Synthesis – Panel 2
"Setting the Stage for Effective Management Decisions"

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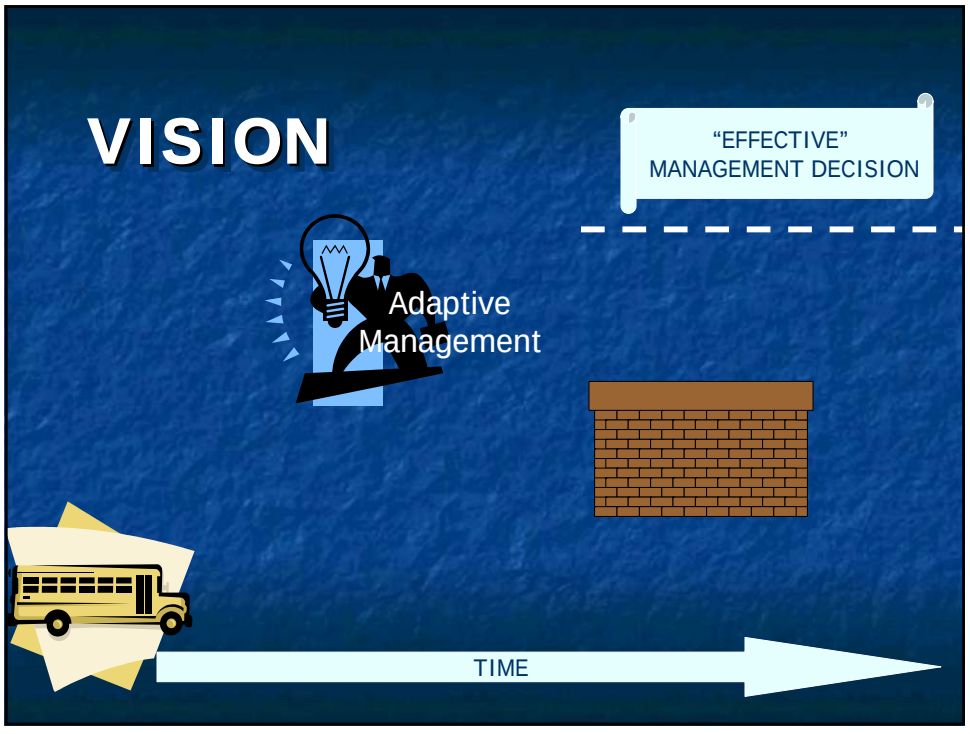

Making Effective Use of Conceptual Models for Management Decision Making

- Environmental problems often approached by looking at one part and not the whole
- Conceptual model needed for every site
- Include site setting, sources, receptors, processes
- Begin large and inclusive, then prioritize and reduce
- Use conceptual model as a tool to distinguish between uncertainty and “wrong headed” notions

Making Effective Use of Conceptual Models for Management Decision Making

- Consider definition of the site, often defined piece by piece - can complicate or confound the conceptual model
- Continue to use the conceptual model after risk assessment to form a vision for where the decision is going, carry through to LTM
- Sometimes there are other competing issues that influence the decision making beyond the “scientific” conceptual model

Optimized Use of Conceptual and Mathematical Models in Sediment Assessment and Management

- Models are often used in a suboptimal manner
- Implement process to insure that they are used properly
  - Conceptual model = organized set of ideas
  - Mathematical model = organized set of equations
- Both types of models provide a framework for data collection

Optimized Use of Conceptual and Mathematical Models in Sediment Assessment and Management

- Conceptual and mathematical models are linked
- Mathematical model provides mechanistic description of what is in the black boxes of the conceptual model
- Mathematical model provides strong test of the conceptual model
- Scientific method needs to be applied
- First iteration of the conceptual model should include hypotheses that need to be tested

Optimized Use of Conceptual and Mathematical Models in Sediment Assessment and Management

- Steps in successful application of mathematical models
  - Conceptual model needs to be iterative/evolving to be effective and reflect adaptive management principles
  - Focus on what the model can do and then use it appropriately
  - Is the mathematical model consistent with the conceptual model? If not, revisit hypotheses
  - Primary modeling objective is to reduce the uncertainty associated with remedy decisions
  - Degree of model complexity should be tied to the cost of being wrong
  - All model parameters need to be constrained by data

Asking Good Questions: The DQO Process and Beyond

- Natural companion to the conceptual model
- DQO process flexible can be used for any application
- Effective DQO process can minimize uncertainties
- Provides framework to properly define the criteria that data collection design for a study should satisfy
- Guards against committing resources to efforts that will not lead to defensible decision
- Provides clarity regarding what information will be collected and how data will be used in making decisions

Asking Good Questions: The DQO Process and Beyond

- Triad Approach
  - –Systematic planning
  - –Dynamic work strategies
  - –Real-time measurement systems (e.g., rapid sediment characterization tools)
- Goal → manage decision uncertainty more effectively by increasing confidence that project decisions are made correctly and cost effectively

Assessing and Managing Exposure at Relevant Spatial and Temporal Scales

- Current risk assessment done as a snapshot in time, results in an overconservative estimate of risk
- Traditional exposure unit approach doesn't work
- Recognize that there are two definitions of spatial scales
  - Biological definition (foraging area)
  - Management definition (site)

Assessing and Managing Exposure at Relevant Spatial and Temporal Scales

- Goal of spatial models is to develop more realistic estimates of exposure
- Need to calibrate and validate these models - presents different challenges
- Standardize those parameters that can be to reduce uncertainty
- Decision analysis uses mathematical models which is linked to the other site models
- Adaptive management used to optimization of decision making and resolution of engineering issues

Meeting Remediation and Restoration Objectives: How Do We Measure Success?

- Not sure we can or should attempt to define success (or failure) to evaluate how well the site cleanups worked
- Question of who makes decisions, differing perspectives (all important)

Meeting Remediation and Restoration Objectives: How Do We Measure Success?

- Need to set RAOs which are statements of goals of remedy
- Measures of Remedy Effectiveness vs. Risk Reduction vs. Restoration
- Develop risk based cleanup levels
- Measure risk reduction over time (what to measure should be in the RAOs)
- Include the concept of restoration

Meeting Remediation and Restoration Objectives: How Do We Measure Success?

- “Decision box” evaluation to assure remediation/recovery is on the right track
- Some difficulties in setting up “box” to assess what will be acceptable
- Apply adaptive management to deal with issue of lack of “achieving the goals”