Engineering With Nature Project Fact Sheet

Remote Sensing of Back-Bay Establishment Following Sediment Nourishment

Background

The placement of beneficial use of dredged material (BUDM) to nourish wetland ecosystems supports the coastal environment against threats like sea level rise and sediment starvation while also providing convenient disposal options for dredged materials from navigational channel maintenance. While these nourished sites require time to establish before realizing the desired ecosystem services (e.g., flood/storm protection, habitat, etc.), the amount of time and processes to reach full potential are poorly understood. This project seeks to better understand the ecological and morphological processes that a nourished site undergoes on its path to an established, thriving, and healthy wetland ecosystem. Providing USACE Districts with reliable methods to monitor BUDM sites will provide the confidence needed to initiate more BUDM projects, which in turn will help USACE to reach their goal of using 70% of dredged material beneficially by 2030.

Objectives

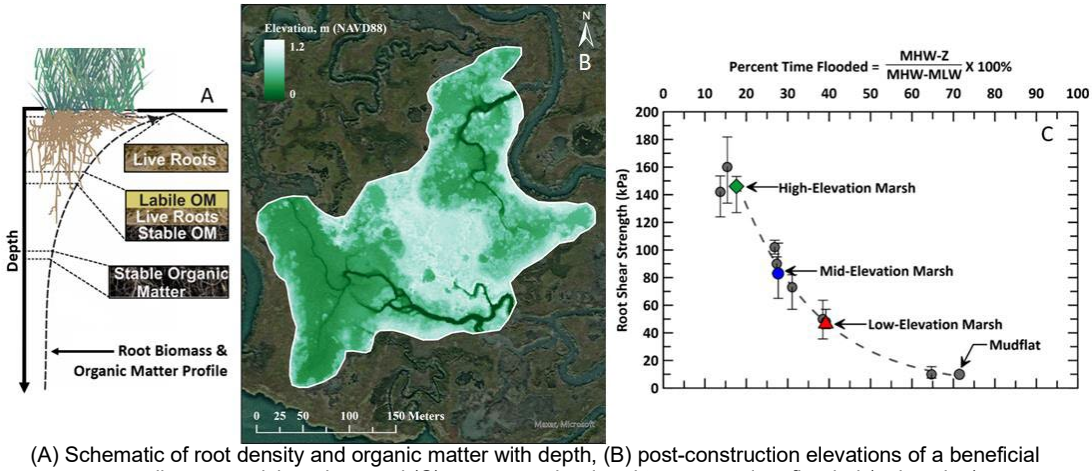
The project objectives are to (1) employ a combination of off-the-shelf and experimental remote-sensing methods to monitor environmental performance measures of a site recently nourished (0-10 years) with BUDM, (2) obtain a better understanding of establishment trajectories, and (3) establish best practices for industry to more effectively monitor BUDM sites.

Approach

The project approach involves two parts, including (1) using remotely-sensed data to monitor large scale morphologic and ecologic responses and (2) using in-situ measurements to provide validated point locations. Remotely-sensed data will include interferometric synthetic aperture radar (InSAR), Light Detection and Ranging (LiDAR), multispectral imagery, and photogrammetry data that will be collected using mixed platform methods. The remotely sensed data will provide information on vertical/horizontal displacement, vegetation indices, and turbidity. For the in-situ measurement sensors, an innovative, low-cost method of employing bender elements will be developed and compared to previously validated sediment profile image method (SPIscan) to monitor morphologic responses.

Outcomes

USACE Districts require cost-effective and accessible methods to monitor back-bay BUDM sites to determine if the site is reaching the design goals and desired ecosystem services. An outcome of this project will be the refinement of remote sensing techniques to monitor morphological and ecological trends. Satellite-based remote sensing methods are the future of site monitoring, however, they still require in-situ data to ensure accuracy. The project will promote collaboration between ERDC, USACE Philadelphia District, federal/agency partners, and academia, with an emphasis on academia to provide training and experience to future researchers and practitioners.



(A) Schematic of root density and organic matter with depth, (B) post-construction elevations of a beneficial use sediment nourish project, and (C) root strength related to percent time flooded (~elevation).

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