

Engineering With Nature Project Fact Sheet



Quantifying the Efficacy of Floating Vegetated Canopies for Shoreline Protection

Background

Shoreline erosion and coastal flooding are multi-billion-dollar problems in the United States that will further intensify in coming decades as climate change manifests in sea level rise and increased storm activity. The federal response to these escalating challenges must include novel, cost effective, and scalable approaches for shoreline protection and flood mitigation.

The energy from surface ocean waves reaching the shoreline is the primary natural cause of coastal erosion. Vegetated floating canopies are a novel Nature Based Solution (NBS) that can dissipate and redirect wave energy before it reaches the coastline. This project will assess the efficacy of using vegetated floating canopies for shoreline protection.

Objectives

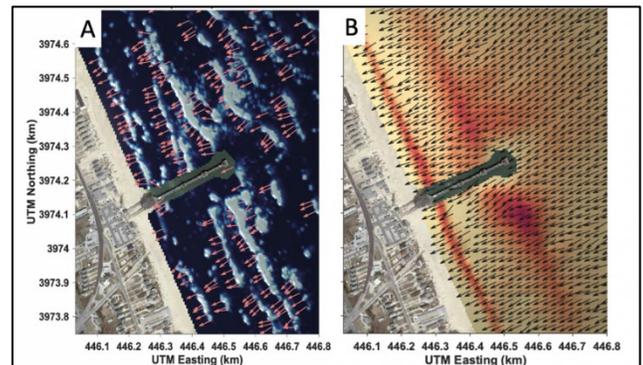
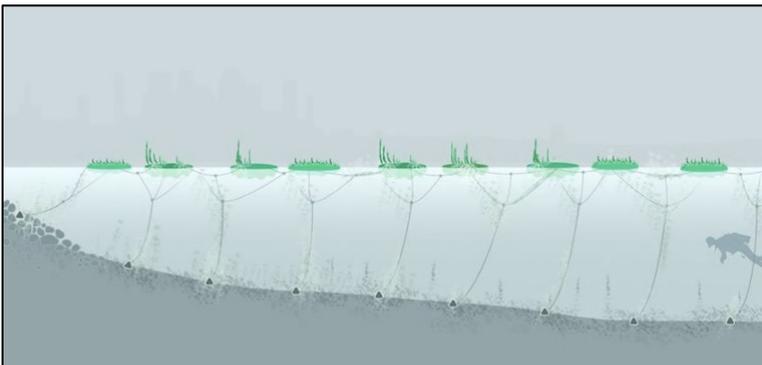
The first objective of this work is to use state-of-the-art observation systems to measure how much wave energy is eliminated by a vegetated floating canopy field and assess how this NBS protects both the local and regional shorelines from erosion. The second objective is to incorporate the findings of the observed data into numerical models so that the models can be used to provide guidance on optimal field design for future projects.

Approach

The approach is divided into three stages including deployment, observation, and analysis. The deployment stage is to establish a full-size field of vegetated floating canopy structures in Provincetown, MA (see lower left figure). The observation stage will use a strategic array of in-situ and remote sensors, as well as repeated shoreline surveys, to assess wave dissipation and refraction associated with the full-size vegetated canopy field, both in the near- and far-field. The assessment stage will evaluate and use the observed data to validate numerical wave models and tune modeled wave parameters, so that the models can be used to provide guidance on strategic field configurations of floating vegetated canopies (see lower right figure).

Outcomes

The findings from this project will provide the first direct measurements of wave refraction caused by an engineered vegetated floating canopy. Combined with wave energy dissipation estimates from in-situ sensors, these results will provide new guidance on exactly how waves interact with this type of NBS to shelter the coastline. By incorporating the findings into numerical models, this project will help guide improved future vegetated canopy deployments that will meet Engineering with Nature® (EWN®) objectives including producing operational and cost efficiencies, providing new ecological habitat, and creating a more climate resilient shoreline protection solution.



Point of Contact:

Ian Connery (ERDC CHL, FRF), ian.w.conery@usace.army.mil, 252 - 261 - 6840 x 266