Living Shorelines

FOR THE CHESAPEAKE BAY WATERSHED

CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

Living Shorelines are a creative and proven approach to protecting tidal shorelines from erosion. The technique consists of planting native wetland plants and grasses, shrubs, and trees at various points along the tidal water line. Plantings are often coordinated with carefully placed bioengineering materials, such as man-made coconut-fiber rolls (or biologs) to protect vegetation and soils. Where viable, oysters can be included as well. Projects may include stone elements, as long as they do not cut off access to the shore.

On College Creek, Annapolis, a natural shoreline showcases an extensive buffer of trees and wetland grasses. Ideal shoreline projects replicate these conditions.

Living shorelines have many benefits and vary with specific site conditions. They:

- improve water quality by settling sediments and filtering pollution;
- provide shoreline access to wildlife, such as nesting turtles, horseshoe crabs, and shorebirds;
- provide shallow water habitat and a diversity of plant species for aquatic and terrestrial animals;

DO YOU HAVE A FAILING BULKHEAD OR EROSION BEHIND A ROCK WALL?

Think about a living shoreline before you replace these structures with similar ones.

Substantial erosion is occuring behind a failing wooden bulkhead, and traditional turfgrass lawns do little to hold soil in place.

- provide shade to keep water temperatures cool, helping to increase oxygen levels for fish and other aquatic species;
- look natural rather than man-made and artificial;
- absorb wave energy so that reflected waves do not scour the shallow sub-tidal zone and hamper the growth of underwater grasses; and
- are often less costly than wooden bulkheads and rock walls (also known as "revetments").

Erosion: A natural process

Shorelines are continually eroded by the movement of water, waves, and wind. Deposition of sediments and sand along shorelines further downstream helps sustain natural habitats. Human activities like high-speed boating and hardened shorelines on adjacent properties can greatly increase the rates of erosion. Installing living shorelines is a way to work with natural processes while still protecting shorelines.

A newly created marsh island protects the sandy shoreline from waves and wind while allowing for the natural movement of sand and water.

In some instances, such as on steep slopes, regrading of the shoreline's bank may be necessary to provide a stable slope and allow newly-planted vegetation to become established. Fill material can also be extended out from the existing shoreline and then planted with appropriate vegetation to create a tidal wetland marsh. In mid-to-high wave energy areas, an offshore breakwater may be installed to diminish wave energy.

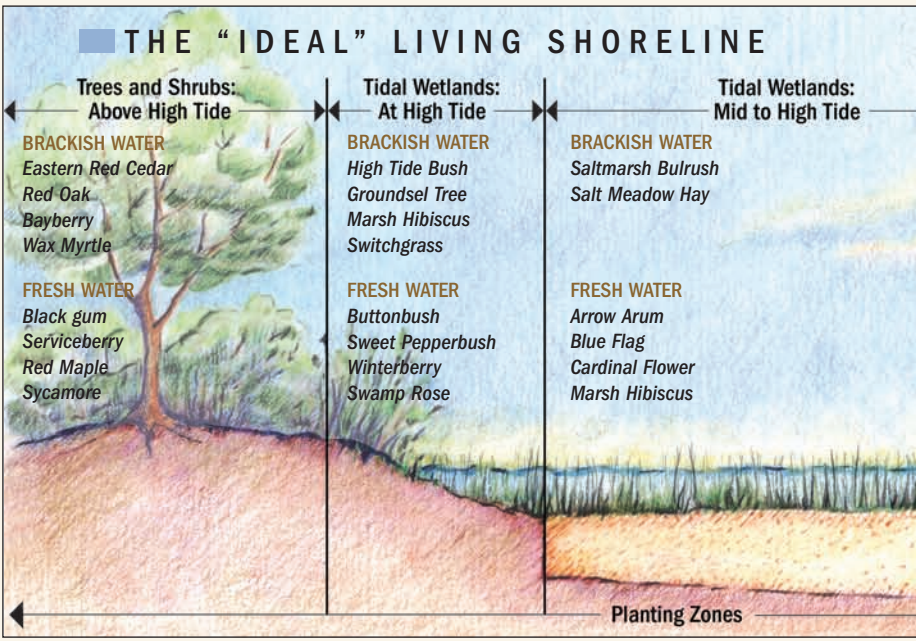
On the right side of the photo is a living shoreline, on the left a bulkheaded shoreline. The steep slopes of the living shoreline were stabilized by planting warm-season grasses, including switchgrass and little bluestem, and native shrubs.

