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Sustainably Managing Sediments in the Face of Climate Change

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ABSTRACT

Sediment serves as a critical resource for beach and shoreline protection and provides nutrients and material for creating and sustaining wetland and coastal habitat. However, sediment can also serve as a vector and sink for environmental contaminants, and sediment accretion can negatively affect navigation and flood control. Annually, approximately one billion cubic meters of sediment is removed from waterways throughout the world to support navigation, commerce, environmental clean-up, habitat restoration, flood control, and other purposes at a cost between \$15 to 30 billion US. Typically, sediments are managed on a project-specific basis without the benefit of a comprehensive, sustainable strategy to enable efficiency gains.

Over the next century, climate change will likely accelerate coastal land loss due to subsidence/inundation and erosion from increased severity/frequency of storm and flood events. When the implications of climate change are taken in concert with the profound influence of human activities on natural processes in developed coastal environments it begs the question: Can regional sediment management strategies accommodate the need to maintain and preserve the beneficial uses that society has identified for a particular system? Are we throwing money at projects for which the long-term outcomes are not sustainable? As engineers and scientists, how should we respond to these challenges?

More sustainable sediment management practices are needed that represent comprehensive approaches for addressing the long-term management of sediments on regional or watershed scales to maintain current and future services while balancing broader environmental, economic, and societal concerns. Challenges to addressing the long-term management of sediments include multiple competing or conflicting uses, jurisdictional and/or regulatory constraints, and economic and societal drivers determining the value of future services to be maintained. Consequently sustainable sediment management plans must, by necessity, be both pragmatic and adaptive.

Net Environmental Benefit Analysis (NEBA) provides a useful framework for balancing multiple competing interests and engaging stakeholders to inform the planning process. NEBA also accommodates consideration of future state scenarios and can help guide development of management plans that provide for pragmatic, sustainable solutions, in the face of climate change.

In this paper we present a framework for the application of NEBA (incorporating ecosystem service values - environmental, social, and economic - attributes) to longer-term, regional sediment management strategies to balance societal requirements with the realities of climate change. Site-specific examples be presented.