TIG environmental®
INVESTIGATIONS ▾ FORENSICS ▾ REMEDIATION

Cleanup of Rivers and Harbors: The Uncertain Promise of A "Circular Economy"

Philip Spadaro, TIG Environmental
Larry A. Rosenthal, University of California, Berkeley

29 June, 2021

Presented at the Twelfth International SedNet Conference
An Online Event

A Member of TheIntelligenceGroup®
RESEARCH ▾ INVESTIGATIONS ▾ FORENSICS

Bio-sketches

Philip Spadaro, LG, VP and Principal Scientist

- 36 years of experience with large contaminated sediment cleanup sites
- Leading expert in urban and industrial waterfront redevelopment, sediment cleanup, and environmental effects of dredging
- Provides technical support for investigation, cleanup, monitoring, litigation, allocation, construction claims, cost-recovery actions, and other matters related to site remediation
- Expertise in the siting, design, permitting, and construction of confined disposal facilities and in the fate and transport of contaminants in estuarine, riverine, and marine aquatic environments

Larry Rosenthal, UC Berkeley

- Senior lecturer in public policy
- Program director, Center on Civility & Democratic Engagement
- Attorney & member, State Bar of California
- Urbanist w/ expertise in housing and the metropolitan economy
- Joint projects w/ P. Spadaro on adversarial legalism and circularity

Disclaimers

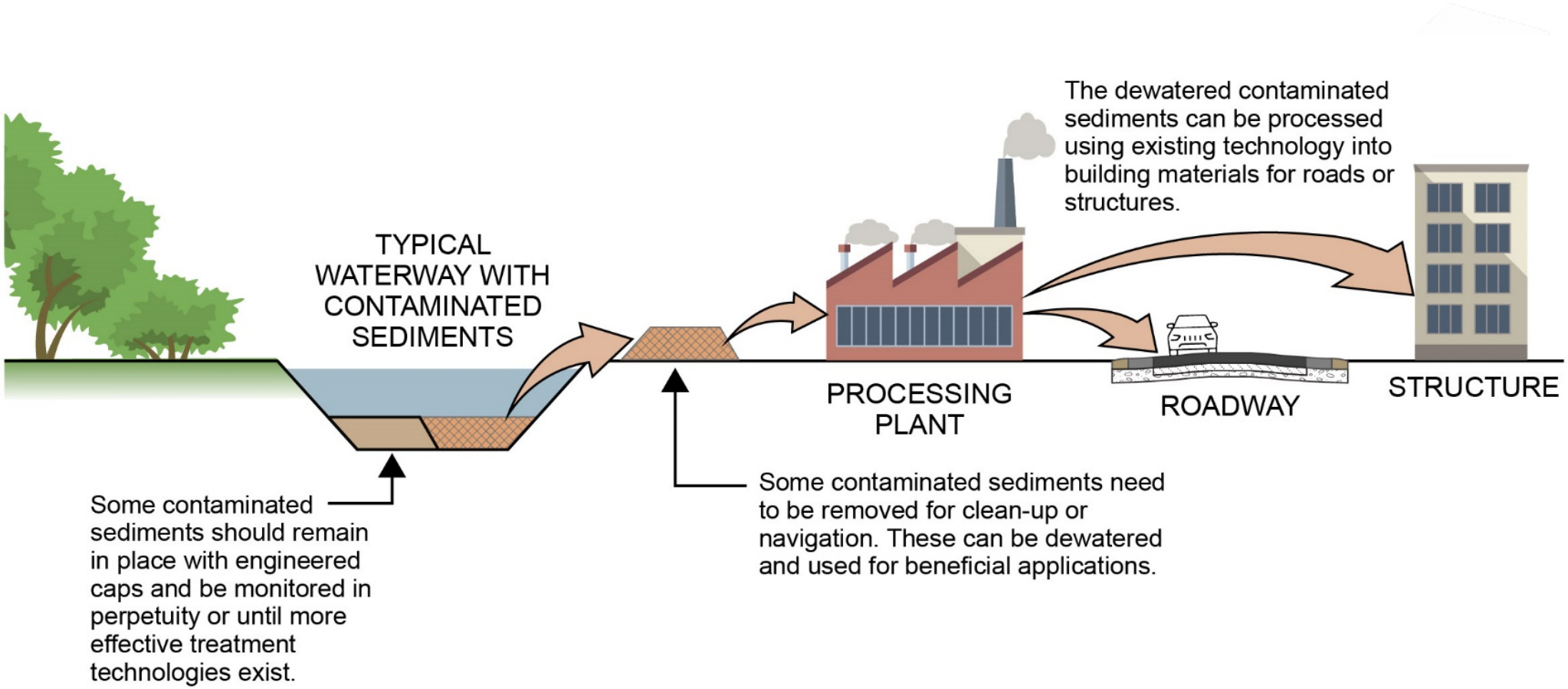
- Comments represent authors' opinions only
- No company or University positions are stated
- No specific technologies, vendors, or contractors are endorsed
- No clients are represented
- No animals were harmed

