

WATERFRONT CONTRIBUTION: A NEW FINANCE PARADIGM FOR CLEANUP OF CONTAMINATED SEDIMENTS

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ABSTRACT

Contaminated sediments pose significant ecological and health threats in ports and harbors around the world. Yet there is surprisingly little progress towards cleanup in most countries. The U.S. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund law) facilitates cleanup projects but they often suffer lengthy delays nonetheless. Participants debate relative responsibility over cost shares. Project finance is often insufficient, in part because resources are diverted by adversarial legalism (Spadaro and Rosenthal 2003, Kagan 2001).

Technologies of sediment remediation (e.g., precision dredging, engineered cap placement, natural attenuation) can now address even the most significant contamination. These innovations allow increasing economies of operation and simplification of remediation design. Applying these technologies in risk-based proportions has produced significant successes, but far too few given the enormity of the challenge worldwide. Without innovations in funding, improved project coordination, and coherent waterfront planning, greater progress will remain difficult to achieve.

We analyze relationships between waterway cleanup of contaminated sediments and waterfront redevelopment. Using examples from North America, we evaluate possible changes in funding paradigms that, if implemented, could accelerate reclamation and remediation. We question the efficacy of the 100-percent-polluter-pays model currently employed in cleanups under the Superfund program and state-equivalent models. Despite its compensatory logic, polluter-pays has difficulty securing polluters' participation and attributing proportions of contamination to original sources.

Further, historic polluters often lack roots in the present-day community, aiming primarily to minimize their financial exposure. By contrast, longer-term interests in waterways and on the waterfront—e.g. municipal governments, port authorities, and community organizations—can play leadership roles via planning, development regulation, and uplands remediation. Though these entities ought bear no more than their fair share of the costs, they should help coordinate the process whenever possible, given their naturally occurring stakes in cleanup and revitalization.

We propose new roles for cleanup authorities and new structures in project-finance. Tax-increment investment and other approaches can salvage public value and limit windfalls for speculators. Better funding and planning methods enhance local control over these projects and their outcomes. Importantly, new approaches can reduce levels of community displacement, as property values rise when cleanup succeeds.

Without such coordination of waterway-waterfront cleanup and redevelopment in the public interest, significant opportunities are lost. Through enlightened practices, perhaps spurred by positive regulation and negotiated solutions emphasizing local constituencies, greater numbers of effective cleanup projects providing meaningful community benefits become possible.

Keywords: Redevelopment, Municipality, Port Authority, Superfund, Funding

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SO MANY OPPORTUNITIES FOR SUCCESS

Throughout North America and in many countries around the world, the cleanup of polluted sediments has been a focal point of environmental concern. Only after the legacy of polluted sediments is adequately addressed can other priorities, such as clean water and healthy aquatic life, become possible.³

Often in the U.S., sediment cleanup projects take place in urban areas where the heavy industries of the 20th century, and sometimes even earlier, were concentrated. The waterfront in these urban areas is typically surrounded by underutilized upland areas. These upland areas, commonly known as brownfields, were once the bustling shipyards and factories that supported the war efforts and economic expansion of the mid-20th century. Often such parcels are contaminated land waiting to be redeveloped. The prospects for redevelopment and revitalization are tied to the cleanup of the waterway itself.

The costs associated with waterway cleanup projects can be significant. The question of “who will pay?” is often the subject of protracted dispute, even when the technical questions of why and how the cleanup should be performed have been adequately addressed. While environmental remediation remains front and center in that process, the local community’s stake in the waterfront’s future may attenuate over the long haul of negotiations over payment of cleanup costs.

Several projects in the United States (U.S.) exemplify this situation. For example, the U.S. Environmental Protection Agency (EPA)-issued Records of Decision (RODs, the official document directing the type of cleanup to occur) have been available for years⁴ for proposed sediment cleanup projects in New York, New York (Gowanus Canal); Newark, New Jersey (Passaic River); Portland, Oregon (Willamette River); and many others, yet progress on the actual cleanups has been slow, at least in part because of protracted negotiations over who should pay the high costs of these cleanups.^{5,6} Below we draw on successful examples as case studies—one in progress, the Gowanus Canal in New York, New York, and one completed cleanup, the Thea Foss Waterway in Tacoma, Washington—to point out some areas for possible improvement in the current approach.

WE HAVE THE TECHNOLOGY, SO WHAT STANDS IN THE WAY OF PROGRESS?

The technology of sediment management has improved markedly in the decades since the 1980s. Far from the early years focused entirely on removal via various forms of dredging, we now have a variety of capping approaches, *in situ* and *ex situ* treatment schemes, and effective approaches to natural attenuation.⁷ This juxtaposition of available and applicable technology and the lack of substantial progress on large sediment cleanup projects suggests that the approach to the question of “who will pay?” is the likely culprit responsible for the delay. With environmental improvement, as with any public good, the market players face only weak incentives to expedite matters and accomplish the best result for all current and future stakeholders.

As it stands in the U.S., the question of who will pay for sediment cleanup is rooted in conflict. The EPA decides the scope of the cleanup, estimates the cost,⁸ and then stands back to observe the ensuing melee among the named

³ Specific legal frameworks for addressing contaminated sediments exist in some states within the U.S., provinces in Canada, and other countries. For more reading on this see Spadaro 2011. Although few regulatory frameworks exist specifically for cleanup of contaminated sediments, most environmental and water quality regulations include cleanup of contaminated sediments as a corollary.

⁴ RODs were published for Gowanus Canal in September 2013, for Passaic River in March 2016, and for Willamette River in January 2017.

⁵ The cost of the clean ups can be considerable. For example, the EPA estimate for capital costs for the cleanup in Portland Harbor is approximately \$1.18 billion in 2017 dollars (EPA 2017).

⁶ Another reason often cited for the lack of progress is the difficulty is achieving adequate source control to reduce the likelihood of recontamination.

⁷ Although advances in the remedial technologies used for sediment cleanup are still improving, the basic approaches have been well defined for over a decade. These technologies are extensively discussed in EPA 2005, Baker et al. 2013, and Reible 2014.

