Natural Shorelines *for* Inland Lakes

A Landowner's Guide to using **NATURAL MATERIALS** to **STABLIZE SHORELINES, IMPROVE WATER QUALITY** and **ENHANCE WILDLIFE HABITAT** along Michigan's inland lakeshore.

Natural Shorelines:

A Simple Solution For Lakefront Property Owners

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.

The Michigan Department of Environmental Quality promotes the use of sound bioengineering practices to keep lakes healthy. MDEQ also encourages homeowners and lake stewards to use ecological principles to assess, design, construct and maintain natural shorelines. This publication covers ways lakeshore property owners can incorporate natural shorelines into their landscapes.

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.

WHY CONSIDER A NATURAL SHORELINE?

The primary purpose of a barrier at the shoreline is to protect the property behind the barrier 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 the two types of barriers used.

Seawalls are in use all over the state. 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

WHAT DO WE HAVE TO LOSE?

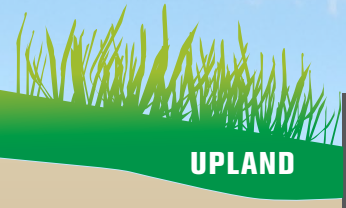
Michigan's inland lakes contain 154 species of fish, including 23 species that are threatened, endangered or of special concern. Five species are already extinct, meaning they can no longer be found within Michigan.

facing the water. They are made out of many materials, including concrete, steel sheet pile, wood and rock-filled wood structures.

Natural shorelines are barriers 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 materials – bioengineering methods – to stabilize the shore. The techniques are not new. For example in the 16th century, willow branches were used to stabilize irrigation channels.

Many property owners are drawn to seawalls because they are perceived to be the most stable. However, they can often cause shorelines to be less stable than shorelines protected by natural landscaping. Seawalls don't 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. This kind of erosion is called scour. Scour contributes to a less stable waterfront, increases the water cloudiness, and has a negative effect on fish breeding 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.

SEAWALL IMPACT ON INLAND LAKES



HARD SEAWALL

Wave reflection off vertical walls causes erosion or scour, removing soil in the lake, near seawalls. Vertical walls also block access to food and shelter for turtles and other wildlife.

THINK ABOUT IT:

DOES YOUR SHORELINE ALLOW TURTLES AND OTHER ANIMALS TO TRAVEL BETWEEN THE WATER AND THE LAND?

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 AND AFTER

The image (above left) 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 next to them. In contrast, the image (above right) shows the biodegradable logs that protect the shoreline for 3-5 years while the native plants establish a root system and a natural, stable shoreline.

WHAT ARE NATIVE PLANTS?

Native plants are flowers, grasses, 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. Most are perennial and reseed themselves.
- Native trees and shrubs are hardier than non-indigenous, offer shade and lower air and water temperatures.
- Most native plants naturally 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 some of 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 lowering wave energy as waves come into the shore. Native plants like shore grasses (e.g., sedges and rushes) often have well-adapted root systems that help anchor the soil in place, and stabilize the shoreline better than non-native plants like turf grasses. Maintaining native vegetation may help keep out nuisance species like the invasive purple loosestrife (*Lythrum salicaria*) and Eurasian water milfoil (*Myriophyllum spicatum*).

COST COMPARISON

Installing native plants along the shore is often more affordable than installing other buffers. Usually the only cost associated with native plants is the labor in locating and transporting them to the project site. Additional items needed to brace the shore in a native planting area – like erosion-control fabrics, twine, wood and rock – are also affordable.

More specifically, the estimated cost of installing a natural shoreline through bio-engineering ranges from $5-100 per linear foot. The costsof hard armoring of the shore (using seawalls) ranges from $50-200 per linear foot. The bioengineering cost estimates include preparing the area, purchasing and planting vegetation, watering and maintenance.*

* Source: Lakeshore Protection in Indiana, Indiana Department of Natural Resources, 2007.

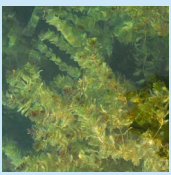
TIRED OF GEESE IN YOUR YARD?

Consider this added bonus: 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.

UNWANTED INVADERS

PURPLE LOOSESTRIFE

Herbaceous perennial that grows 1.5-6 feet tall.



EURASIAN WATER MILFOIL

Aquatic (underwater) perennial that commonly ranges from 3-10 feet in length but may grow to more than 30 feet long and forms dense mats.

For more on these and other invasive species, visit: www.protectyourwaters.net

BENEFITS OF BIOENGINEERING: A SUMMARY

- Natural vegetation used as a bioengineering tool serves as a filter between lawn and lakeshore, preventing pesticides and fertilizers from running directly into the water.
- Native plants absorb more water than the turf grass varieties typically planted in Michigan, which helps 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.
- 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 affordable, attractive and environmentally healthy way to landscape along a lakeshore.

ARE YOU READY TO TRY BIOENGINEERING?

The Water Resources Division of the Michigan Department of Environmental Quality is here to help. The MDEQ recently placed qualifying projects – projects that stabilize shorelines through bioengineering – in a new permit application category. The permitting process has been simplified for projects on inland lakes that meet the following criteria:

- The project site is no wider than 500 linear feet and the top of the bank is no more than three feet above the water.
- Native plants will be used to stabilize the shoreline.
- Inert plant materials are used as part of the bioengineering materials.
- Minimal excavation and dredging are used to stabilize water's edge slopes.

NOTE: 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. An application and directions can be found at: www.mi.gov/jointpermit.

ADDITIONAL RESOURCES

These publications feature techniques on how to incorporate native plants, example design plans, lists of native plants and more.

NEW: Natural Shoreline Landscapes on Michigan's Inland Lakes: Guidebook for Property Owners produced by the Michigan Natural Shoreline Partnership and Michigan State University Extension. Available for $25 at http://web2.msue.msu.edu/bulletins2/

The Water's Edge: Helping Fish and Wildlife on Your Lakeshore Property produced by the Michigan Department of Natural Resources and Environment. PDF available: http://www.michigan.gov/documents/deq/Wateredge_340005_7.pdf

Understanding, Living With, and Controlling Shoreline Erosion - A Guidebook for Shoreline Property Owners (Third Edition) produced by the Tip of the Mitt Watershed Council. PDF available: http://www.watershed-council.org/resources%20and%20publications/files/Shoreline%20Erosion%203rd%20Edition.pdf

Landscaping for Water Quality produced by the Michigan Department of Natural Resources and Environment. PDF available: http://www.michigan.gov/documents/deq/wb-nps-Landscaping-for-Water-Quality_250582_7.pdf

SOURCES

- www.shoreline.msu.edu/shorelinemgt/erosion_control/index.html
- www.lre.usace.army.mil/coastalprocesses/CoastalProtection/Armoring.aspx
- www.fws.gov/.../species/.../Boyd%20Living%20Shoreline%20101.pdf
- http://directives.sc.egov.usda.gov/search.aspx?q=bioengineering
- Stream bank Soil Bioengineering, Technical Supplement 14I

Sea Grant Michigan

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