Circularity Fundamentals

- Elimination of waste throughout supply chains and disposal
- Continual reuse of resources
- Resulting reemergence of original ecologies

The question is how these principles ought to inform realistic and responsible remediation of contaminated sediments

What Circularity's Proponents Envision



Our Motivation (1)

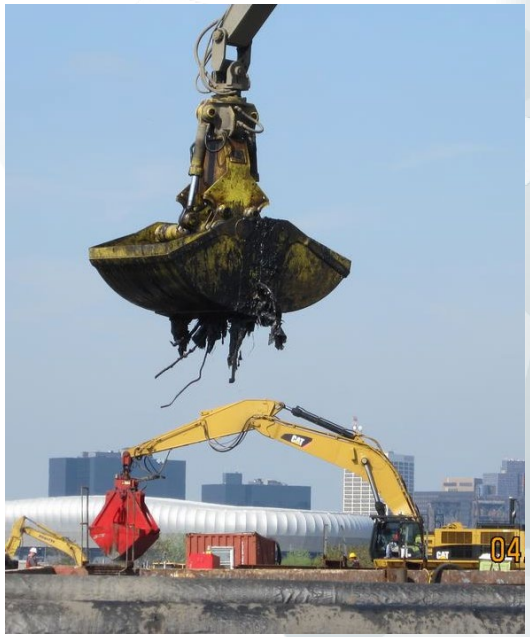
- Contaminated sediments in rivers, lakes, and harbors around the world result in diminished ecological health, degradation of environmental resources, economic losses, and, in rare cases, impacts to human health
- Despite the ongoing interest in the cleanup of contaminated sediments in rivers and harbors, little progress has been made in reducing the number of contaminated sites worldwide
- Circularity holds great promise across sectors of industrial redesign and responsibility, but its application to sediment remediation is hardly automatic

Our Motivation (2)

- Circularity at minimum requires designed waste-avoidance and resource reuse
- An exciting prospect: revenue from value-adding reuse (e.g., specialized building materials) might offset cost and increase the success-rate for cleanup projects
- But viewed realistically, *sediment remediation addresses circularity's failure-cases*, not its fundamentals
- While we see reason for optimism where contaminants aren't at issue, we doubt whether circularity can or should transform practice when contaminants are a key feature

Sediments v. Contaminated Sediments

- Contaminated sediment removal is a small fraction of sediment dredging overall
- For sediments in general, there are a wide variety of successful approaches to beneficial use (circularity)
- The same cannot be said for contaminated sediments, as the practical application of circularity principles appears quite constrained by cost, transient supply of raw material, demand for end product, and institutional features
- We understand proponents' optimism, but to us it seems uncertain how new markets and incentives can be willed into existence or created via either technology or regulation alone



A Deeper Look: Contaminated Sediments and Circular Economy

- The logic of newly energized “circular economy” discourse is appealing
- Maximizing reuse, minimizing impacts, and incorporating sustainability into product design and manufacture are worthwhile endeavors
- Cleanup responds primarily to legacy externalization of waste disposal costs and occasionally to management failures
- It is difficult to see how making processes more circular will facilitate the reduction of human health and environmental risk, the primary goals of cleanup
- Presuming reuse markets and substantial subsidy seems unrealistic

Beneficial Reuse vs. Circularity

- Beneficial reuse of contaminated sediments has been studied in various countries for over three decades ("circularity" is, perhaps, simply new terminology for concepts that have been thoroughly vetted already)
- Relevant studies have failed to produce a successful approach having broad applicability regionally, nationally, or internationally
- In many cases, technically feasible approaches have been developed but regulatory and/or financial feasibility are not typically observed
- And even in cases where overall feasibility is observed, consumer resistance to the products produced will continue to constrain demand features
- Also, the discontinuous supply of raw material makes business planning impossible

Circularity Opportunity: Feasible Types

We stylize three scenarios where circularity might continue to evolve, despite the presence of contaminated sediments:

- **"Prescriptive"**: Regulatory mandates are matched with evolving practice standards, substantial subsidy and public procurement-guarantees for reuse products
- **"Reactive"**: Absent mandates and subsidies, site-specific opportunities will be limited to regional conditions and project realities; depends upon engineering and institutional wherewithal, along with readily identifiable markets for reuse products
- **"Punctuated"**: Our preferred model, where situational engineering meets community-based vision for ensuring project finance and the advancement of neighboring stakeholder interests

Challenges, Opportunities, or Barriers?