⁸ EPA’s estimates of the cost of sediment cleanup are notoriously low. EPA will point out that it is not under any obligation to provide an accurate cost estimate and that its obligation is to form a basis for comparison among alternatives, of which cost is one of several factors (EPA 2000).

responsible parties as they, unsatisfied with their high share, seek to bring in others to help divvy up the bill. In the context of the polluter-pays principle, there is nothing wrong with this approach. Usually EPA has identified one or more of the major polluters and those named naturally try to bring in successively lower tiers of polluters to help pay. The problems with the approach become apparent as the potentially responsible parties take time—usually in the form of convening an alternative dispute resolution process—to gather facts and opinions related to the magnitude of one another’s discharges and use these facts and opinions as inputs to allocation of liability and cost. Typically, the actual cleanup process is on hold until the allocation process runs its course—which can take years.

Once the cleanup project begins, it is a regulatory action, existing largely outside of the community and the market. Our argument in this paper is that this closed-system approach has costs. For all the effort undertaken to harmonize sediment treatment, removal, and disposal with local community need, only local owners, neighbors, and authorities keep the longer-run interests of the waterway and the waterfront in mind. For these characters in the drama, comprehensive management and redevelopment that enhances the community are the genuine stakes. All too often, for them, the complexity and costs are unacknowledged and ultimate success of the waterway restoration is simply assumed. They are neither the experts nor the engineers. In this way, local actors go about their business, the cleanup project implementers theirs, each serving as witnesses of, but not participants in, separate stories.

REMEDICATION LINKED TO REVITALIZATION COULD CREATE THE BROADEST AND LONGEST-LASTING BENEFITS

The better practice in our view is to merge the perspectives of those performing the cleanup with those who stand to benefit from the cleanup—in terms of financing, real estate reality, and overall outlook. The greatest success stories in the cleanup engineering field are not simply accounts of waterways restored to their natural beauty and past economic productivity. When accomplished, these successes are the stories of waterfronts and nearby neighborhoods realizing their full promise—renewed area, sociopolitical systems for which the reclaimed river or harbor is a revitalized aesthetic and economic engine.

Municipalities and ports gain special benefit from sediment cleanup through improved waterway infrastructure, increased property values, and enhanced social benefits, such as public recreational opportunities. Figure 1 shows a typical transformation.

Specifically, the developers of waterfront property need to be brought into the funding equation because they can experience significant financial gain as a nearly direct result of the cleanup process. Neighborhoods revitalize and gentrify as a result of planned or ongoing cleanup. Developers reap rewards without investment in the cleanup. Although the legal frameworks driving cleanup are not suitable to draw in these developers on the front end (as they generally did not cause the pollution) it is possible to recoup some cleanup cost from them.

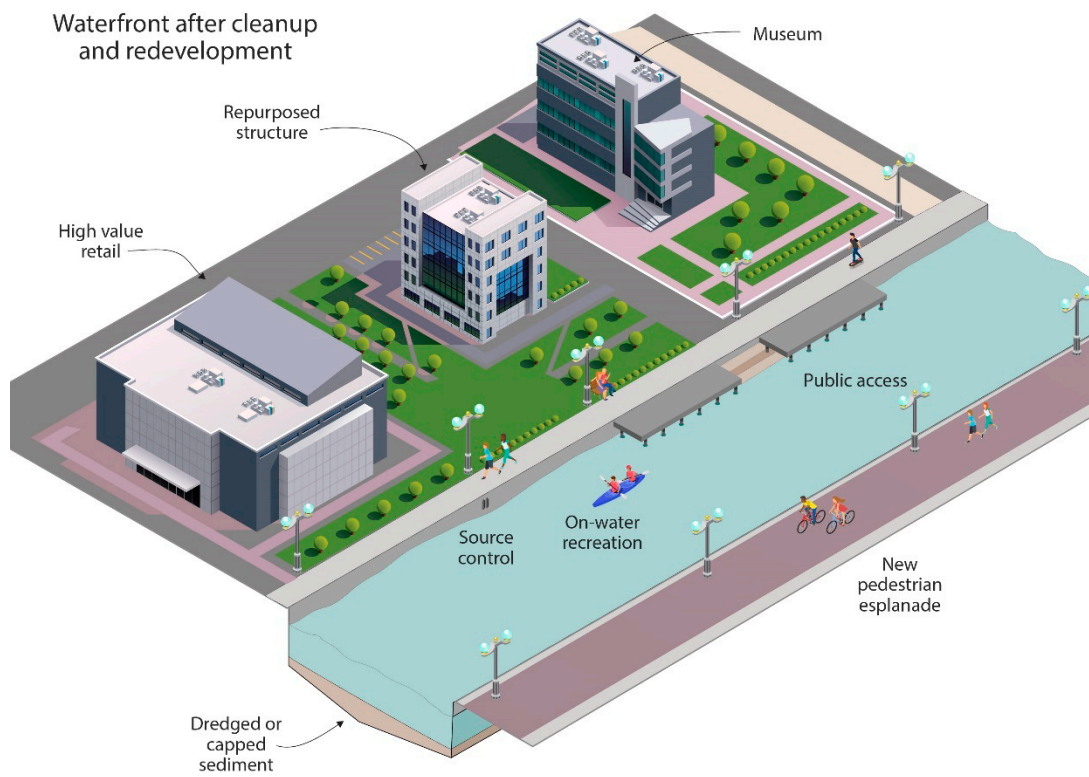
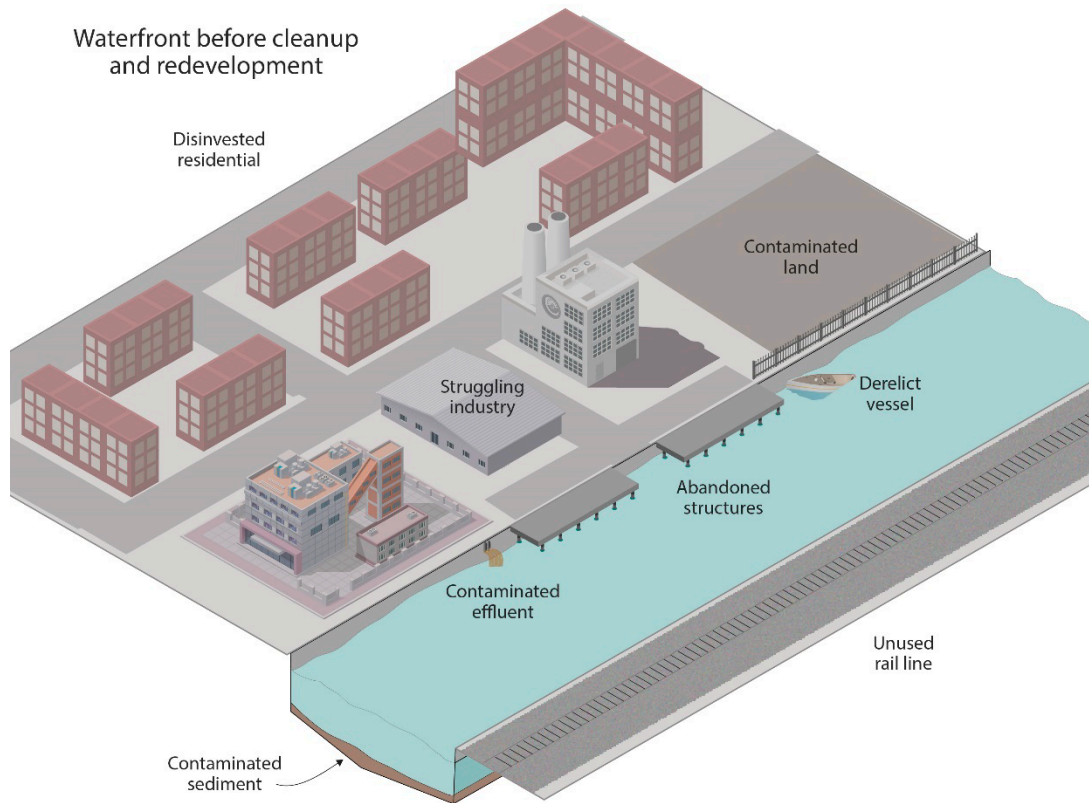