IS "ARMORING" YOUR SHORELINE ALONG TIDAL CREEKS REALLY NECESSARY?

Many waterfront property owners who live on protected creeks and rivers see their neighbors' wooden bulkheads and rock walls and think that they are the only solution to erosion concerns. However, where there is low-to-moderate wave energy and minimal erosion, it is usually not necessary to install these hard structures. Not only are they more costly, but they can destroy shallow water habitats when wave energy is reflected back.

A contrast in shorelines: The living shoreline on the left provides many water quality and wildlife benefits while blending in with the natural environment. The shoreline on the right is completely covered in stone and has no vegetation behind it to prevent erosion.

THE "IDEAL" LIVING SHORELINE



The "Ideal" Living Shoreline

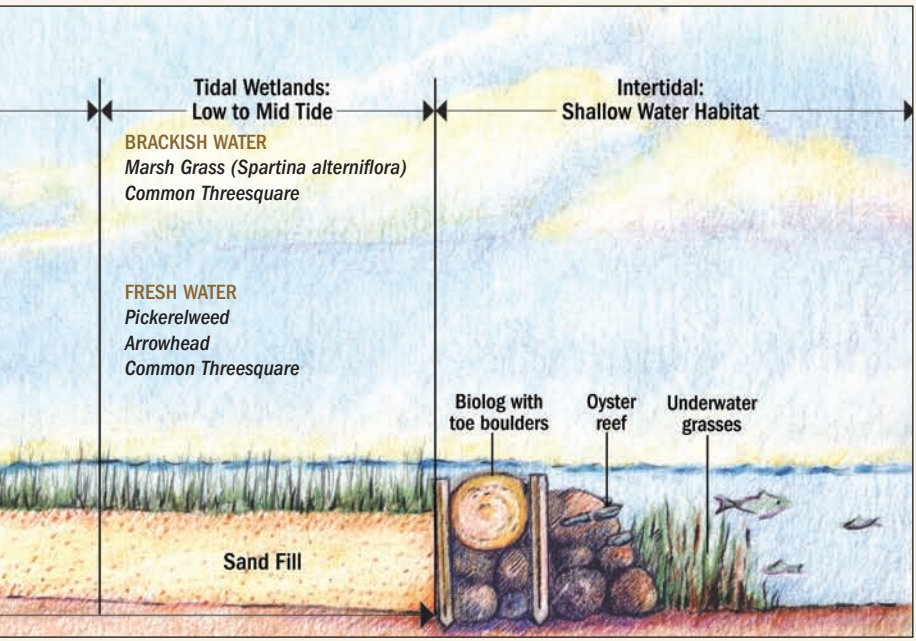
The "ideal" living shoreline in many tidal areas in the Bay watershed contains a succession of natural filters that normally would be found in undisturbed ecosystems. These filters include:

- riparian buffers above the tide line, made up of native trees and shrubs, including a mix of shrubs at high tide elevation;
- tidal wetlands, including grasses, rushes, and sedges at mid-tide elevation, and marsh grasses and common threesquare at low tide;
- oysters and an oyster reef—where appropriate; and
- underwater grasses in shallow water.

Selecting Native Plants

Native trees, shrubs, and grasses have expansive roots that hold soil in place and slow erosion from water and overland runoff. They add critical wildlife habitat and diversity, as well as beauty and value, to your property. Plant selection will depend on your site conditions.

If possible, purchase plants from a local nursery that propagates its own plants from regionally-obtained native stock or seed. (For a list of native plant nurs-



WHAT ARE THE CONDITIONS AT YOUR SITE?

Salinity:	Is your water fresh or brackish?
Water depth:	How great is the fluctuation between low and high tide?
Light:	Does the site receive full sun, partial shade, or full shade?
Slope of bank:	Are the shoreline's slopes gradual or steep?

eries, contact your state's native plant society or go to cbf.org/landscaping). If biologs are used as part of a living shoreline, herbaceous plants can be planted directly in the biologs. Over five to six years, the biolog will decompose naturally, but the plants' roots will grow throughout the log to hold the bank or shoreline edge in place.

