

Solution: LIVING SHORELINES

Description of Solution

Living shorelines are a suite of shoreline erosion control techniques that combine natural coastal habitats with a natural or engineered means of breaking up a waves energy. Unlike traditional erosion control structures, such as bulkheads or seawalls that focus on deflecting wave energy away from a site and may actually increase erosion, living shorelines reduce energy onsite and also allow for the continuation of important natural processes that maintain the health of the broader coastal system. Additionally, living shorelines can and do maintain coastal habitat that would be otherwise lost when traditional coastal management approaches are utilized. While primarily implemented as an erosion control feature, when properly designed, living shorelines can provide some reduction in wave energy during low level storm surge events.

Living shorelines can take many forms. The two primary categories are described below.

- Natural living shorelines are typically used in lower energy environments. They include native vegetation (e.g., marsh grasses and seagrass), clean sediment and biodegradable organic materials (e.g., logs made from coconut fiber).
- Hybrid living shorelines are typically used in lower to moderate energy environments. They incorporate native vegetation, clean sediment, biodegradable organic materials, and low-profile rock structures such as segmented sills, stone containment, and concrete breakwaters (e.g., oyster castles and reef balls) which can be seeded with native shellfish.

Hazard Mitigation

Living shorelines reduce coastal erosion, primarily in lower energy coastal environments – estuaries and protected embayments – by combining vegetated shoreline habitats with some form of living or natural breakwater. The combination of these features breaks up waves closer to shore, reducing wave energy as it comes ashore and then relying on native vegetation to absorb the remaining wave energy as water and waves come into contact with land.

Siting Considerations

The National Oceanic and Atmospheric Administration (NOAA) has established some guiding questions to consider when siting living shorelines. The following is an excerpt from the NOAA document “Guidance for Considering the use of Living Shorelines”.

Natural stabilization systems, like marshes and reefs, should be considered before a hybrid living shoreline design. Living shorelines should be designed based on specific site conditions and the design should be developed in consultation with regulatory staff, a coastal contractor (designer), stakeholders, and other coastal specialists (e.g., engineer or biologist) if possible.



Credit: North Carolina Coastal Federation

Hazards Addressed

Coastal Erosion

Regional Considerations

Northeast
Mid-Atlantic
Southeast
Gulf of Mexico
Great Lakes
Coastal West
Pacific Northwest

Cost

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Community Type

Urban
Suburban
Rural

Scale

Site
Neighborhood

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Important site factors to consider when designing living shorelines include:

- What types of natural habitat are present at the site and along adjacent shorelines?
- What is the extent, rate, and cause of the current erosion problem?
- What are the site's slope, orientation, bathymetry, prevailing currents, waves, and fetch?
- Are other hard shoreline stabilization structures adjacent or nearby?
- Does land loss occur mostly during large storms, or year-round?
- What are the current land and water uses in the area and who owns or manages them?
- How much boat traffic occurs along the shoreline?
- Is the site suitable for planting vegetation as part of a living shoreline project?
- What would be the result if nothing was done to the site?

Additionally, there has been considerable guidance developed to inform the siting, design, and construction of a living shoreline project. Please see the Additional Resources section of this write-up to find general and state specific guidance on pursuing living shoreline projects.

Costs

Costs of a living shoreline will vary greatly depending on the type of shoreline used and the site specific nature of the project. Natural and non-structural living shorelines tend to be lower in cost, while hybrid shorelines are mid-range and structural shorelines are typically highest in cost. The natural shorelines, like biologs, are relatively inexpensive erosion control measures. Hybrid living shorelines that incorporate stone and concrete will cost more, but are still comparable to the cost of bulkheads. A compilation of research on materials cost found living shoreline costs range from \$50 - \$150 per

linear foot based on the type of approach being employed. By comparison, the same analysis found bulkheads range in cost from \$80 - \$1200 per linear foot. Estimates from the same effort found engineering costs to range between \$5000 and \$30,000 for a 300 linear foot living shoreline.

Maintenance Considerations

Annual maintenance is required particularly in controlling invasive plants. Major repairs and reconstruction may be needed periodically following a major storm or flood event especially if the event occurs before plant root systems have developed. More established living shorelines may be able to repair themselves overtime.

Co-Benefits of the Strategy

By maintaining a vegetated coastal edge with necessary tidal exchange, living shorelines preserve natural coastal processes that not only maintain coastal habitats, but can serve to protect and enhance nursery and critical feeding habitats for coastal and estuarine species. Living shorelines can also improve local water quality, in particular reducing nitrogen and phosphorous loading in nearshore waters, by filtering run-off from upland areas and trapping nutrient rich soils in the shoreline system.

Maintenance of these coastal habitats is important because numerous commercially and recreationally valuable fish species rely on coastal and estuarine habitats for spawning and juvenile life stages. It also allows for a more natural aesthetic look to shoreline and coastal areas, preserving the viewshed and part of the coastal living experience. Additionally, a living shoreline allows property owners or the general public the potential to continue to have an entry point to coastal environments and waterways.

Similar or Complementary Solutions

The restoration of offshore features and costal features are closely related to living shorelines and can be used in conjunction with, or as a component of, a living shoreline strategy.