

A Conceptual Model for Advancing Urban Sediment Management: Allocating Limited Finances to Deliver a Sustainable Outcome

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Introduction: Innovative Urban Sediment Management (USM) and its application in today's economic realities of *how to do more with less* can be interpreted differently among stakeholders. To achieve a net long-term environmental benefit, USM programs need to work in parallel with controls on continuing sources and long-term pollution prevention strategies. Building resilience in port communities and urban coastal environments continues to be a challenge globally with competing and non-coordinated regulatory environmental programs. Pollution controls and storm water infrastructure enhancements are costly, but necessary to prevent recontamination after remedial actions. Once ecological systems recover they will in the long run be less costly to maintain. Long-term benefits are realized by urban revitalization, improved delivery of ecosystem services and a reduction and elimination of present and future corporate liabilities. Therefore, the cost of doing *more with less* could cost more in the short-term and must be qualitatively and quantitatively balanced through an integrated environmental management process which starts by introducing a foundational National Sediment Policy.

Challenge: Urban sediment environments need to be approached differently based on their complex stakeholder needs. In urban communities impacted by contaminated sediments the cost of *doing more with less* is most apparent because of the prohibitive costs of remediation, the legacy of past industrial practices and infrastructure engineering. The question usually posed by decision makers is: *why remediate without complete source control?* Upland sustainable development that encompasses green infrastructure practices is an iterative process that should move in parallel over the course of the remediation (Figure 1).

Discussion: Globally, the general overlap of non-integrated sediment programs tends to complicate sustainable solutions where remediation is necessary, especially in urban waterways and communities where re-development and restoration are economic drivers. Progress is hindered by the *polluter pays*, or for that matter, *who pays* principle. This translates to lost time, financials (including revenue) and opportunity. Since implementation timeframes can be

a decade or more in urban systems, the allocation process desensitizes the development of innovative integrated approaches and technologies. Crisis management usually becomes the preferred option (triage), one which initially may have less cost, but never really solves the problems in the long term.

An integrated sediment management approach that focuses on cost-share models is more warranted today than ever before as a means to strike a balance between achieving long-term goals and having *to do more with less*. The nature of urban watersheds, where ongoing sources such as stormwater and legacy contamination impact sediment quality and economic development, justifies policy to a Regional Sediment Management (RSM) watershed level framework. The special considerations required for USM is presented in Figure 1. An advocate is required that integrates RSM in an adaptive management framework that can implement the USM Program with some relative cost-share in a 21st century economic reality which alleviates today's perspective the challenge of perhaps doing *less with more*. An USM case study of United States national significance, Passaic River, New Jersey illustrates on a global platform level, the challenges of adopting an integrated, holistic, and adaptive management approach to remediation and restoration.



Figure 1: Urban Sediment Management Framework