GREAT LAKES REGIONAL SEDIMENT BUDGETS

Planning for Balanced Great Lakes Coastal Environments

Presentation by
U.S. Army Corps of Engineers,
Chicago District

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"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."
STUDY GOALS

To provide a tool for federal, state, and local decision makers to improve coastal resilience and the ability of built and natural environments to withstand, recover from, and adapt to disturbances.

– Gaining a better understanding of littoral transport
– Identifying effects of harbor structures on littoral transport
– Identifying sources, sinks, and pathways of sediment movement

More efficient sediment management by:
– Restoring natural littoral processes
– Reducing navigation maintenance and shoreline protection costs
– Restoring habitat

Support GLRI FA 3, FA4, FA5, and GLWQA Annex 2 Nearshore Framework objectives of restoring nearshore health by developing science-based understanding of littoral processes and how impairments can be addressed through adaptive management.
STUDY PARTNERS

- U.S. Army Corps of Engineers (USACE) Great Lakes Districts
  - Chicago (LRC)
  - Buffalo (LRB)
  - Detroit (LRE)
- USACE Engineer Research and Development Center (ERDC)
- USACE Institute for Water Resources (IWR)
- U.S. Geological Survey (USGS)
- National Oceanic and Atmospheric Administration (NOAA)
- U.S. Environmental Protection Agency (EPA)
OBSTACLES TO EFFECTIVE SEDIMENT MANAGEMENT

– Huge region

– Dynamic and diverse coastlines

– Complicated by
  • Coastal infrastructure
  • Commercial harbors
  • Uncoordinated shoreline management

– Piecemeal approach (local vs. regional) hinders effectiveness and efficiency
LITTORAL CELLS & SEDIMENT BUDGETS

Littoral cells – specified control volumes, delineated based on:

- Geologic features
- Coastal structures
- Data resolution

Calculating sediment budgets – tallying sediment gains and losses through a system over time

$$\Sigma Q_{\text{Source}} - \Sigma Q_{\text{Sink}} - \Delta V + P - R = \text{Residual}$$
BUILDING UPON PREVIOUS AND ONGOING WORK

– Regional sediment budgets already being developed:
  • Lake Erie (wrapped up in 2014)
    – Funds requested to increase resolution of the work done to date
  • Lower Lake Michigan
  • Lake Ontario – RSM request submitted

Sediment Budget Analysis System (SBAS)
– existing GIS-based tool for formulating, documenting and calculating sediment budgets
  • Visual outputs for users
    – Sources
    – Sinks
    – Flux rates
  • Local and regional sediment budgets
MAXIMIZING EFFORT – SEDIMENT BUDGETS AND THE GLCRS

Identified as a probable gap that needs to be filled and incorporated into the GLCRS

• Identify and forecast vulnerability based on sediment transport processes

• Frames the analysis of measures for improving coastal resiliency
  - Structural
  - Non-structural
  - Natural/Nature-based
  - Institutional/Regulatory
NEXT STEPS

– Study kickoff
– Refining goals and objectives
– Developing scope of work
  • Use previous work as a guide
  • Needs/uses identified for GLCRS
  • Deliverables

QUESTIONS?