Sequestering Dredge Material Contaminants for Beneficial Use Applications in 3D Printed Structures

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Risk Management

Problem

The use of 3D printing has grown across many scientific fields, solving problems with innovative ideas and methods. The use of 3D printing technology could also lead to innovation and technologies for the beneficial use of dredge materials. There is a large opportunity to answer the initial questions about the process and methodologies of 3D printing dredge material along with the feasibility of printing dredge material for use in the environment. The development of 3D printing with dredge material is relatively new and there are few journal articles and data to answer the most basic of questions that are needed. The leaching of contaminants from 3D printed dredge material is not understood.

Study Description

This research task will develop optimal methods for 3D printing collected dredge material and determine if the 3D printed dredge material leaches contaminants during or after being 3D printed. The 3D printing methods developed will be best practices and parameters for pre- and post- processing of the dredge material along with what additives can be added to the dredge material that would reduce or remediate the leached contaminant. This research task will provide a solid base for future 3D printing of dredge material novel ideas and techniques.

Products

ERDC Technical report (Q4 FY24) – Methods for 3D printing dredge materials to sequester contaminants.

Short demonstration video (Q4 FY24) – Dredge material leaching demonstration.

Journal Article (Q4 FY25) – Leachate and Toxicity of 3D Printed Dredge Material Structures to Three Species.

Summary

A detailed method and understanding of dredge material in 3D printing will guide future beneficial use of dredge material to meet USACE beneficial use goals. This research topic will develop optimal methods for 3D printing dredged materials and explore the leaching potential from contaminated dredge materials. For dredge materials that do have leachates, additives will be studied to determine best practice types to sequester leachate contaminants. The research topic will increase USACE understanding of potential new avenues of beneficial use for dredge material.

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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Research Products

Product Type	Product Title
Video	Sequestering Dredge Sediment Contaminants for Beneficial Use Applications in 3D Printed Structures https://doer.el.erdc.dren.mil/media.html#bu-3d_1

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