Bringing Wetlands to Market: Expanding Blue Carbon Implementation

Project Location

New England

Project Duration

September 2015 to September 2019

Project Lead

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Project Type

Collaborative research – Generating science that informs decisions

Project Partners

- Cape Cod National Seashore
- Friends of Herring River
- Marine Biological Laboratory
- National Estuarine Research Reserve Association
- Restore America's Estuaries
- U.S. Geological Survey
- University of Rhode Island
- Waquoit Bay Reserve
- West Virginia University

Project Webpage

nerrssciencecollaborative.org/project/Rassman15

Overview

Blue carbon storage—carbon sequestration in coastal wetlands—can help coastal managers and policymakers achieve broader wetlands management, restoration, and conservation goals, in part by securing payment for carbon credits. Despite considerable interest in bringing wetland restoration projects to market, the transaction costs related to quantifying greenhouse gas fluxes and carbon storage in restored marsh has been a significant limiting factor to realizing these projects.

The Waquoit Bay National Estuarine Research Reserve has been at the forefront of blue carbon research and end-user engagement. It launched the collaborative *Bringing Wetlands to Market* project to develop tools to bring blue carbon into wetland management practice. The project's first phase, Nitrogen and Coastal Blue Carbon, conducted cutting-edge research examining the relationship between salt marsh, climate change, and nitrogen pollution.

This second phase of the project, *Expanding Blue Carbon Implementation*, developed a verified and generalized model that can be used across New England and the mid-Atlantic East Coast to assess and predict greenhouse gas fluxes and potential wetland carbon storage using a small set of readily available data. The project conducted a first-of-its-kind market feasibility assessment for the Herring River Restoration Project, one of the largest proposed wetland restoration projects in New England. Alongside this research, the project team developed targeted tools and education programs for coastal managers, decision-makers, and teachers. These efforts have built an understanding of blue carbon and the capacity to integrate blue carbon considerations into restoration and management decisions. Additionally, the project brought new attention to tidally-restricted wetlands as an untapped opportunity to reduce greenhouse gas emissions. In a significant new finding, researchers showed that wetlands impaired by the restriction of tidal flow are a common source for large quantities of anthropogenic methane emissions. This suggests that the protection and restoration of wetlands can be a new, potent method for emissions reduction, while also enhancing habitat and coastal resilience.

Project Approach

The Waquoit Bay National Estuarine Research Reserve and its partners worked with end users to greatly enhance the applicability of an existing model that predicts greenhouse gas exchange (CO2 and CH4) from Waquoit Bay coastal wetlands. The model was based on observations of photosynthetically active radiation, soil temperature, and porewater salinity. The project team gathered and collected data from 26 natural and restored salt marsh sites along the mid-Atlantic coast across a range of ecological conditions, then refined and tested the robustness of the model in order to generalize it for use at a regional scale and over a wider range of environmental conditions. To demonstrate how blue carbon can be applied to degraded tidal wetlands in New England, a carbon market feasibility assessment was conducted for the Herring River Restoration Project at Cape Code National Seashore, which would restore tidal flows to over 1,000 acres of former salt marsh. The assessment included an analysis of the project's technical, organization, financial, and legal feasibility, highlighted potential benefits of a blue carbon market project, and made overall recommendations to Herring River Restoration Project partners.

Throughout *Bringing Wetlands to Market*, strong sustained engagement with restoration practitioners, wetland managers, policymakers, and educators enabled the project team to share lessons from the modeling approach and Herring River feasibility analysis in seminars, outreach materials, and discussions with those interested in blue carbon. The project team identified education needs around blue carbon and created targeted educational programming and interpretation for managers, policymakers, teachers, K through 12 students, and the public.

Results

This second phase of *Bringing Wetlands to Market* brought into focus the significance of hydrologically impaired and managed wetlands (those that have been cut off from natural tidal flows) as a source of anthropogenic greenhouse gas emissions in New England. A few key research and modeling results with particular relevance to blue carbon implementation are outlined here.

- Tidal wetland restoration can be a highly impactful climate change mitigation action. The project showed that tidally-restricted wetlands are a common source for anthropogenic methane emissions. Restoring these wetlands both reduces methane emissions associated with degradation and restores the soil carbon storage capacity of natural salt marshes. Restoring tidal flow to degraded wetlands has a greater climate mitigation impact per unit area than creating or conserving wetlands. Over time, restored wetlands return to long-term carbon storage, while also producing other benefits, such as resilience to accelerating sea level rise.
- The Herring River Restoration Project feasibility assessment showed tidal wetland restoration projects in the United States are well positioned in voluntary carbon markets. The many co-benefits that these projects offer make them attractive to investors. The study found the Herring River project to be eligible for carbon offsets under existing voluntary markets at an expected price of approximately $10 per ton. In most scenarios, carbon revenues would cover start-up project transaction costs and support long-term monitoring.

Products

- Coastal Wetland Greenhouse Gas Model 2.0 (CWGM 2.0)—a user-friendly tool to predict greenhouse gas fluxes and potential carbon storage in coastal wetlands
- Herring River Restoration Project feasibility study
- Educational resources for K through 12 students and teachers
- Blue carbon public outreach materials, fact sheets, and conference presentations
- Several scientific publications

Benefits

- Strong awareness of blue carbon approaches at various levels of government and within resource management agencies. Engagement with the project and its findings helped move forward support for blue carbon with federal, state, and local partners. This includes substantial support for tidal restoration in coastal wetlands in the Climate Stewardship Act of 2019 introduced by Senator Cory Booker, and ongoing discussion with Massachusetts state agencies and policymakers considering wetland management approaches for greenhouse gas benefits.
- Strong influence on blue carbon research, education, and stakeholder engagement across the country.
- Incorporation of tidal restoration and its methane reduction benefits into guidance provided by the U.S. EPA, National Academy of Sciences, and Intergovernmental Panel on Climate Change (IPCC) Wetlands Supplement.
- Increased ability of coastal managers and policymakers to understand and speak to the greenhouse gas benefits of coastal restoration and conservation actions.

What's Next

The project team will continue to work with research and management partners and policymakers to advance further research on methane in wetlands, integrate blue carbon into state greenhouse gas policies, and continue market exploration for the Herring River Project.

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 nerrssciencecollaborative.org or coast.noaa.gov/nerrs.