Figure 1. A typical waterfront transformation after waterway cleanup and redevelopment

HOW COULD THE PROCESS SUPPORT A BROADER VISION?

The first step for the regulatory process would be to acknowledge that there are different types of responsible parties. The legacy industries that typically cause the highly enriched hot spots of sediment contamination near historical facilities are the obvious targets for a “polluter pays” approach. But they are not the only responsible parties. Facilities owned and managed by municipalities and port authorities also typically contribute to contaminated sediments through stormwater runoff, combined sewer overflow effluent, and other activities, such as commercial operation of the waterway.

In a technical sense, municipal and port authorities have a greater interest in the source control and long-term monitoring aspects of the cleanup. From a regulatory standpoint, it is the local authorities that have jurisdiction. Discriminating between legacy industry participants and those with ongoing social or operational interests in the waterway could allow better acknowledgement of responsibility for the future, rather than only the past. Thus, it is logical for these entities to carry a larger share of the costs than they have in the past.

But there is an even more critical reason for the municipal and port authorities to bear a higher proportion of the costs—in many circumstances they own much of the riparian land or enjoy opportunities to acquire and reclaim those parcels. This vantage affords them a unique opportunity to capture the differential in land values before and after the cleanup, in the public interest. Figure 2 shows the potential for synergy in capturing the value of the cleanup in redevelopment.

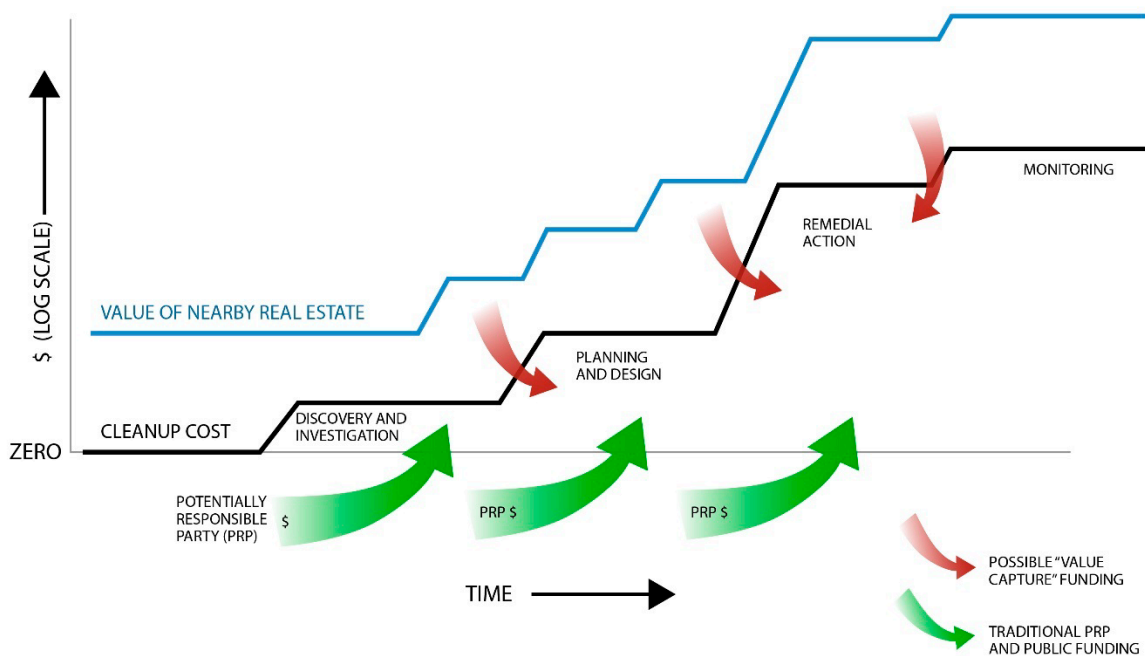


Figure 2. An alternative model for partial funding of waterway cleanup

The artificial division between past polluters and present and future stewards—while possibly necessary for narrow assignments of cleanup liability, and financial responsibility—sidesteps opportunities for visionary, comprehensive management of a waterway-waterfront renewal project. Municipalities and ports, the long-term owners and operators of urban waterfronts, need to play a leadership role. Rather than “hiding in the bushes” in hopes of avoiding exposure to the liability for the cleanup, they ought to take the long view and seek to capture the value of the cleanup beyond the fundamental improvement in sediment quality.

LARGE CLEANUP PROJECTS SHOULD BE LINKED TO WATERFRONT REDEVELOPMENT AND REVITALIZATION

In the free-market exchange in real estate, owners and investors are usually free to speculate in waterfront markets however they wish. Their portfolios of buy-and-hold titles, options, unpurchased prospects, and other land-based investments represent a sphere of activity that is separate from the technical features of the cleanup projects themselves. All too often, status quo arrangements simply leave the real “spoils” of waterway remediation—profits in land-investment markets and the associated lending systems financing them—to the downstream actors with financing to take advantage of the opportunities. Unless collective will is mustered to intervene in the public interest, private actors freely amass and extract gains in land value that had been inconceivable until the completion of the very cleanup projects that created those gains.

