural shorelines are buffers that may include erosion-control fabrics, native vegetation and rocks. Some natural shorelines use living and nonliving plant materials in combination with natural and synthetic support, like biologs, to stabilize the shore. The techniques – called bioengineering – are not new. For example in the 16th century, willow branches were used to stabilize irrigation channels.

## WHAT DO WE HAVE TO LOSE?

Michigan's inland lakes contain 154 species of fish, including 23 species that are threatened, endangered or of special concern. Five species are already extirpated, meaning they can no longer be found within Michigan.

Many property owners are drawn to seawalls because they are perceived to be more stable. However, they can often cause shorelines to be less stable than those protected by natural landscaping. Seawalls do not allow for absorption of the energy that waves bring in – waves hit the seawall, and the energy is bounced back out to the water. In the process, wave energy that has bounced off the wall scoops out soil and sand and causes erosion at the base of the wall. This kind of erosion is called scour. Scour contributes to a less stable waterfront,

# SEAWALL IMPACT ON INLAND LAKES




In addition to deflecting wave energy, seawalls also disrupt the natural transition between the water and the land. Vertical walls physically block access to and from the water for turtles, frogs and other animals that need contact with the land to feed, rest and nest.

*Before*

*After*

decreases water clarity, and has a negative effect on fish, animals and aquatic plants near the shore. In contrast, bioengineering along the shore absorbs some or all of the wave energy, which helps thwart shore erosion and scour.

## BEFORE AND AFTER

The top image shows the impact of erosion before using native plants for shoreline stabilization. The erosion is visible along the shoreline, and the neighboring seawalls intensify the erosion. In contrast, the bottom image shows a shoreline protected by native plants that have established a root system and created a natural, stable buffer.

JANE HERBERT

MICHIGAN SEA GRANT

## WHAT ARE NATIVE PLANTS?

Native plants are grasses, flowers, shrubs and trees that are indigenous to a particular area. A few reasons to use native plants:

- Native plants provide food and habitat for birds and other wildlife, and they help maintain natural biodiversity.
- Since they are adapted to living in their native territory, native plants require minimal maintenance and watering once established. Many are perennial.
- Native trees and shrubs can be hardier than non-indigenous varieties. They offer shade and help lower air and water temperatures.
- Native plants attract birds, which prey upon insects, decreasing the need for pesticides.

## ALONG YOUR SHORELINE

Planting is a relatively easy, affordable and attractive way of incorporating bioengineering into lakeshore design. Native plant species, which are well adapted to local climate and soil conditions, are particularly good options for landscaping. The use of native plants can have significant positive benefits for the lake and the shoreline. For example, plants that overhang and create shade improve water quality for fish, waterfowl and other aquatic life by providing food close to the water's edge. A vegetated buffer along the shore can also help absorb the extra nutrients (like those from fertilizers) and pollutants in surface runoff as the water drains to the lake.

Plants in the water and along the shore like lily pads and cattails (called emergent and floating vegetation) help limit the amount of erosion by absorbing wave energy as waves come into the shore. Native plants like sedges and rushes (grass-like plants along the shore) often have extensive root systems that help anchor the soil in place and stabilize the shoreline better than non-native plants like turf grasses (lawn). Maintaining native vegetation sustains natural biodiversity, and may help keep out nuisance species like the invasive purple loosestrife (*Lythrum salicaria*) and phragmites (*Phragmites australis*).

## COST COMPARISON

Installing native plants along the shore and creating a natural shoreline is often more affordable than installing other types of buffers. Additional items needed to brace the shore in a native planting area – like erosion-control fabrics, biologs, twine, wood and rock – are also affordable. The estimated cost of installing a natural shoreline, including bioengineering materials, averages from $10-20 per linear foot. Unlike with bulkheads and hard armoring along the shore, property owners can often implement bioengineering methods themselves rather than hire a contractor. The cited cost per linear foot includes area preparation, purchasing and planting vegetation, additional stabilizing natural materials, watering and maintenance.

