

The Three Sediment “R”s Risk, Resolve & Remediate

A sedimental journey...

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Azimuth Consulting Group
Vancouver
April 30 2008

Objectives of Keynote

- Set the stage for papers and posters
- High-level review
- Tie together conference/session themes
- Pose questions
- Spark discussion
- Some entertainment value!



Risk, Resolve & Remediate

- Site assessment
- Conceptual site model
- Risk assessment

- Consultation
- Remedial options and feasibility
- Decision

- Remediation
- Monitoring



Typical Steps

- Site assessment
- Conceptual site model
- Risk assessment
- Consultation
- Remedial options and feasibility
- Decision
- Remediation
- Monitoring

Suzie Thibodeau

Blair McDonald
(Thomas et al)

Helen Manolopoulos

Miranda Henning

Remediation

- In situ
 - Capping
 - Monitored natural attenuation (natural recovery)
 - Treatment
 - Institutional controls
- Dredge/excavate, dewatering then
 - Landfill
 - Capping
 - Confined Disposal Facility (CDF)
 - Treatment

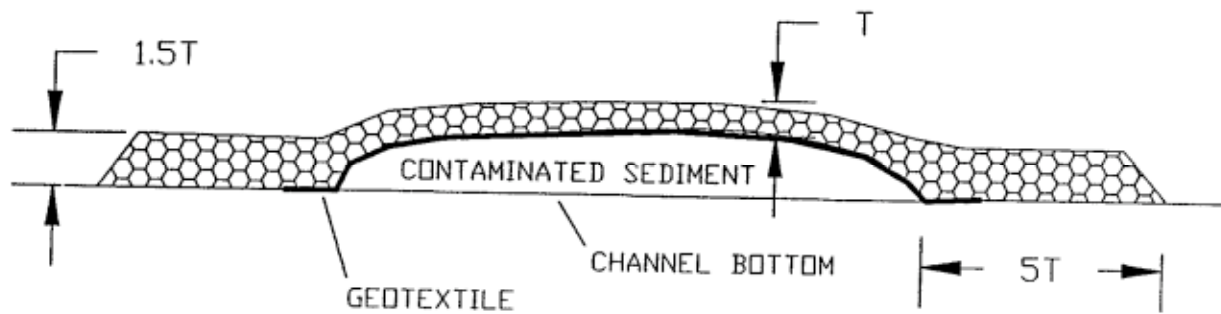
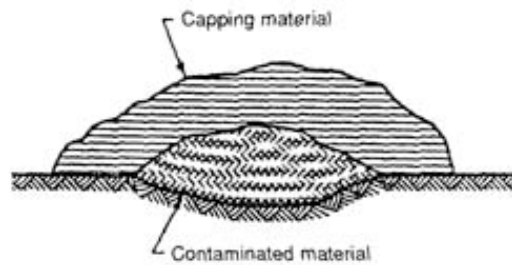
Danny Reible

