



Assessing Ecological and Physical Performance of Sustainable Shoreline Structures

Overview

Nature-based, ecologically enhanced, or soft shoreline stabilization techniques (hereafter termed “sustainable shorelines”) have the potential to maintain and enhance important ecological services, provide greater resilience to physical forces, and be cost-competitive with traditional approaches such as revetments and bulkheads. In order for these techniques to be used more widely in the Hudson River Estuary, their performance must be demonstrated and evaluated locally. Landowners, site designers, and decision makers have expressed this need to enhance their confidence in proposing innovative designs to clients, investing in sustainable shoreline construction, and steering permit applications toward these less traditional options.

Over the past eight years, the National Estuarine Research Reserve System’s Science Collaborative has supported the Hudson River Sustainable Shorelines Project, which engages a regional research team to quantify the ecological functions and physical stresses on the full range of Hudson River shorelines. This research is the basis for development of information and tools needed by regulators, engineers, and resource managers to identify the best settings and approaches for sustainable shoreline protection in the Hudson River Estuary. The research included the establishment of a sustainable shoreline demonstration network of seven sites with varying modes of construction distributed along the Hudson. The current project expands that work by 1) developing and field-validating rapid assessment protocols for physical and ecological functions of ecologically enhanced shorelines and 2) training local land managers in these protocols. This work will solidify confidence in the suitability of novel shoreline techniques in the Hudson River Estuary and enable local managers to track performance.

Project Location

Hudson River Estuary, New York

Project Duration

September 2015 to September 2018

Project Lead

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Project Type

Collaborative Research – generating science that informs decisions

Project Partners

- Cary Institute of Ecosystem Studies
- Consensus Building Institute
- Hudson River National Estuarine Research Reserve
- Stevens Institute of Technology

Anticipated Benefits

- Equipped with examples of the feasibility and performance of sustainable shorelines in the Hudson River Estuary, state and federal regulators and funders of shore zone projects will be better able to guide applicant toward innovative, ecologically enhanced shoreline stabilization approaches.
- State and federal regulators will be able to direct permit and grant recipients and their engineers to appropriate protocols for monitoring the performance of sustainable shorelines.
- Consulting engineers will have greater confidence in applying non-traditional shoreline stabilization designs and documented performance to show clients how these approaches can meet stabilization and ecological needs.
- The resulting uniform assessment protocols and database will facilitate long-term and cumulative tracking of performance.
- Consistent assessment of structural performance will also feed back to improved design.

Project Approach

The project approach consists of the following elements:

- Creation of a collaborative structure involving both a coordinating team and an advisory committee to engage users and seek their input throughout the project.
- Further refinement and validation of an ecological rapid assessment for application at the sites in the demonstration network.
- Development of a physical assessment to complement the ecological assessment. This will expand upon prior forensics analyses of shoreline performance completed after major storm events.
- Data collection through the application of these assessment protocols.
- Training of local land stewards, e.g., landowners and park managers, in these techniques so they may track how well their shoreline is performing physically and ecologically.

Targeted End Users and Anticipated Products

Major products to be produced are:

- Simple, field-tested procedures for assessment of both the physical stability and ecological functioning of ecologically enhanced shorelines built along the Hudson River.
- Rapid assessment training tools, including a guidance manual and demonstration videos.
- Database of sustainable shoreline performance data.

Resources

- Assessing Ecological and Physical Performance of Sustainable Shoreline Structures webpage: hrnerr.org/hudson-river-sustainable-shorelines/assessing-ecological-physical-performance

About the Science Collaborative

The National Estuarine Research Reserve System's Science Collaborative supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is managed by the University of Michigan's Water Center through a cooperative agreement with the National Oceanic and Atmospheric Administration (NOAA). Funding for the research reserves and this program comes from NOAA. Learn more at www.nerrs.noaa.gov or www.graham.umich.edu/water/nerrs.