The most rapid and successful efforts occur when federal, state, and local authorities, along with responsible parties, interested community members, and regional investors, come together to coordinate plans, objectives, and financial resources. The more these actors assert themselves to capture waterfront real estate gains in value and reinvest them toward public need, the more effective project planning thereby becomes.

That capture has ethical implications as well. The privatization of the gains in this particular type of land-based wealth has genuine distributional consequences for the original residents. Owners and neighbors of polluted waterways suffer the joint consequences of depressed values, the disquieting appearances of noxious odors, and long-lasting public health risks. Though residential and commercial renters may take advantage of lower prices, they do so at great cost and sometimes suffer distress and disease as a result. After cleanup, as waterfronts are acquired and redeveloped, incumbents risk suffering the brunt of new inequities. It is galling that outsiders (such as real estate interests and financing sources located elsewhere) can enter a locality, acquire or occupy property, and deprive the incumbents of some considerable share of a project’s financial benefits.

Waterway pollution cleanup, like a growing economy, “lifts all boats” in a sense, liberating neighbors from their many difficulties and once dampened prospects. But, given the intense social investment necessary to enforce waterway cleanup requirements and make the projects successful, why allow so many profits to be pocketed by outsiders?

ALTERNATIVE APPROACHES LEVERAGE COMMUNITY INVOLVEMENT AND COLLABORATIVE FINANCING

In the U.S., Europe, and other locations, the prospects for redevelopment of degraded, environmentally compromised waterfront sites have long yielded provocative growth opportunities (see, for example, Eidelman 2018, Salkin 2005, Hoyle 2000, Jauhainen 1995, Sieber 1991). The systematic consideration of real estate opportunities in these settings, or waterfront brownfield redevelopment, is a rising area of market investment, due to not only waterway remediation efforts but also the decline of traditional waterfront industries (Brownill 2013).

Compared to traditional redevelopment, waterfront brownfield redevelopment is subject to complexities arising from the needs to preserve maritime activity; provide shoreline access, often under a public trust or navigable-waters regime; protect area ecology; and observe design limits due to water-table fluctuations and the like (Hersh 2012).⁹ Developers rightly perceive the costly nature of such projects. Designs and construction schedules must reckon with cleanup engineering and implementation delays, along with municipal regulatory uncertainty. Nevertheless, the opportunities may remain valuable in relative terms. Waterfront parcels in or near urban centers benefit from existing urban infrastructure and amenities, labor and transportation networks, and lower levels of political resistance compared to development in suburban, environmentally undisturbed locations (Deason et al. 2001). Indeed, society’s gradual return toward considering denser and more centralized development sites in response to excessive sprawl helps resolve the high costs of new suburban/exurban infrastructure, the social costs of growing commuter congestion, and the need for greenspace/agricultural preservation (Brueckner 2000). The growing profitability of infill development brings ready sources of capital—ever watchful for advantageous land-valuation prospects driven by port and harbor cleanup projects—to urban waterfronts.

⁹ Hersh (2012) provides a literature review, theoretical insights, and case-study examples.

A taxonomy of waterfront remediation and redevelopment projects suggests the benefits of comprehensive public management, developer give-backs ensuring general social benefit (Hersh 2012, noting “white hat” developer roles), creative financing using risk-adjusted underwriting techniques, and mindful design and development standards. Overall best practices include (1) comprehensive planning and administration, (2) merging short-run project orientation with long-run neighborhood and even regional vision, (3) sustained project-wide interactive multiple-stakeholder management, and (4) coordination of interests across the natural and regulatory boundaries that otherwise separate water quality and sediment concerns from brownfield reclamation and real-estate development incentives.

Unlike the attenuated battles among potentially responsible parties during Superfund proceedings, successful waterfront redevelopment is characterized by early adoption of mutually acceptable terms and a collaborative posture with state and local environmental authorities relative to public land use. The most experienced players in waterfront redevelopment appear to treat distributive claims of project benefits—such as those labeled under the principles of environmental justice and gentrification—not as surprising inconveniences to suppress but rather expected opportunities with which to bargain with waterfront incumbents and neighbors in good faith (see Bunce 2009).

As the accompanying typological table demonstrates, project settings vary greatly, however a few broad themes emerge. Success in waterfront redevelopment usually involves energized public leadership, be it from elected officials, municipal agencies, local industrial interests, or community nonprofit organizations. The projects share an emphasis on planning, inclusive discourse, and designed processes for the revelation of social priorities. What is missing in many instances is the opportunity to ensure both an end-stage flow of public goods and public capture of some fair portion of the gain in waterfront parcel values. We believe that missing link represents a lost opportunity to prevent windfall profits accruing to those with only temporary interests in sites’ long-term environmental and economic health.

Table 1. Waterway Environmental Remediation and Waterfront Redevelopment: Selected Examples

Case	Challenges	Public Participation and Leadership	Financing Approaches and Development Strategy ^a
Harbor Point, Stamford, Connecticut U.S. (66-acre waterfront residential, office and commercial development) Adjacent waterway: Long Island Sound Non-Superfund site (Sources: MuniCap 2018, Hersh 2012)	Brownfield due to industrial activity (sulfur smoking, dyeing, manufacturing of kerosene engines, operating utilities, ship building, fabricating, painting, and blacksmithing); tidal marsh requiring wetlands permitting	Mayoral and gubernatorial advocacy; development of affordable housing, parks, and general services infrastructure	Simultaneous real estate and environmental projects; tax increment financing for infrastructure improvements and environmental remediation and treatment; U.S. federal programs: Recovery Zone Economic Development Bond participation, Sustainable Communities Initiative grant for transit-oriented development, U.S. Environmental Protection Agency (EPA) Brownfields Assessment Grant funding to bolster local planning; early land acquisition by a developer able to carry the property on its balance sheet for the duration of the project
Toledo Maumee Waterfront, Toledo, Ohio, U.S. (waterfront retail, marina and recreational development)	Site of former power plant (fly ash ponds, asbestos, polychlorinated biphenyls [PCBs], heavy metals, in situ bioremediation)	Mayoral promotion and acquisition of foreign investment; city agency coordination and public-visioning process; agile repositioning of land holdings and development rights, once	U.S. federal employment-based fifth preference category (EB-5) investment vehicle, ^b combined with public land dedication on a site owned by power-plant operator’s successor, First Energy; that firm also provided \$8 million toward site remediation