Victor Magar

Roger Santiago

In Situ Capping

Level bottom capping

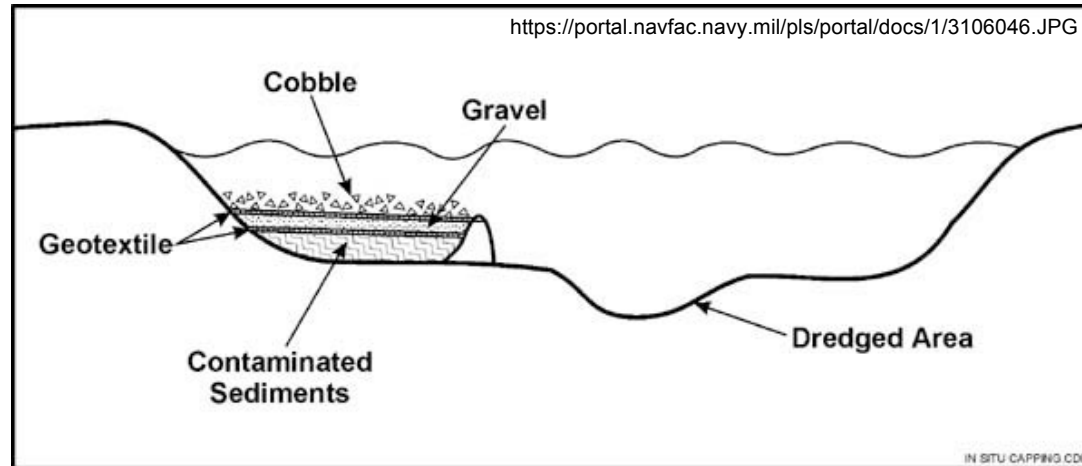


Maynard (ACOE) for ARCS



Service Engineering Group

In Water Confined Disposal Facility

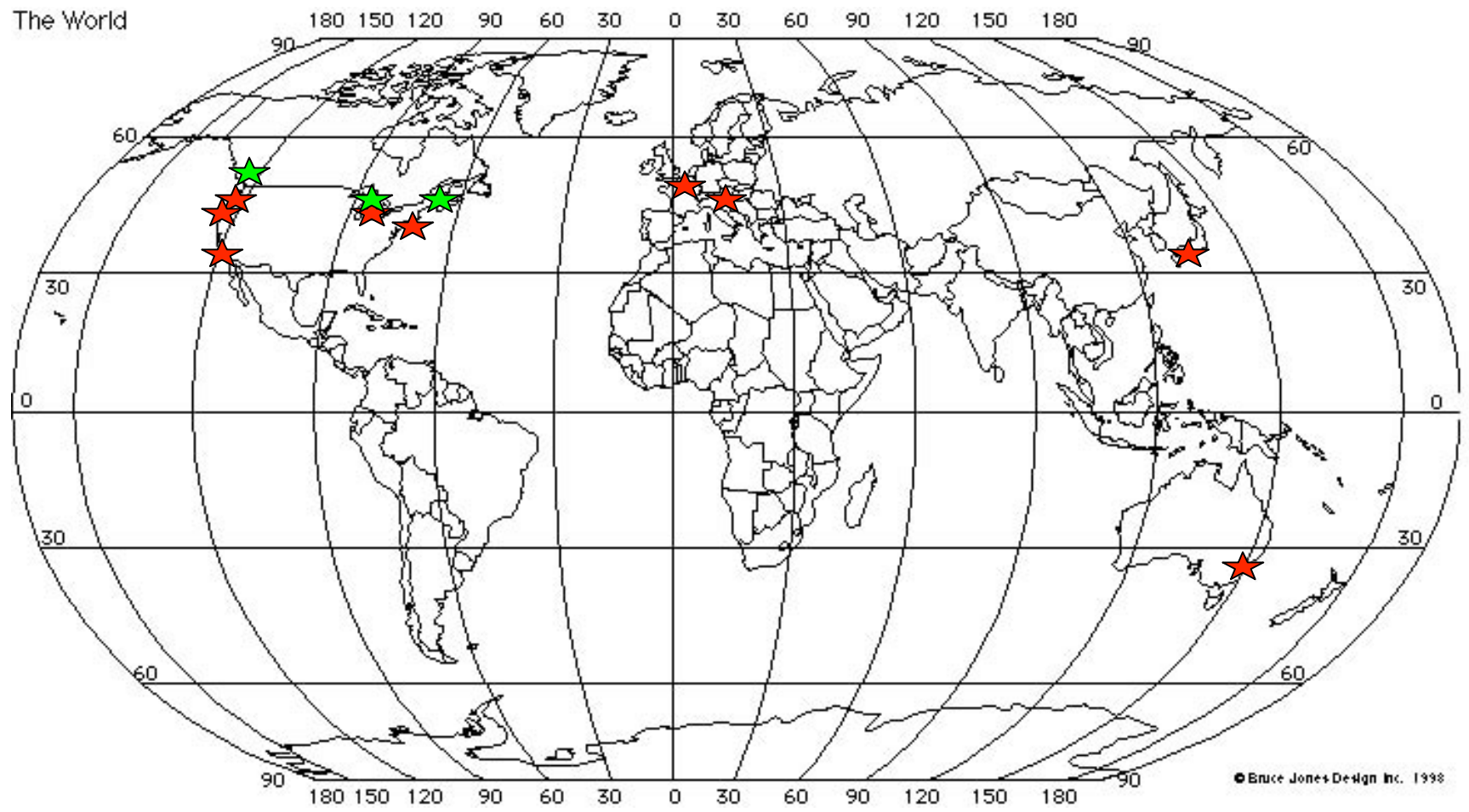


Upland Confined Disposal Facility



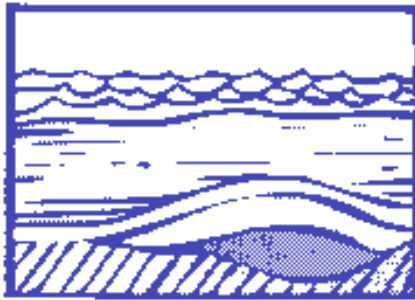
PFE Mouillee
<http://www.lrd.usace.army.mil/navigation/glnavigation/cdf/>

The World



Puget Sound Washington State

The Puget Sound Confined Disposal Site Study (July 1997).



