



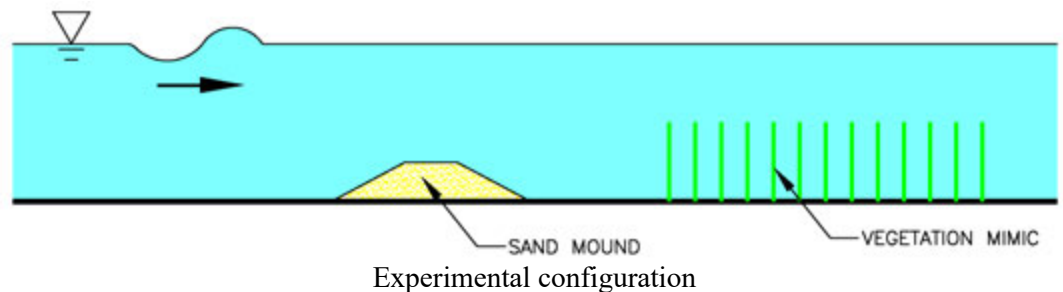
Nearshore Berms for Wetland Nourishment

Description (Previous research efforts have focused on nearshore berms placed on an open coastline, but nearshore berms can also be placed in bays and estuaries, particularly near wetlands to shelter the wetland by dissipating wave energy and to provide a sediment source to the wetland.

Vegetation can alter the wave climate by dissipating wave energy and alter the bathymetry by creating an environment conducive for suspended sediment to settle out of the water column or by capturing sediment transported into the vegetated area. There are fundamental knowledge gaps in the understanding of wave dissipation by vegetation and sediment transport in vegetated areas. These knowledge gaps can have a significant impact on the interpretation of bathymetric changes in vegetated canopies.

A two phase experiment is proposed to be conducted at the ERDC to fill some of the knowledge gaps in wave energy dissipation and sediment transport in vegetation with variable submergence. The proposed experimental configuration is shown in the figure below. The first phase will study hydrodynamics of waves propagating through submerged vegetation mimics consisting of wooden dowels. High resolution velocity measurements will be conducted using Acoustic Doppler Velocimeters (ADV's) and Particle Image Velocimetry (PIV) to quantify the mean cross-shore undertow profile, wave-induced setup (storm surge), and turbulent characteristics responsible for sediment settling or mobilization. These measurements will be used to validate an analytical wave model, which can increase the understanding of mean flow processes in a submerged canopy.

The second phase of the experiment is inspired by the active nearshore berms that have been placed near coastal wetlands as a beneficial use of dredged sediment to nourish wetlands. This phase of the experiment will monitor the sediment transport of a nearshore berm placed near the vegetated area. The nearshore berm will be exposed to a range of hydrodynamic conditions and the sediment migration will be monitored. This phase of the experiment will improve the fundamental understanding sediment transport in coastal vegetation and is the first step towards the long term goal of creating placement guidance and tools for nearshore berms near coastal wetlands.



Issue/Challenge To Address

There is a major knowledge gap in the understanding of sediment transport in vegetated wetlands. This project will investigate how nearshore berms can be used to nourish wetlands

Successes Lessons Learned

Lessons learned will be compiled during the duration of this study.

Projected Benefits Cost Savings



US Army Corps
of Engineers.
Engineer Research and
Development Center

National Regional Sediment Management Program Engineer Research and Development Center (ERDC):



Nearshore Berms for Wetland Nourishment

An improved understanding of sediment transport near wetlands will lead cost savings for ! O&M and FRM by making more nearshore placement areas available for dredged sediment in ! the long term.

The improved understanding will benefit future ecosystem restoration projects. !

Expected Products

- Journal Article - Hydrodynamics in submerged canopies
- Journal Article – Sediment transport in submerged canopies

Stakeholders/Users

Stakeholders will be involved and notified of progress through a group advocacy newsletter, journal publications, and conference presentations.

Leveraging Opportunities

Funding for this project will be leveraged with several programs. The cost of this experiment with an international collaborator is \$345k. This experiment is proposed to be funded \$260k between four US Army Corps of Engineers research programs (CIRP, Flood and Coastal, DOER/EWN, and RSM). The hydrodynamic portion of the experiment will be funded by Flood and Coastal and DOER through their EWN initiative. The sediment transport in submerged canopies portion of the experiment will be funded by CIRP and RSM. Deltares in Delft, Netherlands will support this experiment with ~\$75k in labor funds for a Dutch colleague to participate. The \$10k needed for his travel expenses will be funded through Dutch funding mechanisms.

Points of Contact

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Participating Partners

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