



Project Location

Village of Piermont and Piermont Marsh,
New York

Project Duration

November 2016 to October 2019

Project Lead

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Project Type

Collaborative Research – generating
science that informs decisions

Project Partners

- Consensus Building Institute
- Engineering School of Sustainable Infrastructure and Environment, University of Florida
- NASA Goddard Institute for Space Sciences
- New York State Department of Environmental Conservation, Hudson River National Estuarine Research Reserve
- Palisades Interstate Park Commission
- Piermont Waterfront Resilience Commission
- Rosenstiel School of Marine and Atmospheric Science, University of Miami
- U.S. Geological Survey, New York Water Science Center

Affiliated Reserve

Hudson River National Estuarine
Research Reserve

Understanding the Role Coastal Marshes Play in Protecting Communities from Storm Surge and Flooding

Overview

Coastal communities are striving to safeguard themselves from increasing storm risks. One approach is to restore and manage natural features, including coastal wetlands such as Piermont Marsh on the Hudson River in New York. Residents believe Piermont Marsh significantly reduced wave and flood debris damage on the abutting Village of Piermont during Hurricane Sandy. Without the marsh, the financial impact of Sandy would likely have been far worse. Marsh managers and village leaders now seek to better understand the marsh's capacity to buffer against waves, flood, and debris, and the economic values associated with these functions. In partnership with the local community, this project will design and apply state-of-the-art predictive models that will evaluate different approaches to managing the marsh. As a result, marsh managers will better understand coastal wetlands' role in enhancing community resilience to storm events and will have the tools and knowledge to make sound decisions.

Anticipated Benefits

- State marsh managers and local resilience planners will have access to science-based, locally specific information about flood and wave protection tradeoffs among different management and climate scenarios.
- The Village of Piermont will have resources and products needed to make sound, science-supported decisions when developing sea level rise, storm mitigation, and climate adaptation plans.
- The project will inform policy and funding for state and regional efforts to advance the use of natural and nature-based features in coastal protection.
- The project will serve as a case study of understanding and enhancing the role of marshes in storm-prone tidal estuaries.

Project Approach

Informed by two years of engagement and planning with the Village of Piermont, the project team will conduct marsh field surveys and hydrologic and hydrodynamic surveys during flooding events. These data will be used to develop storm surge, wave, and coastal flooding simulations, and risk maps. The project will apply state-of-the-art, predictive models of climate, coastal, and ecological processes that will evaluate alternative marsh management scenarios. The project team will also complete an ecosystem valuation to better understand the economic benefits of the flood protection services provided by the marsh.

To ensure that the work is informed by and useful to the village and creates products tailored to local needs, the project team includes a resident who is a leader in resilience planning. The team will also conduct regular briefings with the Piermont Waterfront Resilience Commission. Broader community-wide outreach will be shaped in cooperation with local leaders.

Targeted End Users and Anticipated Products

Marsh managers, habitat restoration practitioners, and community resilience and adaptation planners will have several new tools and resources to help them make well-informed decisions:

- An assessment of marsh flood and wave buffering capacity under different management scenarios and future conditions, and an economic valuation of this service.
- Baseline data on vegetation characteristics and atmospheric, hydrologic, and hydrodynamic variables during high-energy flooding events to use as a foundation for parameters in regional coastal flooding modeling efforts.
- A comprehensive assessment of the flood-, surge-, and wave-buffering capacity of Piermont Marsh, and how capacity may vary under different vegetation management scenarios.
- Flood maps that incorporate the effects of sea level rise and climate change.
- A freely available web-based app, designed to share flood-risk and ecosystem-service value maps and other products with different user audiences.

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 coast.noaa.gov/nerrs or graham.umich.edu/water/nerrs.