Aquatic



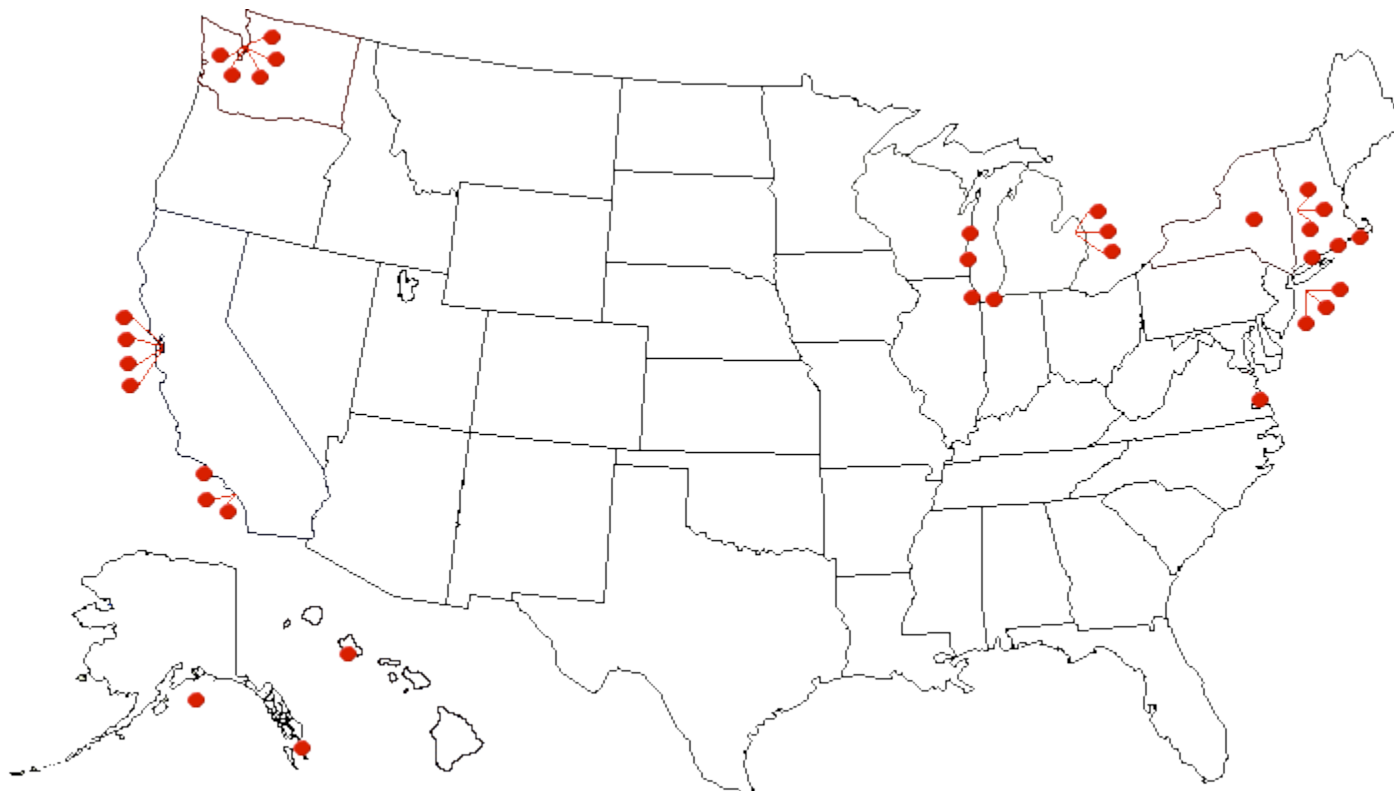
Nearshore



Upland

The three-year study will explore three options for disposal of contaminated sediment: confined aquatic disposal, nearshore confined disposal, and upland disposal.

US Army Corps of Engineers Center for Contaminated Sediments



● Contaminated Sediments Projects

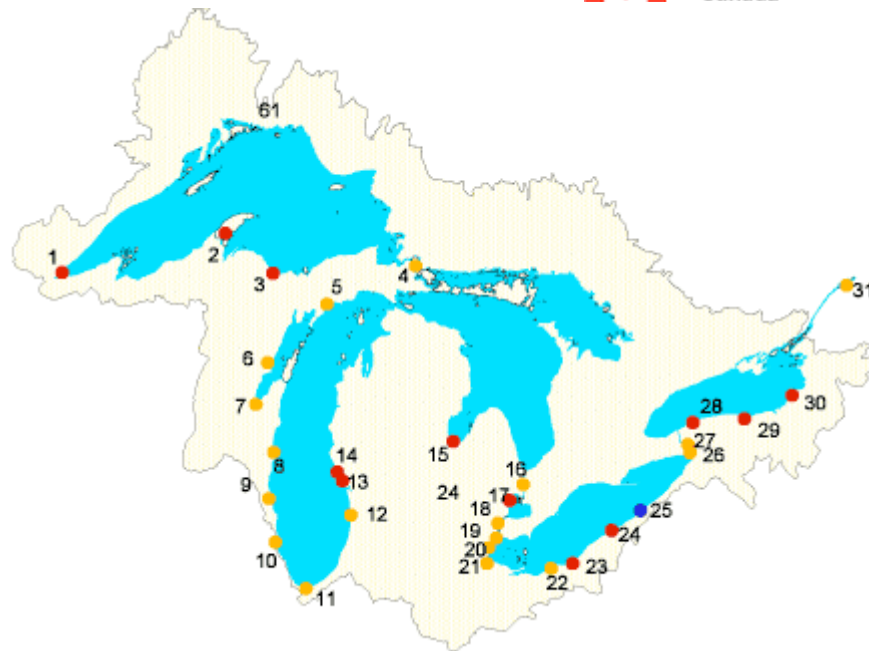
<http://el.erdc.usace.army.mil/dots/ccs/>

