Dredge Sediment Reuse: Expanded Approach with Broad Applications

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BACKGROUND & OBJECTIVE
An increase in the size of cargo ships has required construction of deeper and wider ship channels resulting in the generation of large volumes of dredged sediments. Coupled with the limited suitable shoreline sites to build new containment facilities and restrictions on ocean dumping, this has resulted in the need to collaborate with many stakeholders to manage economically viable and large-scale innovative dredged material reuse projects. In addition, stream and river sediment is more frequently being managed as a pollutant by USEPA, particularly in East Coast fish habitats such as the Chesapeake Bay, further complicating dredging disturbance and reuse placement.

PORT OF BALTIMORE
- Over 30 million tons of cargo annually
- Over 100,000 jobs connected to the port
- Contributes nearly $3 billion in annual wages and salaries

The team conducted an in-depth review of tidal and non-tidal sediment characteristics in the Mid-Atlantic region, USEPA and state dredge material reuse regulations and guidance documents, and the various geographic environments for the purpose of developing innovative dredged sediments reuse plans and partners. Critically, these plans and partners are designed to leverage detailed cost-benefit analyses and local expertise to maximize the economic benefit of dredge material reuse.

To effectively manage dredged sediments with varying physical and chemical characteristics within a defined water body, a wide variety of sediment reuses are typically necessary. Reuse partners identified for fine grain sediments are very different from the many reuse options available for predominantly sand-sized sediments. In addition, sediment generated from projects in the Mid-Atlantic often contain both “clean” sediments suitable for many reuse applications and contaminated sediments with limited reuse applications, prompting the need for a diversified reuse plan. Establishing these varied reuse partners is the foundation of successful and economically sustainable projects.

RESULTS & LESSONS LEARNED
Prior practice of establishing a single large volume reuse that can address all types of sediment and contaminants is not economically viable for many jurisdictions with varying degrees of contamination nor is it flexible enough to withstand a changing product marketplace. An in-depth understanding of the numerous physical, regulatory and stakeholder considerations is required for innovative reuse to be successful. This work highlights the need for the establishment of a team of environmental professionals and contractors working together to quickly respond to and solve the complex problems associated with the removal and reuse of dredge materials from Mid-Atlantic water bodies.

SEDIMENT REUSE EVALUATION

The Measurement of Environmental and Resource Values
- Travel cost method
- Hedonic pricing
- Contingent valuation
- Choice/conjoint analysis
- Benefit transfer
- Averting behavior/avoided cost
- Eckstein market pricing

SUCCESSFUL CASE STUDY EXAMPLES

Upper Newport Bay Ecosystem Restoration
- Removal of 1.5 million cubic yards of accumulated sediment from the Upper Newport Bay
- Used a combination of an amphibious excavator and portable hydraulic suction dredge for semi-submerged dredging, pumping and capping
- Reduced sediment to build habitat islands within the Upper Bay for the endangered California Least Tern and other migratory waterfowl

Hamilton Army Airfield Wetlands Restoration Project
- Beneficially reused over 6 million cubic yards of dredged sediment from the Port of Oakland 50-foot deepening project
- Pumped material onto 988 acres of a former military airfield adjacent to bay
- By using the sediment, airfield was transformed into tidal and seasonal wetlands, upland ponds and grasslands, tidal ponds, a wildlife corridor, an intertidal channel and a mudflat area
- Material was dredged and transported via scows and then pumped up to seven miles throughout the site using a system of 5 high-powered pumps

Point Isabel: Sediment Reuse on Former Industrial Site
- Lead impacted dredged sediment was encapsulated within veneers and capped to create a 22-acre shoreline park
- The dredged sediment was dewatered and contained onsite as upland fill
- The shoreline was stabilized with a geotechnical and rip-rap, and the shellfish bed habitat was restored with clean sediment