Panel 5 Synthesis: Comparison-Based Decision Making

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The Role of Tradeoffs in Sediment Management (Logan/McShea)

EPA's Regulatory Decision Framework for Sediment Sites is Risk-Based
[The goal is to reduce risk, often driven by fish consumption]

- Tradeoffs at sediment sites may not be necessary or useful when:
  - Stakeholders agree on the course of action
    - Science is clear
    - Outcome is reasonably certain

Study vs. Action

- Tradeoffs are made when extensive study is occurring vs. implementation of action
- Impasse can be created – but there are ways out
  - Bring in outside experts
  - Combine study and action
  - Use a phased approach

The Role of Tradeoffs in Sediment Management

Limitations of Technology vs. Risk Based Goals

- Examples of effective balance of tradeoffs
  - Focus on system-wide performance
  - Use of pilots or other studies to establish realistic, site-specific technology expectations
  - Allows rationale evaluation of achievable goals

Cost vs. Degree of Protection

- There is an interplay between cost-effectiveness and cost-benefits
- Cost-benefit can be a component of cost-effectiveness
- Question: What is the relative incremental cost compared to the risk reduction of each alternative?
- Examples of effective balance of tradeoffs
  - Conduct early, discreet actions that are expected to be beneficial and prioritize resources
  - Expend resources to get best bang for the buck

The Role of Tradeoffs in Sediment Management

Short-term Impacts vs. Long-term Risk Reduction

- The science needs to be improved to provide realistic assessments of risk and impacts
- All remedial options will have risk tradeoffs
  - Risks should be assessed against no action
  - Some options may transfer the risk
  - Risks may be manageable, but should be understood
  - Time to implement a remedy is a factor
- Examples of less effective balance of tradeoffs
  - Remedial response that causes harm
  - Failure to account for short term impacts can skew remedy evaluation

The Role of Tradeoffs in Sediment Management

Finality vs. Long-term Management

- Role of Permanence
  - Relates to the potential for long-term risk
  - Does not necessarily equate to mass removal
- Examples of effective balance of tradeoffs
  - Realistic assessment of relationship between remedial options and long term management needs
  - Flexible phased approaches that provide for modifications based on performance

Balancing Tradeoffs

- Need to maintain focus on risk reduction as the goal for sediment cleanups

Application of Multi-Criteria Decision Analysis Tools (Kiker/MacNair)

- Decision-making tools may be useful to identify values or decision criteria that are important to each stakeholder
- These may help reduce the factors that have to be dealt with at a complex site
- Has application as a potential stakeholder organizational tool
- Intuition is not always right
- Decision tools can help identify potential areas for compromise
- Decision tools help us be transparent about the basis for our decision
- A decision matrix may help make sense of multiple lines of evidence or multiple criteria

Dollars and Sense in Risk Management Decision Making
(Evison/Stansbury/Grosso)

- Mean total project cost of sediment removal projects is $200 per cubic yard (based on 49 projects)
- Mean total project costs of in-situ caps is about $60 per square yard (based on 8 projects)
- Regulators and industry should work together to make actual costs for all types of remedies more available
- We should dissect average and mean costs to help us make better cost estimates
- Regulators should evaluate policy changes that could save cost
- Uncertainties around both cost and effectiveness should be incorporated into decision-making
- The cost-effectiveness analysis may benefit from incorporating some of the aspects of cost-benefit analysis techniques

Incorporating Public Stakeholder Interests
(Siegel)

- It's important to ask what stakeholders envision as end uses for a site
- Habitat restoration issues are often very important to public
- Bringing the public into the process early increases the likelihood of finding creative, practical, and affordable ways to meet public concerns
- Community Advisory Groups help the community be heard and can organize diverse points of view
- It's important to provide technical assistance to communities, whether through EPA grants or privately funded
- Frequent meetings allow community representatives to gradually understand technical issues
- Look for win-win solutions that at least partly meet community goals

The Need for Comparative Net Risk Evaluation
(George on behalf of the SMWG)

Comparative Net Risk Defined

- Comprehensively Considers Risks Due to
  - Direct Impacts/Target Risks
  - Those associated with the presence of contamination in sediments
  - Indirect Impacts/Competing Risks
  - Those associated with remedy implementation
  - CNRE Seeks to Measure the Net Effect of Intervention, Offset by the Degree of Competing Risk Created

The Need for Comparative Net Risk Evaluation

Basis & Need for Comparative Net Risk

- "All remediation technologies have advantages and disadvantages when applied at a particular site and it is critical to the risk management that these be identified individually and as completely as possible for each site."
- "For a site, it is important to consider "overall" or "net" risk in addition to specific risks."*

  ***A Risk Management Strategy for PCB Contaminated Sediments National Research Council 2001**

- EPA Management Principle Nos. 8 and 10 emphasize risk management and risk reduction

The Need for Comparative Net Risk Evaluation

Shortcomings of Traditional Approach

- The Net Effectiveness of the Remedial Alternative is not Considered, for example:
  - If Post-Dredging Residuals Remain, What Would the Long Term Effectiveness of the Remedy be, Such as the Length of the Time to Remove Fish Consumption Advisories?
  - If MNR is Selected, What Would the Impact on its Long Term Effectiveness Be if There is a Flood Event?
- Consideration of Implementation Risk is Either Not Considered or is Deferred to a "Design Consideration"
- Often Does Not Consider Real-World Barriers Which Impede or Diminish the Anticipated Effectiveness of One or More of the Sediment Management Alternatives
- Lack of Incorporation of These Factors May Drive Remedy Decisions that are:
  - Less Protective than Anticipated
  - More Injurious to the Environment
  - More Costly than Necessary

The Need for Comparative Net Risk Evaluation

Possible Benefits of CNRE Approach

- By Incorporating Consideration of Broader Range of Impacts, Helps to Ensure that both Traditional Risks (Human Health/Environment) and Risks of Remedy Implementation are Considered
  - Direct Impacts
  - Indirect Impacts
- Comparative Format Allows Each Remedial Alternative to be Evaluated on its Merits Against its Potential Impacts
- Helps to Ensure that All Relevant Criteria are Evaluated Throughout the Process
- Enables Uncertainty to be Portrayed in Comparing Alternatives
  - Current Alternatives Analysis Tends to View Outcomes as More Well-Defined than they Really Are

The Need for Comparative Net Risk Evaluation

Components of a Comparative Net Risk Protocol

- Basic Components
  - Baseline Exposure Forecast
  - Acceptable Risk Target
  - Time to Reach Targets
  - Cumulative Exposure & Risk
  - Net Effectiveness Evaluation of Each Alternative
- Uncertainty is Associated with Each Component and Must be Satisfactorily Bounded

Consistency with CERCLA 9 Criteria

- CNRE is consistent with CERCLA's 9 Criteria which requires evaluation and balancing of short-term and long-term risks and benefits, including residual risk

Closing Thoughts

- Current Risk Assessment/Decision Paradigms do not Address a Sufficiently Broad Array of Risk
- Current Remedy Evaluation Does Not Evaluate the Net Risk Reduction of the Remedial Alternatives
- Comparative Net Risk is Essential to Development and Selection of Robust and Effective Sediment Remediation Alternatives
- Interest exists amongst various stakeholders in developing a comparative risk protocol for use in decision-making at contaminated sediment sites