The financial cost of hard armoring the shore (using seawalls and bulkheads) can range from $45-200 and up per linear foot. Bulkheads need to be installed by a professional contractor, after the correct permits have been obtained. The cost estimate includes the materials needed for the wall and typical labor. However, costs can vary widely, depending on site preparation, engineering expenses, backfill and if other materials are used.

| Natural Shoreline (vegetation) | Bioengineering (biologs and vegetation) | Riprap (rocks) | Bulkheads (concrete) |
|---|---|---|---|
| Installed by resident/ contractor: $10-15/linear foot. | Installed by resident/ contractor: $15-20/linear foot. | Installed by contractor: $35-75/linear foot.<br>Installed by resident: $20-30/linear foot. | Installed by contractor: $45-200/ linear foot. |
| Cost depends on number, type and size of plants used and labor. | Cost varies depending on materials and labor. | Costs vary widely depending on grading. | Costs do not include backfill and some labor. |

*Sources: Reston Association (www.reston.org); Coastal Systems International, Inc.; U.S. Army Corps of Engineers.*

## ARE YOU READY TO TRY BIOENGINEERING?

Constructing a structure or dredging on the bottomlands of an inland lake requires a permit under Part 301, Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. However, the MDEQ has created a minor project category to allow expedited permit application processing for specific bioengineering practices for stabilization of inland lake shorelines. The objective of the minor project category is to reduce the inconvenience and cost of the permit process for applicants proposing minor activities while protecting aquatic resources. More information on the minor project category and an application with directions can be found at: www.mi.gov/jointpermit

## BENEFITS OF BIOENGINEERING: A SUMMARY

- Natural vegetation serves as a filter between lawn and lakeshore, preventing pesticides and fertilizers from running directly into the water.
- Native plant roots filter more water than the turf grass varieties typically planted in Michigan. They help prevent flooding or standing water.
- Vegetation and natural and biodegradable items are often less expensive to implement than structural methods like concrete seawalls.
- Plants, shrubs and trees can provide an attractive privacy screen for property owners, while maintaining views of the lake.
- Vegetated strips using native plants often require little to no maintenance once established, leaving more time to enjoy lakefront living.
- Plants in the water and along the shore help absorb the wave energy, which helps keep soils and sands settled and makes for clearer (less turbid) water.
- Bioengineering is an attractive and environmentally healthy way to landscape, with a living buffer.

## TIRED OF GEESE IN YOUR YARD?

Maintaining a vegetated strip along the shore can act as a natural deterrent for Canada geese. Taller plants like native grasses, wildflowers and shrubs (2-3 feet tall) along the shore are less inviting to the geese, which favor open expanses of manicured lawns and unrestricted access to the lakeshore.

## HEALTH MEASURES

- 36% of lakes nationwide have been graded with "poor" lakeshore habitat.
- Lakes with poor surrounding vegetation are about three times more likely to also have poor biological conditions.

— *U.S. Environmental Protection Agency, National Lakes Assessment*

## CONTACT INFORMATION

Michigan Department of Environmental Quality Environmental Assistance Center
(800) 662-9278
deq-assist@michigan.gov

## ADDITIONAL RESOURCES

The Michigan Natural Shoreline Partnership provides many additional resources on natural shorelines and landscaping. The following publications feature techniques on how to incorporate native plants, example design plans, lists of native plants and more, and are available for free or low-cost through the shoreline partnership library webpage. The library is accessible through the main site at: www.shorelinepartnership.org.

- *Natural Shoreline Landscapes on Michigan's Inland Lakes: Guidebook for Property Owners*. Book available.
- *The Water's Edge: Helping Fish and Wildlife on Your Lakeshore Property.* PDF available.
- *Understanding, Living With, and Controlling Shoreline Erosion: A Guidebook for Shoreline Property Owners (Third Edition)* PDF available.
- *Landscaping for Water Quality.* PDF available.

DEQ
www.michigan.gov/deq

Sea Grant Michigan
www.miseagrant.umich.edu

MICHIGAN NATURAL SHORELINE PARTNERSHIP
www.shorelinepartnership.org

*This publication was produced by Michigan Sea Grant and the Michigan Department of Environmental Quality.*

Printed on 100% recycled paper. MICHU-11-501