Enhancing Confined Disposal Facilities Operation to Support Coastal Resiliency

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Dredged Material Management - DMM

Problem

In current practice, uncontaminated sediment is often dredged from navigation channels and locked away in Confined Disposal Facilities (CDFs). These CDFs are reaching capacity while the surrounding environments degrade due to sea level rise and storm forcings. While Districts are interested in sediment extraction, USACE currently lacks guidance on optimal methods to identify the physical characteristics (i.e., grain size, geotechnical properties), mine, and transport material, especially for water-locked CDFs (i.e., CDF islands). As a result of current inefficiencies and lack of guidance, there have been no major, systematic efforts to extract sediment from CDFs for the purpose of environmental restoration. Additionally, CDFs utilize earthen containment dikes and toe protection features, which may require adaptive management such as enhanced toe protection and dike raising to increase capacity. Coastal forcings (i.e., toe scour) can pose risks to navigation channels, infrastructure, species, and public safety. Limited resources and guidance contribute to under-documented CDF failures that cannot be efficiently addressed with a reliance purely on upland geotechnical techniques and principles.

Study Description

The purpose of this research is to develop guidance for CDFs to support increased beneficial re-use of dredged material and ensure the resilience of CDFs to natural forces. The proposed research addresses this through multiple objectives: (1) Use case studies to demonstrate how geotechnical and remote sensing surveys can assess sediment suitability and quantify sediment volumes within CDFs (2) develop guidance documents on cost-effective methods to characterize, extract, and transport material to support beneficial re-use opportunities. (3) Identify adaptive management opportunities using geotechnical, geophysical, and remote sensing surveying methods paired with slope stability and scour analyses. Guidance documents will outline monitoring, computational, and adaptive management methods of CDF earthen containment dikes to address needs expressed in Statement of Need 2182.

Products

The primary outreach product resulting from this work is documentation of the current state of practice for CDF sediment extraction and associated issues (including summaries of project sensing sessions), multiple journal and conference publications on CDF field demonstrations, and a final sensing session to assess if all needs were met and identify a path forward.

Summary

The USACE currently seeks to beneficially use 70% of dredged material by 2030 but contaminated sediment still relies on placement in CDFs. This project supports restoring CDF capacity for contaminated sediment by co-developing with districts guidance for characterizing, extracting, and beneficially re-using clean sediment.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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