Engineering With Nature Project Fact Sheet

Title

Characterize and Evaluate Performance of Sediment Strategically Placed Adjacent to Wetlands

Background

Strategic placement of dredged material in the nearshore as a beneficial use technique is a common practice for Operations & Maintenance (O&M) dredging within the Corps of Engineers. The nearshore placement design concept has been recognized to follow the principles of Engineering with Nature (EWN) and Regional Sediment Management (RSM) by allowing the waves and tidal forces to move sediment into alignment with the natural environment. Previous research efforts have focused on the nearshore placement of dredged sediment on open coastlines, but sediment 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.

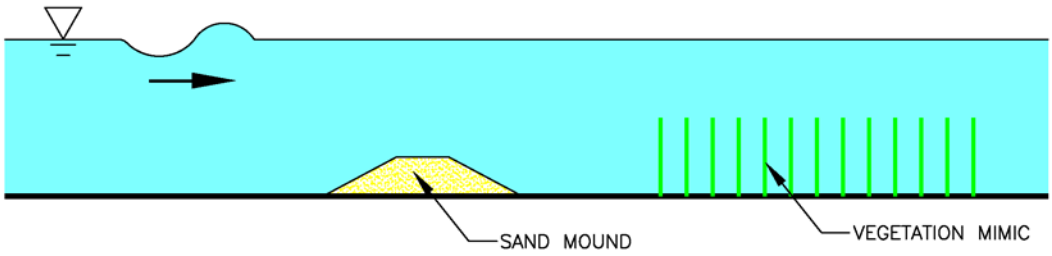
Vegetation can alter the wave climate by dissipating wave energy and alter the bathymetry by creating an environment conducive for suspended sediment to settle out of the water column or by capturing sediment transported into the vegetated area. There are fundamental knowledge gaps in the understanding 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.

Objectives

Understanding the hydrodynamics and sediment transport in vegetated wetlands is the first step towards the long term goal of creating placement guidance and tools for strategic placement of dredged sediment near coastal wetlands. This study could also make more nearshore placement sites available in bays and estuaries near wetlands by improving the understanding of the sediment transport near vegetated wetlands.

Approach

A two phase experiment was conducted in a wave flume at the ERDC in Vicksburg, Mississippi to improve the understanding of the hydrodynamics and sediment transport in a submerged canopy. The first phase measured the hydrodynamics in a meadow of submerged vegetation mimics using wave gauges coupled with Acoustic Doppler Velocimeters (ADV's) and Particle Image Velocimetry (PIV). The ADV measurements were measured at several locations through the meadow, and the high resolution hydrodynamic measurements is critical for understanding the hydrodynamics driving the sediment transport in the second phase. The second phase of the experiment strategically placed sediment near the meadow of vegetation mimics and measure the morphological evolution of the placed sediment with laser bathymetric measurements to study the sediment migration under a range of hydrodynamic conditions.



Experiment configuration

Outcomes

Results from this experiment will be published in three scientific journal articles: two journal articles on the hydrodynamics and one journal article on the sediment transport near the submerged canopy.

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