Case	Challenges	Public Participation and Leadership	Financing Approaches and Development Strategy ^a
<p>Adjacent waterways: Maumee River, Lake Erie</p> <p>Superfund site</p> <p>(Source: Hersh 2012)</p>		<p>foreign investment opportunity developed</p>	
<p>New Bedford Harbor, New Bedford, Massachusetts, U.S.</p> <p>Adjacent waterways: Acushnet River</p> <p>Superfund site</p> <p>(Sources: Nelson and Hansen 1991, Fried-Cassorla 2012)</p>	<p>Residuals from electronic component manufacture (PCBs, heavy metals), with contaminated soils and surface water runoff; complex site engineering combining upland disposal and confined aquatic disposal cells</p>	<p>Maximizing public-land set-aside (cultural, historic) in adjacent New Bedford Whaling Historical Park (U.S. National Park Service),</p> <p>Multi-stakeholder Municipal Harbor Plan (City of New Bedford and Town of Fairhaven 2010)</p>	<p>National Oceanic and Atmospheric Administration Brownfields Showcase</p> <p>Community agreement to coordinate policies and streamline operations; “historic mills” overlay coordination; longer-range financing of prioritized development strategies ongoing (early stage)</p>
<p>Thea Foss Waterway, Tacoma, Washington, U.S.</p> <p>Adjacent water body: Commencement Bay</p> <p>Superfund site</p> <p>(Sources: Spadaro et al. 2015, EPA n.d.)</p> <p>See Case Study 1 below for more information.</p>	<p>Early industrial development, including a grain mill, steam plant, gas works, machine shop, and ship and boat-building facilities, and facilities for marine transport, resulting in contamination from heavy metals, phthalates, petroleum-based products, PCBs, polycyclic aromatic hydrocarbons (PAHs), and pesticides</p>	<p>Community discussion, environmental master plan, Strategic Plan for Redevelopment of the Foss Waterway, Thea Foss Waterway Design and Development Plan (Tacoma Planning Commission 2006)</p>	<p>City purchased 43 acres of adjacent contaminated land (27 acres with state assistance).</p> <p>Through the Community Renewal Tax Relief Act of 2000, federally designated renewal community, which provides tax incentives to attract and expand area businesses and create employment opportunities.</p>
<p>Gowanus Canal, borough of Brooklyn, New York, New York, U.S.</p> <p>Adjacent Waterway: Gowanus Canal & Bay</p>	<p>Industrial basin featuring coal gasification, oil refineries, chemical plants, cement manufacturing, and tanneries; isolation of non-aqueous phase liquid and associated PAHs, along with</p>	<p>Multi-stakeholder “Gowanus PLACES” neighborhood planning study featuring more than one hundred hours of community discussion; engagement of numerous city agencies,^c neighborhood organizations,</p>	<p>Too early to assess</p>

Case	Challenges	Public Participation and Leadership	Financing Approaches and Development Strategy ^a
Superfund site (Source: NYC Department of City Planning 2018) See Case Study 2 below for more information.	modernization of underwater containment tanks	nongovernmental organizations, and business interests	

Notes

^a Our preliminary framing analysis in this paper, greatly informed by these examples and others, highlights efforts by stakeholders to coordinate cleanup projects and community vision for future site utilization. Additional research is required to evaluate the equitable apportionment of land-value gains and other critical outcome-factors over the longer term.

^b The U.S. EB-5 visa, employment-based fifth preference category, or EB-5 Immigrant Investor Visa Program, created in 1990 by the Immigration Act of 1990, provides a method for eligible immigrant investors to become lawful permanent residents by investing at least \$1,000,000 to finance a business in the U.S. that will employ at least 10 American workers (Nixon 2016).

^c A recently published planning framework (NYC Department of City Planning 2018) documents participation among the mayor’s offices of housing & economic development, recovery & resiliency, and sustainability; and city departments/agencies responsible for cultural affairs, education, environmental protection & remediation, housing preservation & development, parks & recreation, small business services, transportation, emergency management, human resources landmarks preservation commission; and many others.

The real challenge for gains in financial efficiency is the bright-line boundary between waterway sediment remediation and waterfront redevelopment. Given the different jurisdictional authorities governing each activity, waterway cleanup financing and waterfront real estate development proceed according to separate ledgers. In a sense, water quality and environmental resources are taken for granted in redevelopment processes, resulting in a lopsided investment frontier that shortchanges precisely the elements of environmental transformation that make waterfront revitalization possible in the first place (Hein 2016). A more coordinated financial system that could leverage long-run gains in waterfront land values to help pay for sediment treatment and removal expenses would be more socially preferable. In most project venues in the U.S. and elsewhere, these potential efficiencies will only become accessible via overhaul levels of reform in governing jurisdictional arrangements and public/private incentives. Barring such systematic restructuring, second-best options include local interventions aimed at garnering *some* public benefit from redevelopment first initiated, in some sense, by the fact of the adjacent waterway cleanup effort. The hard economic fact, unfortunately, is that the full scope of environmental and social benefits from waterway-waterfront redevelopment often fail to materialize without creative financing and management approaches.

Evolving development-finance practice highlights a number of mechanisms local authorities should consider (and sediments-related industries should understand). Examples include tax increment finance (TIF) (that is, bonds underwritten by expectations of future *ad valorem* tax gains); tax-credit mechanisms; and urban development grants such as the U.S. Brownfields Economic Development Initiative (HUD-BEDI).¹⁰ Overall, each of these mechanisms exploits the real estate wisdom of “buy low, sell high” by attracting sources of capital and financing toward higher-risk investment opportunities. As to any positive upside such investors foresee, some proportion will relate to the cleanup and other publicly driven investments, bringing into play notions of land value recapture (LVR) in the public

¹⁰ On TIF, see Dye & Merriman 2006. On the Low Income Housing Tax Credit and the New Markets Tax Credit, see Fischein & Chakrabarti 2009. On HUD-BEDI, see Schnapf 1999.

interest (Calavita 2014). Under LVR principles, those profiting from redevelopment opportunities are required to distribute the benefits equitably, particularly where infrastructure expenditures are substantially responsible for the very existence of those opportunities. In our view, that redistribution rarely happens without the intervention of public authorities and political coalitions in the neighboring community.

CASE STUDIES

Past and ongoing projects serve to illustrate successes and opportunities in ways the theoretical discussion struggles to achieve. We therefore offer two examples of projects where cleanup project funding and waterfront redevelopment opportunities intermingle. In the case of the Thea Foss Waterway project in Tacoma, Washington, the leadership of the municipality paved the way for success. In the case of the Gowanus Canal in Brooklyn, New York, the outcome remains to be seen, but the opportunity for success is great.

