



NOAA's Living Shorelines Engagement

Our oceans and coasts are subject to increasing stresses from storms, warming waters, and declining habitats. **Green infrastructure solutions** to shoreline management, such as living shorelines, will help humans and natural resources coexist on our coasts in a changing climate.

The term "living shorelines" is broadly recognized to encompass a range of different shoreline stabilization applications (along estuary coasts, bays, and tributaries) typically comprised of vegetation or other "soft" elements and may include some type of harder shoreline structure (i.e., oysters or oyster reefs) for added stability.

Living shorelines reduce erosion in ways that provide habitat value and enhance coastal resilience. While techniques and designs are regionally specific, they all have elements that maintain the seamless continuum between land and water to support ecosystem services and habitat values.

Leading by Example

- Providing technical assistance on project design
- Funding projects
- Evaluating innovative techniques
- Promoting the use of living shorelines on NOAA properties

Building and Nurturing Innovative Partnerships

- Partnering with state coastal management programs to strengthen state policies and regulatory processes
- Collaborating with federal agencies on federal permits and consultations (e.g. Nation Wide Permit 2017 renewal process)
- Participating in interagency efforts to promote natural and nature-based features, such as Systems Approach to Geomorphic Engineering (SAGE) and the Army Corps Engineering Research Development Center (ERDC) Natural and Nature Based Features (NNBF) work

Bringing Science & Planning to Stakeholders

- Helping coastal communities to use living shorelines and natural and nature-based features to build resilience
- Conducting research to improve effectiveness and show value (i.e., ecosystem services)
- Providing guidance, training, and public awareness



Chesapeake Bay, Maryland



Puget Sound, Washington



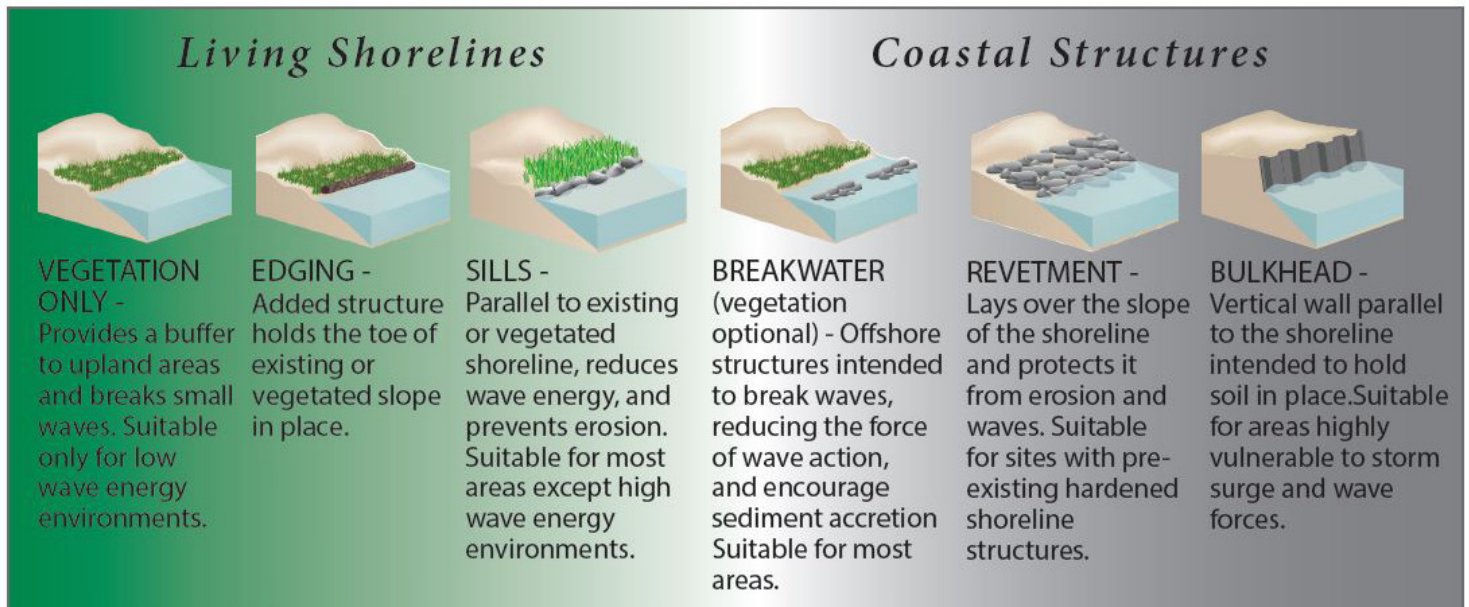
Beaufort, North Carolina

Learn more at www.HabitatBlueprint.noaa.gov/living-shorelines

HOW GREEN OR GRAY SHOULD YOUR SHORELINE SOLUTION BE?

GREEN - SOFTER TECHNIQUES

GRAY - HARDER TECHNIQUES



A continuum of green (soft) to gray (hard) shoreline stabilization techniques.
(Adapted from SAGE 2015 Natural and Structural Measures for Shoreline Stabilization brochure).

What have we accomplished?

Within a relatively short period of time, NOAA and its partners have made major strides in the understanding and use of living shorelines. We have:

- Clarified NOAA's position on living shoreline approaches in the 2015 *Guidance for Considering the Use of Living Shorelines*
- Released the NOAA Living Shoreline website in 2016
- Coordinated with Army Corps of Engineers on the inclusion of a Nation Wide Permit for Living Shorelines for the 2017 Nation Wide Permit reissuance
- Authored several peer-reviewed papers on living shorelines services, including:

Living Shorelines: Coastal Resilience with a Blue Carbon Benefit, authored by Davis, et al and featured in PLoS ONE

Currin, C. A, Davis, J., Malhotra, A. In Press. Response of salt marshes to wave energy provides guidance for successful living shoreline implementation. In, Bilkovic, D.M., Mitchell, M.M., La Peyre, M. K., Toft, J. D. (eds); *The Science and Management of Nature-based Coastal Protection*. CRC Press, expected publication March 2017.

- Completing Literature Database on Green Infrastructure for Coastal Resilience that will be available in 2017
- Continued building long-term monitoring plans and adaptive approaches into key projects
- Provided state-level technical assistance, guidance, and training to increase the rigor of living shoreline projects.