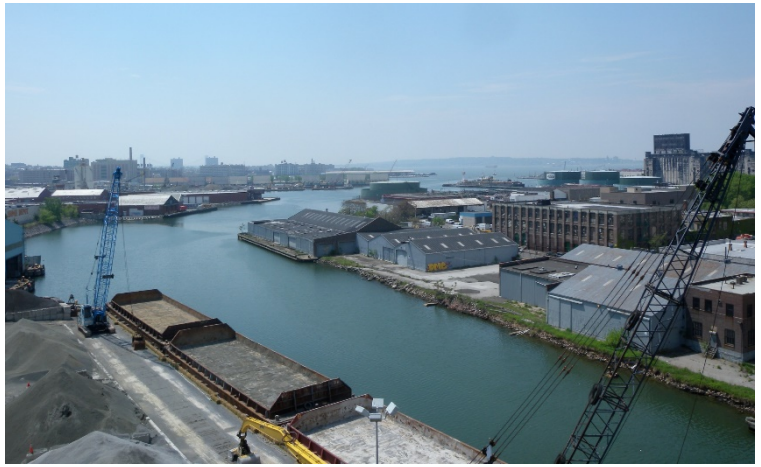
Circularity for contaminated sediments must confront financial, technical, legal, regulatory, and social constraints

A Technically and Economically Feasible Approach to Beneficial Reuse of Contaminated Sediments Remains Elusive

- The costs are much higher than more typical technologies such as landfill disposal
- Regulatory frameworks, absent substantial subsidy, may not succeed via "mandate" alone
- There is no available market for the resulting materials as there is low public acceptance of products manufactured from contaminated materials

The Largest Contaminated Sediment Cleanups Address Circularity Opportunities Poorly

Lower Duwamish Waterway

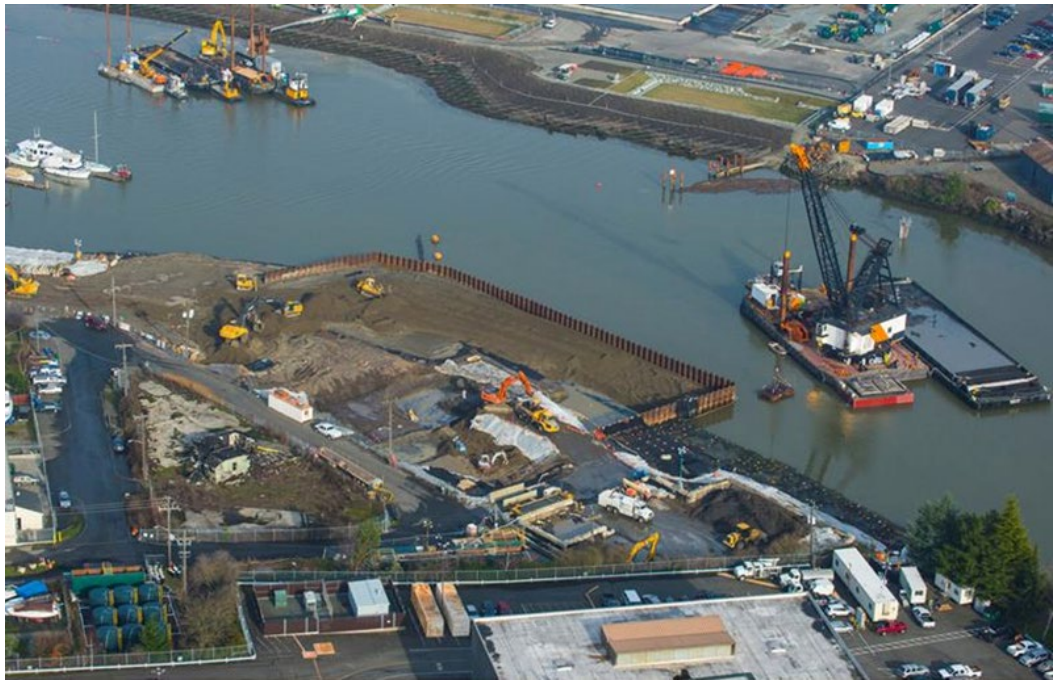


Gowanus Canal (Brooklyn)

Portland Harbor (Willamette River)

Asking those responsible for cleanup to pay the additional cost of circularity is not reasonable as long as lower cost alternatives are available

Conclusion:
Circularity's Barriers Loom Alongside Its Promise



- Contaminated sediment reuse – technically feasible, but fraught financially
- Social, environmental, regulatory, and constrained-markets factors create barriers
- Remediation projects continue to require realism, practicality and professional responsibility
- To date circularity poses more questions than it does answers ….

TIG environmental®
INVESTIGATIONS • FORENSICS • REMEDIATION

Thank You

Philip Spadaro

Vice President and Principal Scientist

TIG Environmental

221 1st Avenue West Suite 505
Seattle, WA 98119

pspadaro@intell-group.com

+1 (206) 438-3952

www.intell-group.com

Larry A. Rosenthal

Senior Lecturer, Public Policy

UC Berkeley

2607 Hearst Avenue MC7320
Berkeley, CA 94720

lar@berkeley.edu

+1 (510) 642-2062

gspp.berkeley.edu