Case Study 1: Thea Foss Waterway: Municipal Leadership from Cleanup Through Redevelopment



The Thea Foss Waterway¹¹ was first dredged and improved by the Army Corps of Engineers in 1902. Early industrial development included a grain mill, steam plant, gas works, machine shop, ship and boat building facilities, and marine transport. Industry thrived until the 1960s and declined until most industries were abandoned or seriously diminished in the 1980s. The waterway became a part of the Commencement Bay Nearshore-Tideflats Superfund site in 1981.

The City of Tacoma's (the city's) decision to take on the challenge of regaining its waterfront took courage and foresight. In 1992, recognizing that it had an interest in the outcome of the cleanup of the waterway, the city purchased 27 acres of adjacent contaminated land with state assistance and subsequently purchased 15 additional acres.

The city completed a comprehensive environmental master plan setting forth the approach to dealing with the contamination issues in the upland areas as well as the waterway and created a Strategic Plan for Redevelopment

¹¹ Known as the City Waterway until renamed in 1990 for Thea Foss, the founder of Foss Maritime.

of the Foss Waterway in 1993 to specify details such as public access to the waterfront, views from the downtown area, the height of buildings, and to develop a consistent design approach (Atkinson et al. 2013).

The City of Tacoma approached the regulatory agencies, the Washington State Department of Ecology and EPA, with proposals for tackling the environmental issues. This approach included the negotiation of an Area-Wide Consent Decree with the Department of Ecology setting forth cleanup strategies for the contaminated upland areas that incorporated development improvements with cleanup techniques. By setting forth cleanup options in advance of redevelopment, the city was able to remove some of the uncertainty that potential developers were facing, thereby reducing their risk and encouraging their involvement.

To expedite the Superfund sediment cleanup project, the city approached EPA and volunteered to enter into an Administrative Order on Consent to complete the design process for the cleanup of the contamination in the waterway. In 1994, knowing that the project would succeed only with the cooperation of other potentially responsible parties, the city facilitated the formation of a Funding and Participation Group in which members could participate in the study and design process for a nominal fee. The city also completed an environmental impact statement for the waterway development in 1995 (City of Tacoma 1995).

During design, the parties took into consideration the current and planned navigation needs of the waterway and developed a cost-effective remedy that included a combination of capping, dredging, and natural recovery as allowed by the ROD. In 1997, the City of Tacoma and other parties agreed to proactively enter into a multi-year, non-binding allocation process, with EPA's support and using the services of a third-party neutral arbitrator, to allocate liability for cleaning up this site. The result was a comprehensive settlement proposal from the responsible parties to EPA in response to the Special Notice Letters. Through these cooperative and proactive efforts of many of the responsible parties, the City and its partners achieved a timely cleanup of the waterway that anticipated the redevelopment of its waterfront. The sediment cleanup itself has been well described in other presentations (Graalum et al. 2002).

The city also put in place several financial incentives for developers to encourage investment in the area. The Thea Foss Waterway is in the federally designated Renewal Community.¹² The City of Tacoma was allocated \$12 million in various annual tax deductions to 2009 and has a 10-year property tax exemption for new residential construction of four units or more. These financial incentives have helped spur private investment on the waterfront.

Although redevelopment work is still in progress, the success of the City of Tacoma's approach to this issue is unmistakable. Environmentally, the upland areas and the shorelines of the waterway are again usable by the community. On the waterfront, public and private development investments have soared, with nearly \$350 million in private investment since the cleanup of the waterway began. The inventory of residential housing units along the Thea Foss Waterway has increased from essentially zero to 770. Nearly 200,000 square feet of office and commercial space has been added to the inventory along the waterway. Property values in the area have increased approximately eight-fold. The revitalized waterway with the new developments are putting aside the blighted industrial image of Tacoma's past and a new and exciting image of the city has emerged.

¹² Through the Community Renewal Tax Relief Act of 2000, federally designated renewal community, which provides tax incentives to attract and expand area businesses and create employment opportunities (Fiore 2001).



Case Study 2: The Gowanus Canal: A Collective Vision for Responsible Development



The Gowanus Canal, is a 100-foot wide, 1.8-mile long canal in the borough of Brooklyn in New York City (the city) in the U.S. The waterway began as a dredging success story, when in 1869, a 1.5-mile creek and estuary system was converted into a nearly two-mile harbor and mini-port with a connection to the Gowanus Bay. Legacy industries included coal gasification, oil refineries, chemical plants, cement manufacturing facilities, and tanneries.

The Gowanus Canal was listed as a Superfund site in 2010 and the Record of Decision, selecting a remedy for the site, was signed in September 2013. The selected cleanup remedy requires isolation of non-aqueous phase liquid and associated polycyclic aromatic hydrocarbons, installation of a sealed bulkhead wall to stem further runoff of coal-tar effluents, modernization of underwater containment tanks, and other upgrades. In 2012, when planning for the cleanup was already well underway, Hurricane Sandy caused the Gowanus Canal to breach its banks and flood the waterfront with toxic water and sludge, adding further complications to the process of cleanup. A dredging and capping pilot project commenced in the fall of 2017.

From 2013 to 2015, several hundred people, representing community leaders and a host of government agencies, nongovernmental organizations, and neighborhoods participated in a multi-stage “Bridging Gowanus” planning process. The impetus for these convenings stemmed from the gathering recognition that once unsightly, nearly uninhabitable waterfront properties will, as a result of the cleanup, suddenly gain livability, cachet, and newfound attractiveness in the residential marketplace. The resulting 2018 report, *Gowanus: A Framework for a Sustainable, Inclusive, Mixed-use Neighborhood* (New York City Department of City Planning 2018), attempts to recast zoning and land use regimes so as to steer development responsibly.

The plan, representing the community’s collective vision for a revitalized Gowanus corridor over the long run and emerging in the middle of the cleanup itself, largely takes the cleanup for granted. Indeed, the Superfund regulatory scheme tends to circumscribe the public’s perspective in just this way. The technical features of the dredging and sediment-treatment and removal strategy lie outside the purview of community planning processes. Financing waterway cleanup work is taken to be the business of others. The opportunity we highlight in this paper—capturing land-value increases as a source of cleanup finance—is not one the Bridging Gowanus process seeks to galvanize. Commendably, the community’s concern is far more riveted on goals to make the future community more resilient, inclusive, and sustainable. Key among the concerns is the likelihood that, with climate change, the waterway’s floodplain will only expand, making waterfront development project riskier.

