RAPID TIDAL MARSH GROWTH IN THE HUDSON RIVER DUE TO SHORELINE MODIFICATIONS

Results show that many tidal wetlands on the Hudson are remarkably young, having developed only within the last 150 years as a result of human activity

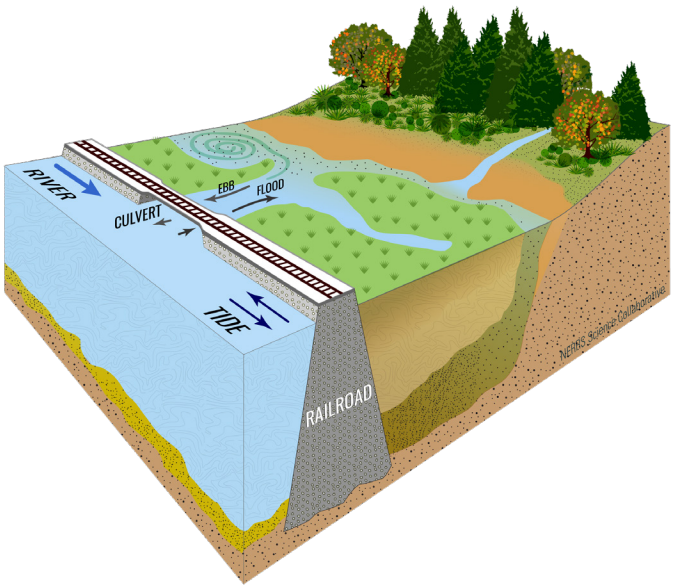
This document is part of a series that captures the outcomes of Dams and Sediment on the Hudson (DaSH), a research project to assess how sediment released by dam removals in the Lower Hudson River watershed would affect the estuary. For more information, visit www.hrnerr.org/hrnerr-research/dams-and-sediment-in-the-hudson.

KEY POINTS

- The Hudson River shoreline has been heavily modified since 1850 CE due to railroad construction, dredge spoil emplacement, and channelization.
- A majority of the tidal wetlands on the Hudson River are less than 150 years old and grew in response to these shoreline modifications.
- Marshes that formed as a result of modifications have accreted vertically up to three times faster than sea level rise (SLR), indicating abundant sediment supply that will aid in resilience for marshes along the Hudson to accelerated SLR.

BACKGROUND

Dams and Sediment on the Hudson (DaSH) was a research project funded by the National Estuarine Research Reserve System (NERRS) Science Collaborative to assess how sediment released by dam removals in the Lower Hudson River watershed would affect the estuary. Scientists from the Woods Hole Oceanographic Institution, University of Massachusetts-Amherst, and the Hudson River NERR led the research, and the Consensus Building Institute led the collaborative process. A broad coalition of Hudson River stakeholders, including representatives from the New York State Department of Environmental Conservation (NYSDEC), engineering firms, and non-profits advised the researchers.

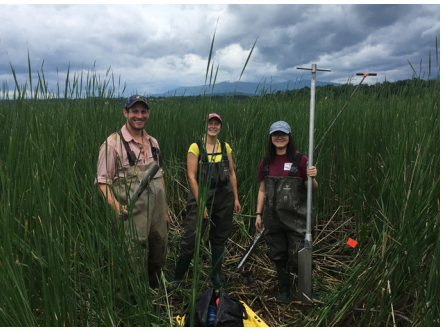


TIDAL WETLANDS ON THE HUDSON RIVER

Tidal wetlands are widely recognized as one of the most important coastal habitats, supporting critical fish and wildlife species, providing natural filtration for improving water quality, and mitigating flooding for coastal communities. These tidal wetlands are currently a highly valued feature of the Hudson River Estuary, and often are assumed to have persisted for as long as the tidal river has been in existence. However, many of the Hudson River's tidal wetlands reside behind or adjacent to man-made structures such as railroad causeways and dredge spoil islands. How have these relatively recent structures impacted tidal wetlands on the Hudson River?

AGE OF WETLANDS?

The research team collected detailed transects of sediment cores from representative wetlands along the Hudson River Estuary including Stockport Flats, Esopus River Delta, Tivoli Bays, Vanderburgh Cove and Iona Island. Using geochronological dating techniques, the team determined when each wetland began to form and how rapidly they were accumulating sediment. Surprisingly, results show that most of these wetlands are remarkably young, having developed only within the last 150 years, and some only within just the last few decades. Results point to man-made activities on the Hudson River as a positive and necessary ingredient for the development of many tidal wetlands in the system, but why?



HUMAN IMPACTS

The Hudson River is remarkably straight, with steep banks and a deep channel carved into bedrock by past glaciations, with few naturally sheltered locations in which tidal wetlands can develop. Following the growth of railroads in the mid-1800's, railroad causeways became a defining feature of the Hudson River shoreline. Sheltered coves and embayments behind these causeways had weaker tidal currents and quickly trapped sediment pumped in from the Hudson River's main channel each flood tide, resulting in the shallowing of these systems to tidal flats and then tidal wetland development. Dredging of the Hudson River's navigation channel, which was extended to Albany around 1930, had similar impacts with dredge spoil islands constructed adjacent to the navigational channel providing shelter for additional tidal wetlands. In all, the research team estimates that over 50% of tidal wetlands on the Hudson River have developed as an unintended consequence of human activities along the river, and in turn are relatively new features for the system.

NEXT QUESTIONS

Interestingly, not all of the coves and embayments now sheltered by the railroad have been converted to tidal marsh. Why did some areas develop into marsh while others did not? Research on this question is ongoing and will provide valuable information on the recipe for success in marsh development. With billions proposed for future tidal marsh creation and restoration, this research will allow for an important assessment on the viability of specific strategies as long-term investments.

WANT TO LEARN MORE?

Visit the DaSH website (https://www.hrnerr.org/hrnerr-research/dams-and-sediment-in-the-hudson) to learn more and find data collected with this project, links to journal articles, and a tool to help estimate the amount of sediment trapped behind a dam.

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