Great Lakes Areas of Concern – US & Canada

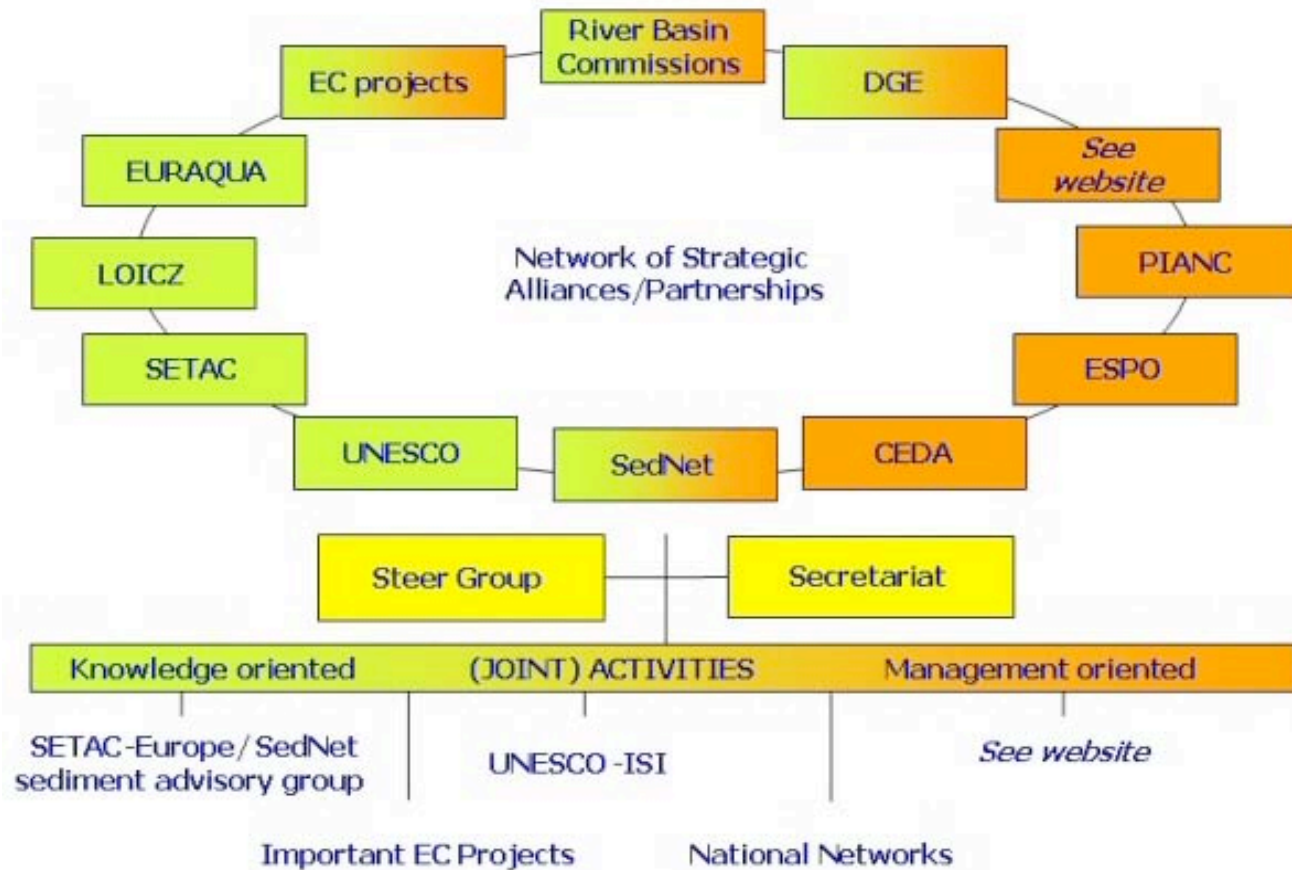


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SedNet



SedNet



Comprehensive Basin Scale/Site specific risk management approach is recommended:

1. Communication between managers and the public, throughout the decision process
2. Identification of management objectives
3. Determination of appropriate risk indicators
4. Use of risk indicators to prioritise sites on a river basin scale and to rank risks on site-specific scale
5. Apply a decision making process in which potential effects on the river basin and on the site-specific scale are weighed against each other, taking into account the economic, societal and environmental risk
6. Selection, implementation and monitoring of the final management option(s)

Drivers

- What is driving sediment assessment and remediation?
 - Navigation depth
 - Development pressures
 - Ports
 - Urban
 - Regulation
 - Site-specific regulatory action
 - Outstanding liability
- Drivers are, in part, dependent on your viewpoint...