Thus, the Bridging Gowanus process lends support toward our main theme: that public interest and investment in the uplands cleanup should be harnessed to capitalize public improvements, if not the cleanup itself, and that regulatory processes should be adapted to make such transfers more practicable. Though it arises in the status quo framework, the Gowanus case nevertheless manifests the value of such opportunities, in two primary ways. First, the city and its constituencies recognize that the cleanup is an ideal moment to revisit land-use and zoning priorities. The local imperative, it would seem, is to maintain separation of industrial and residential uses and maximize the addition of thriving green-space in lieu of dense, new development. Second, the Gowanus plan emphasizes the need to impose Mandatory Inclusionary Housing (MIH) requirements on new residential projects in the neighborhood. Through onsite dedicated below-market units, or via in-lieu fees paid into municipal trust funds by the developer, MIH works to redirect higher-profit-margin private-market units toward low- and moderate-income working families. Although this wealth transfer does not directly advantage the ledger of the cleanup project itself, it does represent local effort to impede what otherwise might be a speculative bonanza benefiting only private real-estate interests.

What this story and so many like it illustrate is the quandaries facing waterway-reclamation finance and management, particularly as they manifest in long-established waterfront neighborhoods. Cleanup projects are rife with threats, and flush with opportunities to address them more sensibly. But the regulatory scheme and business as usual are not consistently aligned with the genuine, local public interest. It is time for the field to begin ensuring that values of environmental safety and waterway restoration are matched with principles of sound planning, financial ingenuity, real estate strategy, and environmental justice.



WE HAVE THE BONES OF A NEW PARADIGM

The status quo approach to waterway remediation and waterfront development is bifurcated at best and splintered at its worst. Inherent in the current regulatory process is cost uncertainty and inaccuracy as well as adversarial postures among potentially responsible parties attempting to reduce their own burdens of responsibility. We attempt to show that the current model of divorcing the processes, the players, and the payers in the regulatory phase from the redevelopment phase serves neither the short-term nor the long-term interests of waterfront communities.

We propose instead a new paradigm for waterway cleanup and waterfront redevelopment. The new paradigm requires vision to adopt any or all of the following strategies:

- Reframing and redefining the responsibilities for costs, including distributing more costs to those who benefit from waterway cleanup
- Encouraging municipalities and port authorities to catalyze cleanup efforts by adopting more proactive roles
- Driving real community investment through vision, leadership, and engagement
- Finding and leveraging alternative financing approaches, such as tax increment-based investments; funding for economic development, environmental protection, and sustainability; and public-interest capture of the inequitable windfalls that disproportionately benefit land speculators
- Tying some long-term investment gains to social and environmental benefits, such as ensuring that legacy residents can afford to remain in place, creating or reclaiming urban green spaces, and building resilience in the face of climate change

Some of what we propose is already in place, assembled through collaboration and nimble action. We believe there is more yet to do. A coordinated financial system that ties long-term gains in waterfront values to payment for sediment cleanup would reallocate responsibilities and invigorate community investment at the front end.

The stories we have gathered show that, where there is public will and wherewithal, change is possible. We submit these examples and our paradigm to spur other communities to seize the opportunities inherent in waterway cleanup and waterfront redevelopment and pave the way for yet more change.

REFERENCES

- Atkinson, S., Dowie, S., Henley, M. and Van Zwalenburg, K. 2013. *Evolution of a Working Waterfront: A Case Study of Tacoma, Washington's Thea Foss Waterway [Case study]*. National Working Waterfront Network. Available at: http://www.wateraccessus.com/case_study.cfm?ID=33 (accessed September 25, 2018).
- Austin, J.C., Anderson, S., Courant, P.N., and Litan, R.E. 2007. *Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes Ecosystem*. Washington, D.C.: The Brookings Institution. Available at: http://www.healthylakes.org/site_upload/upload/GrtLakesCostBenefit.pdf (accessed September 25, 2018).
- Baker, K., Spadaro, P.A., Hay, S., MacLeod, C. 2013. *Guidance on Characterizing, Assessing and Managing Risks Associated with Potentially Contaminated Sediments*. Publication, Energy Institute in cooperation with CONCAWE. London, England. May 2013.
- Braden, J.B., Taylor, L.O., Won, D., Mays, N., Cangelosi, A., and Patunru, A.A. 2006. *Economic Benefits of Sediment Remediation. Final Report for Project GL-96553601 U.S. Environmental Protection Agency*. Chicago: EPA. Available at: <http://www.sehn.org/tccpdf/property%20value%20benefits%20of%20cleanup.pdf> (accessed September 25, 2018).
- Brownill, S. "Just Add Water: Waterfront Regeneration as a Global Phenomenon," Chap. 3 in *The Routledge Companion to Urban Regeneration*, ed. M.E. Leary and J. McCarthy (London: Routledge), 45–55.
- Brueckner, J. "Urban Sprawl: Diagnosis and Remedies." *International Regional Science Review* 23, no. 2 (April 2000): 160–171.
- Bunce, S. "Developing Sustainability: Sustainability Policy and Gentrification on Toronto's Waterfront." *Local Environment* 14, no. 7 (August 2009): 651–667.
- Calavita, N. "Land Value Recapture in the US: The Case of San Francisco." *Advanced Engineering Forum* 11 (2014): 330–337.
- City of New Bedford Massachusetts and Town of Fairhaven, Massachusetts. 2010. New Bedford/Fairhaven Municipal Harbor Plan. Available at: <https://www3.epa.gov/region1/superfund/sites/newbedford/504398.pdf> (accessed September 25, 2018).
- City of Tacoma. 1995. Thea Foss Waterway Development Alternatives Plan. Final Environmental Impact Statement. Available at: http://cms.cityoftacoma.org/planning/Dome-Brewery%20Subarea/TheaFoss_FEIS_1995.pdf (accessed September 25, 2018).
- Deason, J.P., Schad, T.M., and Sherk, G.W. "Water Policy in the United States: A Perspective." *Water Policy Journal* 3, no. 3 (2001): 175–192.
- Dittman, J. and P. Spadaro. 2017. "Who Should Pay for Sediment Cleanup?" Paper and presentation, Eighth International Smart Rivers Conference, Pittsburgh, Pennsylvania, September 18–21, 2017.
- Dye, R. & Merriman, D. 2006. "Tax Increment Financing: A Tool for Local Economic Development." *Land Lines*. Lincoln Institute of Land Policy. January 2006. Available at: <https://www.lincolninst.edu/publications/articles/tax-increment-financing> (accessed September 25, 2018).
- Eidelman, G. "Failure when Fragmented: Public Land Ownership and Waterfront Redevelopment in Chicago, Vancouver, and Toronto." *Urban Affairs Review* 54, no. 4 (2018): 697–731.