An excellent guide on native plants for restoration in the Bay watershed is the U.S. Fish and Wildlife Service book *Native Plants for Wildlife Habitat and Conservation Landscaping* (www.nps.gov/plants/pubs/chesapeake/toc.htm).

Showy native wetland plants, like Blue Flag iris (left) and Marsh Hibiscus (right), attract pollinators, provide seasonal color, and have extensive root systems to hold shorelines in place.

When to Plant

Perennials and grasses should be planted during peak growing season (in mid-to-late summer) to allow enough time for their root systems to become established before they go dormant in the late fall. Trees and shrubs should be planted in spring and fall when there is adequate rainfall to help them develop strong roots and leafy growth.

Volunteers plant hundreds of marsh grass plugs (Spartina alterniflora) *at the Back Creek Nature Park waterfront.*

Maintenance

Waterfowl, such as ducks and geese, love to feed on newly-planted vegetation. To keep them out of the area for the first full growing season, a three-to-four foot tall mesh enclosure—tied onto wooden stakes—should be erected. Large debris, such as logs, algae mats, and trash, should be periodically cleared from the site to protect wetland plants from smothering. For beach and water access, keep a narrow path to the water unplanted to avoid trampling vegetation. Control non-native invasive plants, such as English ivy and multi-flora rose, and replace them with native wetland plants and shrubs.

Fencing shown on the right keeps ducks and geese from browsing and pulling out recently planted marsh grass plugs (next to the biolog) and warm-season grasses (on the slope.) After the first full growing season, fences can usually be removed.

Expand Your Buffer

If your property is experiencing erosion, it is important to understand where it is coming from; not all erosion is due to waves, wind, and tides. On properties with steep slopes leading to the water, a major source of severe erosion can be runoff from rooftops, downspouts, and paved driveways unless adequate tree and shrub buffers are planted closer to the house.

Well-established shoreline buffers include mature native trees and shrubs to help frame the view. Extensive buffers anchor the soil, provide wildlife habitat, and make the shoreline more aesthetically pleasing.

By planting woody vegetation such as shrubs and smaller trees to create an understory, and large canopy trees as part of the buffer, you can greatly reduce runoff and soil loss coming from the land. The wider the buffer the better, but a width of at least 30 feet is ideal. If you are concerned about maintaining your view, plant larger trees away from sight lines and plant low-growing shrubs instead.

Three Types of Shoreline Projects

NONSTRUCTURAL:
Biologs and vegetation

HYBRID:
Segmented sills, jetties, or groins with natural beach shoreline and/or marsh plantings

STRUCTURAL:
Offshore breakwater (openings provide wildlife access)

WHICH PROJECT IS RIGHT FOR MY SITE?

(source: MD Department of Natural Resources)

Site Conditions	Low Energy (Nonstructural)	Medium Energy (Hybrid)		High Energy (Structural)
Shoreline Location	creek or cove	minor river	major tributary	mainstem Bay
Water Depth (ft/near shore)	-1.0	-1.0 to -2.0	2.0 to -4.0	-4.0 to -15.0
Fetch (mi/distance to nearest opposite shore)	0.5	1.0 to 1.5	2.0 or more	2.0 or more
Erosion Rate (ft/yr)	2 or less	2 to 4	4 to 8	8 to 20
Erosion Control Treatment Options	Nonstructural projects	Hybrid Project		Structural Projects
	beach replenishment	marsh fringe w/groins		bulkheads
	marsh fringe	marsh fringe w/sills		revetments
	marshy islands	marsh fringe w/breakwaters		stone reinforcing
	biologs, groins	beach replenishment w/breakwaters		groins and jetties
Cost per foot	$50–100	$150-300	$350–500	$500–1,200

Permit Process

Permit requirements for installation of living shorelines vary depending on state and local laws. No permits are required to plant vegetation on existing substrate on tidal or non-tidal shorelines unless fill is introduced or damaging equipment is required. However, permits are required for any alteration of shorelines in tidal areas, as well as wetlands. This includes:

- removal of vegetation;
- grading and introducing fill material;
- installation of nonstructural materials like biologs with toe boulders (narrow bands of rock that hold sand-fill and biologs in place); and
- installation of hard structures like bulkheads, sills, and revetments.