Viewpoints

- **Site owner** who wants to sell, triggering sediment assessment
- **Site developer** needs permits
- Site operator with shallow draft
- **Crown** with portfolio of contaminated sediments & sites and associated liabilities
- **Regulator** identifying a site causing pollution, requiring action
- **Public** who want to restore human & ecological uses in aquatic systems

Challenges

- Contaminated sediments pose significant risk, but no action taken
- Sediments pose some risk, but opinions differ on “acceptability”; impasse
- Cross-jurisdictional issues
- Avoidance of assessing & remediating sediments due to our onerous system
- Delays in addressing draft depth issues at operating facilities → \$\$
- Lost opportunities due to contaminated sediments scaring off purchasers (liability) – brownfields initiatives

Challenges cont'd

- Lack of a top-down approach, where protection goals & relative risks of sites are viewed in watershed context
- Site-based approach dominates (but success with Federal portfolio management strategies)
- Making decisions about remediation in the face of uncertainties
- Unsustainable approach of sediments going to landfills
- Brainstorm more...

IF YOU HAVE (UNRESOLVED) SEDIMENT ISSUES...

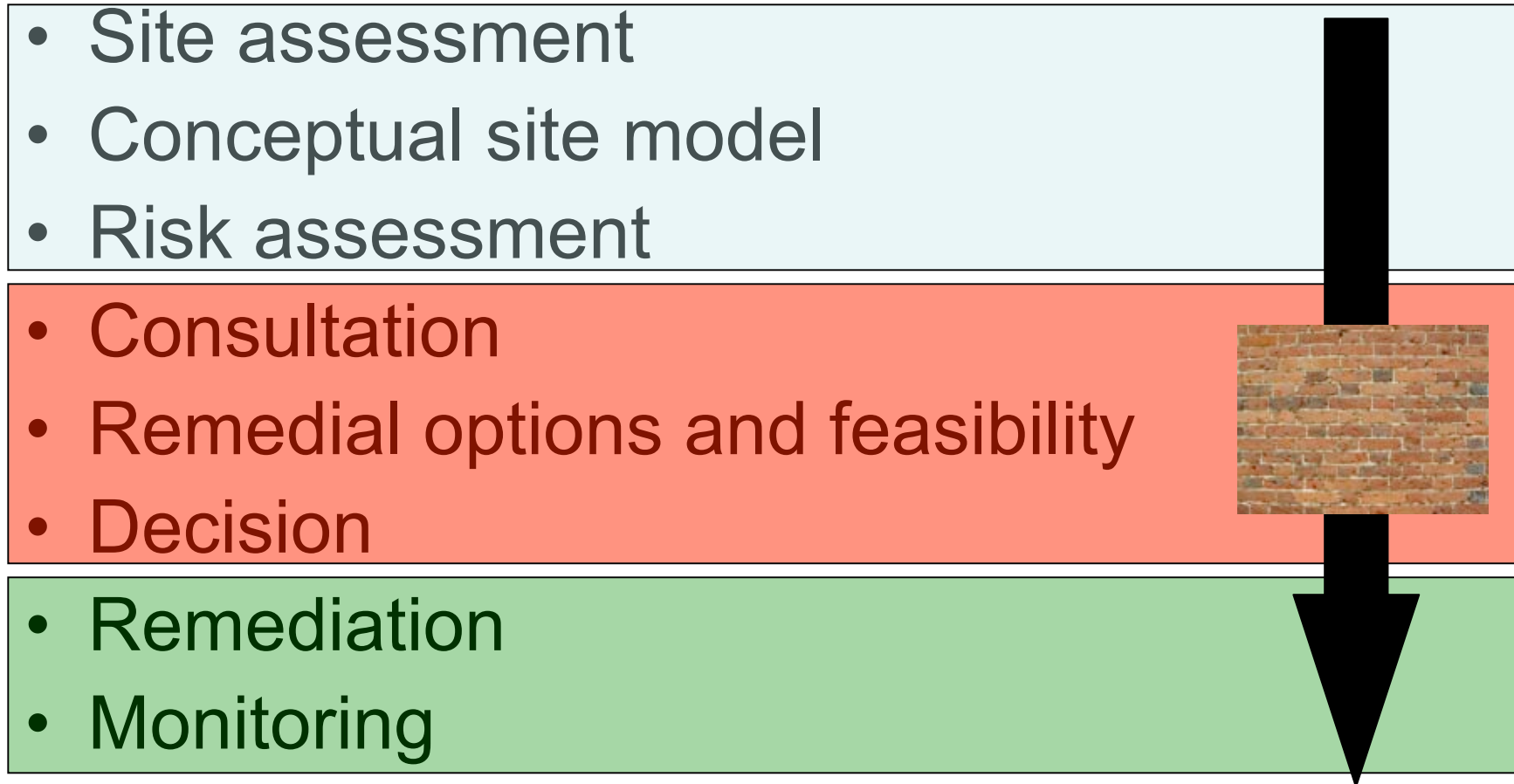


YOU ARE NOT ALONE

Informal Audience Poll

- How many of you have assessed contaminated sediments?
- And found unacceptable risks?
- And remediated those sediments?

Risk, Resolve & Remediate





Barriers to Resolution



- Weak and poorly-supported processes for consultation & decision-making in some regions
- Parties with different interests – often brought in late in the process
- Lack of experience & precedence in some areas
- Lack of will to make sediments a larger-scale issue (site-by-site approach not working); think by watershed or region or portfolio
- Resources (both \$\$\$ and people)
- Complexity (technical, jurisdiction, env. media, site use) = site-specific solutions