- EPA (U.S. Environmental Protection Agency). 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency, Washington, D.C.
- EPA (U.S. Environmental Protection Agency). 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. U.S. Environmental Protection Agency, Washington, D.C. Available at <https://semspub.epa.gov/work/HQ/174471.pdf> (accessed September 26, 2018).
- EPA (U.S. Environmental Protection Agency). 2017. Portland Harbor Superfund Site Record of Decision. Seattle: EPA.
- EPA (U.S. Environmental Protection Agency). n.d. *Restoring and Revitalizing Waterfront Resources: Tacoma's Thea Foss Waterway*. Seattle: EPA. Available at: <https://semspub.epa.gov/work/HQ/196400.pdf> (accessed September 25, 2018).
- Fiore, Nicholas. 2001. "The Community Renewal Tax Relief Act of 2000." *Journal of Accountancy*. Available at: <https://www.journalofaccountancy.com/issues/2001/aug/thecomunityrenewaltaxreliefof2000.html> (accessed September 25, 2018).
- Firschein, J. and Chakrabarti, P. 2009. *A Primer on the Low-Income Housing Tax Credit (LIHTC) and New Market Tax Credit (NMTC) Programs*. Washington, D.C.: US Federal Reserve Board, Division of Banking Supervision & Regulation.
- Fried-Cassorla, E. 2012. "New Bedford: A Waterfront Case Study." NextCity.org (November 7). Available at: <https://nextcity.org/daily/entry/new-bedford-a-waterfront-case-study> (accessed September 25, 2018).
- Glenn, J., P. Spadaro, C. Moody, and R. Reed. 2017. "Who Owns the Riverbed?" Paper and presentation, Ninth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 9–12, 2017.
- Graalum, S.J., P.A. Spadaro, and M.L. Henley. 2002. Thea Foss Waterway Remediation and St. Paul Waterway Nearshore Fill Design. Presentation, Third Specialty Conference on Dredging and Dredged Material Disposal, COPRI/ASCE, Orlando, Florida.
- Hein, C. "Port Cities and Urban Waterfronts: How Localized Planning Ignores Water as a Connector." *WIRES Water* 3, no. 3 (May/June 2016): 419–438.
- Hersh, B.F. 2012. *The Complexity of Urban Waterfront Redevelopment*. Herndon: NAIOP (Research Foundation).
- Hoyle, B. 2000. "Global and Local Change on the Port-City Waterfront." *Geographical Review* 90, no. 3 (July 2000): 395–417 (July).
- Jauhiainen, J. "Waterfront Redevelopment and Urban Policy: The Case of Barcelona, Cardiff and Genoa." *European Planning Studies* 3, no. 1 (1995): 3–24.
- Kagan, R. 2001. *Adversarial Legalism: The American Way of Law*. Cambridge: Harvard University Press.
- MuniCap, Inc. n.d. Harbor Point, City of Stamford, Connecticut Case Study. Available at: <https://www.municap.com/case-study-habor-point.htm> (accessed September 27, 2018).
- NYC (New York City) Department of City Planning 2018. *Gowanus: A Framework for a Sustainable, Inclusive, Mixed-Use Neighborhood*. NYC Department of City Planning. Available at: <https://www1.nyc.gov/assets/planning/download/pdf/plans-studies/gowanus/gowanus-framework-full.pdf> (accessed September 25, 2018)
- Nelson, W.G. and Hansen, D.J. "Development and Use of Site-Specific and Biological Criteria for Assessing New Bedford Harbor Dredging Project." *Environmental Management* 15, no. 1 (1991):105–112.
- Nixon, Ron. "Program That Lets Foreigners Write a Check, and Get a Visa, Draws Scrutiny." *New York Times*. March 15, 2016. Available at: <https://www.nytimes.com/2016/03/16/us/politics/program-that-lets-foreigners-write-a-check-and-get-a-visa-draws-scrutiny.html> (accessed May 9, 2017).

- Pearsall, H. "Superfund Me: A Study of Resistance to Gentrification in New York City." *Urban Studies* 50, no. 11 (2013): 2293–2310 (August).
- Reible, Danny D. 2014. *Processes, Assessment and Remediation of Contaminated Sources*. New York: Springer.
- Salkin, P.E. 2005. "Integrating Local Waterfront Revitalization Planning into Local Comprehensive Planning and Zoning." *Pace Environmental Law Review* 22(2):207–230 (Fall).
- Schnapf, L. 1999. "Financing Development of Contaminated Properties." *Natural Resources & Environment* 13, no. 3 (1999): 465–470.
- Sieber, R.T. 1991. "Waterfront Revitalization in Postindustrial Port Cities in North America." *City & Society* 5, no. 2 (December 1991): 120–136.
- Spadaro, P., G. Vanacker, G. Kayens, W. De Cooman, J. Teuchies, K. Van Nieuwenhove, K. Laurysen, and A. Boden. 2017. "Sediment Remediation in Flanders – A New Model for Intragovernmental Coordination." Poster and presentation, Ninth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 9–12, 2017.
- Spadaro, P., M. Henley, J. O'Loughlin, and M.P. Slevin III. 2015. "The Role of the Municipality in Cleanup of Contaminated Sediments: Lessons from the Thea Foss Waterway in Tacoma, Washington." Presentation, Eighth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 12–15, 2015.
- Spadaro, P.A. 2011. "Remediation of Contaminated Sediment: A Worldwide Status Survey of Regulation and Technology." *Terra et Aqua* 123 (June 2011): 14–23.
- Spadaro, P.A., and L. Rosenthal. 2003. "The Concept of Adversarial Legalism as Applied to Waterfront Cleanup." Proceedings, International Conference on Remediation of Contaminated Sediments, Venice, Italy, September 30–October 3, 2003.
- Tacoma Planning Commission. 2006. *Thea Foss Waterway Design and Development Plan*. City of Tacoma. Available at: <http://cms.cityoftacoma.org/Planning/Shoreline/PlanDocs/TheaFossPlan.pdf> (accessed September 25, 2018).

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