



Project Location

Guana Tolomato Matanzas
National Estuarine Research
Reserve

Project Duration

January 2016 to December 2018

Project Lead

Christine Angelini
University of Florida
(352) 274-7815
c.angelini@ufl.edu

Project Type

Collaborative Research – generating
science that informs decision

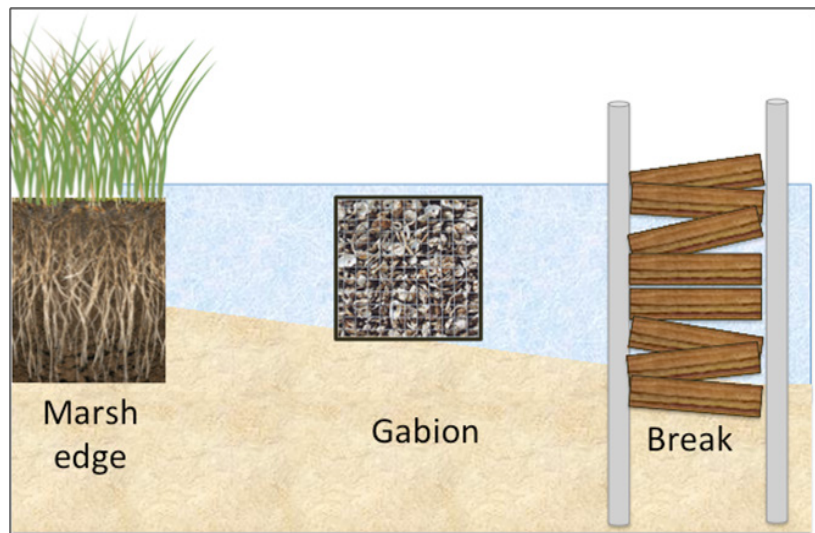
Project Partners

- Guana Tolomato Matanzas National Estuarine Research Reserve
- NIOZ Royal Netherlands Institute for Sea Research
- Northeast Florida Aquatic Preserves
- Radboud University Nijmegen
- University of Florida
- University of Groningen
- University of New Hampshire

Re-Engineering Living Shorelines for High-Energy Coastal Environments

Overview

In estuaries worldwide, the loss of salt marshes and oyster reefs has been alarming, especially along high-energy coastlines. To dampen boat wake and wave stress, mitigate erosion, and restore oysters, managers have been building more natural bank stabilization techniques—often referred to as living shorelines—adjacent to salt marsh edges. These efforts have been largely unsuccessful in achieving coastal management goals under the most destructive, high-energy conditions. This project will test the efficacy of a new strategy for protecting coastal habitat in high-energy environments. The experimental study will integrate engineering and ecological approaches by deploying “gabion-breaks,” a hybrid method for building living shorelines to protect and restore coastlines. Over three years, boat wake and wave energy, oyster reef development, and salt marsh edge movement will be monitored along reaches of shoreline with and without gabion-breaks to measure their success in protecting and enhancing coastal habitat. The project team will incorporate their findings into training activities for restoration practitioners and coastal managers as well as interpretive exhibits for reserve visitors.



Anticipated Benefits

- Stable shorelines, restored oyster reefs, and enhanced biodiversity along reaches of the Guana Tolomato Matanzas National Estuarine Research Reserve and Northeast Florida Aquatic Preserves.
- A cadre of restoration practitioners trained in effective methods for installing, maintaining, and monitoring living shorelines in diverse wake and wave climates.
- A network of resource managers and restoration practitioners informed of a new approach's ability to reduce shoreline erosion and protect coastal ecosystems.

Project Approach

This experimental study will utilize engineering and ecological approaches to optimize the design of living shorelines across an energy gradient in the Guana Tolomato Matanzas Reserve. The project team will profile wave and wake forces, sediment stratigraphy, and marsh erosion rates, using these data to inform the structural design of gabions and breaks. In a large-scale field experiment, engineers, ecologists, and end users will then test the efficacy of gabions positioned behind breaks in dampening waves, slowing marsh erosion, and facilitating oysters. The team will further refine the gabion-break design to optimize its ability to stabilize salt marshes and restore oysters at different wave- or wake-energy levels.

Anticipated Products and Targeted End Users

- Training module for coastal managers to teach estuarine habitat restoration practitioners how to implement the newly designed gabion-break model.
- Video-based manual on the newly designed gabion-break model for the National Estuarine Research Reserve network.
- Interpretive, interactive exhibit at the Guana Tolomato Matanzas Reserve's Environmental Education Center to demonstrate how coastal managers are using engineering and ecology to protect local coastal ecosystems.

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.