- Inflexible systems + lack of policy

Approaches to Resolution



Sediment Management
Decision Framework

Integrated Environmental Assessment and Management — Volume 2, Number 1—p. 51–58
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Risk-Based Decision Making to Manage Contaminated Sediments

Todd S Bridges,† Sabine E Apitz,‡ Leah Evison,§ Kymberlee Keckler,|| Mary Logan,# Steve Nadeau,†† and Richard J Wenning‡‡*

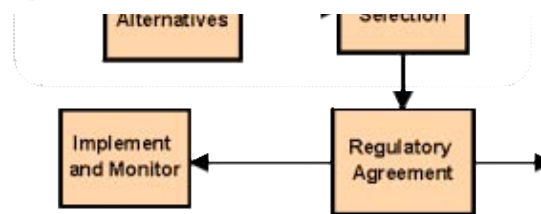


Integrated Environmental Assessment and Management — Volume 3, Number 2—pp. 223–233
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Application of Multicriteria Decision Analysis Tools to Two Contaminated Sediment Case Studies

Boris I Yatsalo,† Gregory A Kiker,‡ Jongbum Kim,§ Todd S Bridges,§ Thomas P Seager,|| Kevin Gardner,|| F Kyle Satterstrom,# and Igor Linkov††*



<http://www.smwg.org/>

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Approaches to Resolution

- **Sediments are both project + process:** ensure the process aspects get adequate attention
- **Begin with the end in mind:** think about remedial and risk management options from the beginning of site assessment
- **Start early:** define & build-in interests of regulators and stakeholders; communication about policy
- **Methods such as “Structured decision making” and “multi-criteria decision making” are your friends:** ask the right questions and organize information to be available at the optimal junctures in your process
- **Collect multi-purpose data:** invariably, we need to optimize information value per \$ spent; careful planning is required.
- **Plan and agree how decisions will be taken...**



Stream H: Remediation of Sediments

- Potential Questions:
 - What are the challenges & barriers to successful sediment remediation? Generally? In Canada?
 - What can we do to address these barriers (what, why, who)?
 - Next steps for federal contaminated sites?
 - What can we learn from each other's experience?