

Beneficial Use of Contaminated Sediments: A Literature Review for the Sediment Management Work Group

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What is Beneficial Use?

- Dredged sediment can:
 - Go to a disposal facility
 - Be used as a resource (“beneficial use”)
- Beneficial uses
 - Coastal resiliency management
 - Locally manufactured building materials
 - Wetland/other natural habitat restoration and enhancement
 - Land reclamation
- Beneficial uses can involve pre-treatment

Sustainability Mindset

- Beneficial use advantages:
 - Reduces demand for limited landfill space
 - Promotes development of pre-treatment technologies
 - Helps satisfy demand for construction fill
 - Encourages circular use of locally available material
 - Lowers energy use, greenhouse gas emissions
 - Improves ecosystem quality by enhancing habitat

White Paper – SMWG

- Commissioned deliverables:
 - White paper – 170+ citations
 - Annotated bibliography – 50+ annotations
- Present the findings of a literature review on beneficial use of sediments in North America and Europe
 - Identify the current state of the practice
 - Successes, barriers, existence in regulation, and examples
- Explicit focus on contaminated sediments

Background

- Beneficial use has examples throughout the last 30 years but most regulatory entities in North America and Europe regulate dredged material as if it were a waste
- Recent updates to certain programs consider select beneficial use scenarios, when environmentally appropriate
 - US Army Corps of Engineers 2021; EPA 2021
 - Regional programs
- Short-term appeal to landfill solutions:
 - Typically lower upfront costs than treating and using the sediment
 - Fear over chemical exposure
 - Lack of streamlined process for beneficial use means those options require time and creativity
 - Lack of need for more creative, sustainable solutions
- Commitments to sustainability (i.e. European Union's Green Deal) promote changing how we think of beneficially using sediment

Barriers to Beneficial Use

- Permitting and licensing for beneficial use are complex, sometimes unclear, and require extensive consultation with multiple parties
- Conservative screening criteria, even if exposure pathways have been reduced
- Public trust or acceptance in incorporating products that used contaminated sediment as a raw material

What Works

- Thinking about “clean” sediments as a resource is a good starting point
- Regional efforts are important at providing precedent for national and international regulation updates
- Pre-planning and regional coordination are commonly cited as essential to successful acceptance and permitting of beneficial use
- Education and early involvement of stakeholders where beneficial use can be incorporated

Decision Making Frameworks

- Since 2017, several studies have suggested new decision-making frameworks for sediment remediation
 - Green and Sustainable Remediation (GSR)
 - Sediment Life Cycle Assessments (LCAs)
 - Offer various criteria and incentives for environmental and socio-economic benefits
 - Better account for long-term effects than previous evaluation frameworks
- Most papers called for research focus in improving beneficial use technologies to:
 - Improve versatility of beneficial use options
 - Reduce environmental impact of using contaminated sediment as a resource

Key Observations

- ◆ Pre-treatment of contaminated sediment expands beneficial use options
 - Reduces bioavailability/mobility of contamination which could support public acceptance
- ◆ Sustainability evaluations are becoming more common
 - Innovation in sustainability evaluations & international commitment for sustainable solutions increases demand for beneficial use solutions.
 - Computing project life cycle costs, including indirect benefits and costs, finds beneficial use options favorable over landfilling sediment.

Key Observations

- ◆ Addressing broad concerns about contamination can reduce stigma
 - Designing beneficial use solutions with stakeholders helps incorporate their perspectives and demonstrate why beneficial use makes sense for their priorities.
 - Early inclusion, communication, and education all facilitate this process.
 - Need to find a way to have healthy discussions about environmental risks and benefits
- ◆ Adaptive management strategies must be incorporated to better understand how to beneficially use sediments
 - End use of contaminated sediment affects both risk and risk acceptability.
 - Environmental risk assessment can and must improve to better evaluate potential risk exposure from sediment in specific settings.

Key Observations

- ◆ Sediment management has become an issue, therefore approaching management options through sustainability evaluation creates opportunities rather than barriers.
 - Effective sediment management will be an ongoing collaborative process requiring participation from regulators, researchers, and stakeholders.
 - This literature review identified numerous precedents for incorporating beneficial use in sediment management options.

For more information

- To get a copy of the white paper, contact Sediment Management Work Group <https://www.smwg.org/>
- Resources in the white paper:
 - Tables documenting sediment management programs
 - Adaptive management overview
 - Annotated bibliography
 - Beneficial Use Project Examples
 - *New Jersey / New York Harbor*
 - *Montezuma Wetland Restoration*
 - *Ports of Long Beach / Los Angeles*
 - *St. Louis River / Interlake / Duluth Tar (SLRIDT)*
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