

Nitrogen Removal Services of Restored Salt Marshes in Jamaica Bay

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Abstract

Coastal wetlands are important sites of nitrogen removal, a critical ecosystem service in highly eutrophic environments. In Jamaica Bay, over 92% of historic wetland area has been lost over the past century. Despite considerable efforts to restore wetland ecosystems in Jamaica Bay and throughout New York City, few studies have examined the value of ecosystem services used to justify their cost, and little is known about the ecological mechanisms contributing to the success or failure of reconstruction. Past and ongoing restoration efforts in Jamaica Bay provide a unique opportunity to study nitrogen-removal ecosystem services in natural and restored wetlands in an urban, eutrophic environment. In collaboration with researchers from several institutions, we are using a chronosequence of marsh restorations to assess how marsh vegetation, sediment characteristics, and key processes of the nitrogen cycle develop over time following restoration. The ultimate goal of our project is to determine the restoration age and environmental conditions under which salt-marsh restoration will effectively provide ecosystem services such as nitrogen removal. We employ a combination of flow-through incubation, field survey, and experimental methods to identify the key biological and abiotic factors limiting nitrogen-removal services in natural and restored marshes. Preliminary results indicate that restored marshes remove a significant amount of nitrogen via microbial denitrification and accumulation of organic material. Across the restoration chronosequence, we detected increases in plant root mass, indicating that restored marshes also become more stable over time.

Biography

I am an ecosystem ecologist interested in the effects of organisms and ecological communities on ecosystem function. I am especially interested in predicting how changes to communities arising from human activities (e.g., global climate change, sea-level rise, species invasions, and land development) will alter critical ecosystem services. My research to date has focused on predicting the effects of wetland plant communities on denitrification, a microbial nitrogen-removal process that is an important ecosystem service in wetlands. My work has also addressed the impacts of management, including both invasive-plant removal and salt-marsh restorations, on ecosystem services.