A joint federal/state permit application (JPA) from the U.S. Army Corps of Engineers is now in place to help streamline the process. Go to cbf.org/livingshorelines for appropriate links.

Getting Help: Demonstration Projects and Workshops

Many living shoreline projects have been successfully installed in the Chesapeake Bay watershed. For a list of publicly-accessible projects, go to cbf.org/livingshorelines.

Getting Help: Financial Assistance for Public and Private Living Shoreline Projects

Maryland has a wide range of loan, grant, and cost-share programs available for homeowners, communities, local governments, and non-profit organizations through state agencies and private foundations.

Virginia has grants available for private individuals through the Chesapeake Bay Trust's Living Shorelines Initiative. The Chesapeake Bay Restoration Fund in Virginia only funds projects for public and non-profit organizations.

ORGANIZATION	PROGRAM	PROJECT TYPES	ELIGIBLE	STATE	AMOUNT	DUE DATE	CONTACT INFORMATION
Chesapeake Bay Trust, NOAA-Restoration Center, Campbell Foundation, National Fish and Wildlife Foundation	Living Shorelines Initiative	grant	public and private	VA, MD	up to $75,000	Sept.	www.cbtrust.org
Chesapeake Bay Trust Program	Stewardship	grant	public and some private	MD	up to $25,000	July, Dec.	www.cbtrust.org
National Fish and Wildlife Foundation Program	Chesapeake Bay Small Watersheds	grant	public and private	VA, MD	up to $50,000	Feb.	www.nfwf.org
Maryland Department of the Environment, Water Management Administration	Small Creeks and Estuary Restoration Program	grant	public and private	MD	75% cost share	Feb.	www.mde.state.md.us
Maryland Department of the Environment, Tidal Wetlands Division	Tidal Wetland Compensation Fund	grant	private	MD	generally up to $50,000	on-going	www.mde.state.md.us
Maryland Department of the Environment, Water Quality Financing Administration	Water Quality Revolving Loan Fund	low interest loan	public and private, applicant must be local gov't.	MD		Feb.	www.mde.state.md.us
Maryland Department of the Environment, Water Quality Financing Administration	Linked Deposit Program	low interest loan	private	MD		Feb.	www.mde.state.md.us
Maryland Department of Natural Resources Shore Erosion Control Program	Nonstructural Erosion Control	no interest loan	public and private	MD	public: no limit; private: up to $25,000	on-going	www.dnr.state.md.us

(Source: Chesapeake Bay Trust and Maryland Department of Natural Resources)

How to Make Your Living Shoreline Happen:

1. Identify your site conditions and determine suitable types of projects.
2. Contact your local and state agencies to get technical assistance and arrange a site visit.
3. Contact consultants and contractors who specialize in constructing living shorelines for a site visit, information, and financial estimates.
4. Plan ahead!
   - Permits take time (four months or longer depending on the type of work needed) so if you want construction to begin in the spring, you will need to start the permit process in the fall.
   - For grasses and herbaceous perennials, the best time to start construction is in the spring since plants are available from nurseries at the start of the peak summer growing season. (Trees and shrubs can also be ordered for a fall planting.)
5. Take photos before, during, and after your project.
6. Educate your neighbors and community about why you are constructing a living shoreline and what the benefits are to your local watershed and the Bay.
7. Enjoy your beautiful shoreline and the wildlife that you will attract!

Go to **cbf.org/livingshorelines** for more information.

Living shorelines provide a natural setting for both humans and wildlife. They play an important role in restoring water quality in our rivers and streams, and ensure a future for fishing, crabbing, and boating on the Bay.

ABOUT THE COVER:
Shown one year after planting, this living shoreline project at St. John's College, Annapolis, replaced 800 feet of wooden bulkhead with native plantings, tidal wetlands, oysters, and underwater grasses.

bottom photo: Beth LeFebvre/CBF Staff

Living shorelines offer wildlife vital habitat. Diamondback Terrapins need access to shorelines to lay their eggs.

inset photo: Willem M. Roosenburg

PHOTO CREDITS:

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cbf.org/livingshorelines

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CHESAPEAKE BAY WATERSHED

The Chesapeake Bay's 64,000-square-mile watershed covers parts of six states and is home to more than 17 million people.

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