Assessing Ecosystem Restoration Benefits

NCER Conference
21 July, 2009

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“Providing Solutions for Tomorrow’s Environmental Challenges”
Calcasieu Ship Channel

- $8M Annual Dredging
- No CDF Storage
- 500k Tons/Yr Erosion
- Biotechnical Stabilization
  - Cost effective alternative
  - Ecosystem benefits
- Marsh restoration
  - Groins
  - Trap sediments
  - Improve navigation
- 7 – 10 year ROI
Woodland Valley, NY

- New York City water supply
- Sediment filtration avoidance
- Avulsion/failing banks (sed)
- Threatened infrastructure
- $1.5B vs $8B filtration

Demonstration Objectives:
- Reduce sediment load / turbidity
- Property protection
- Enhanced fish habitat
- Recreation
NRRSS Results

• Approx 37,000 Entries
• 46% Success Criteria
• 33% Some Monitoring
• 10% Effective Monitoring

“Only a handful of projects that provide sufficient data to allow a comprehensive assessment of benefits.”

Palmer, 2008

“Providing Solutions for Tomorrow’s Environmental Challenges”
Assessment Questions

- Which alternative is preferred?
- Are the benefits worth the investment?
- What is the priority among projects?
- What are the cumulative benefits?
Service Value

USACE Ecosystem Restoration

- Purpose: “…to restore degraded ecosystem function, structure, and dynamic processes to a less degraded more natural condition.” (ER 1105-2-100).
- Subject to cost sharing requirements
- CE/ICA analyses required
- Outputs must warrant costs
- “Significance” a key factor
- ~ $500M/yr
Example Calculation of Benefits

Oyster CEM

Source (urban runoff)
Stressor (higher freshwater discharge)
Effect (lowered salinity)
Attribute (decreased estuarine WQ levels)
Performance Measure (salinity envelope)
HSI (oyster)
HU's (acres x oyster HSI)

Salinity
Adult Density
Sedimentation (muck and rate)
Hydrodynamics
Temperature
Water Management
Reproduction
Predation
Dissolved Oxygen
Larval Recruitment
Disease
Oyster Abundance and Health

Food

Oyster Abundance and Health
Program Need/Objectives

Deficiencies in Corps ER feasibility reports and in the demonstrated success of the agency’s ER program have been identified by HQUSACE, the Office of ASA(CW), and in OMB.

- Capability to determine the environmental worth of proposed projects relative to their costs

- Analyses of environmental benefits based on best available methods that will withstand external peer review

- Metrics and methods consistent with national and regional strategies for environmental restoration

- Clear communication and accounting of the benefits of proposed and in-place restoration projects, as well as the Corps’ ER Program
The Challenge

- Wetlands
- River Basins
- Islands
- Sea Grass
- Coastal
- Stream Corridors
- Urban
- Riparian
- Reservoirs
Emphasis

**FY08**
- Determination of state-of-science/practice
- Identification of needs
- Establishment of partnerships
- Interim guidance

**FY09**
- Practical technical notes
- Presentation of case studies and examples
- Additional web-based analytical and DSS tools
- Program and product reviews leading to decision
Themes of EBA Research Program

**Conceptual models** to link restoration actions to predicted benefits

Empirical, stochastic and mechanistic **forecasts** of ecosystem response to hydro-geomorphic manipulation

**Metrics** for assessing benefits in different ecosystem types, across regions and applicable at the project and program scale

Multi-criteria **decision** analysis to **support** risk-informed planning, recognizing local needs while ensuring national interest

Environmental **benefits quantification** in alternatives and post-project evaluation to document contribution to NER account

**Ecosystem services** using economic principals to account for social, economic, and ecological benefits

Tools for **programmatic assessment** at regional and national levels
Major Technical Challenges

• Baseline Condition
• Appropriate Metrics
• Timeline/Scale
• Spatial Footprint
• Aggregation/Comparison
• Uncertainty/Risk

“Providing Solutions for Tomorrow’s Environmental Challenges”
### Attributes of Restored Systems:

- Characteristic assemblage of species, including indigenous species to extent practicable
- All functional groups present for continued development along appropriate trajectory
- Physical environment capable of sustaining reproducing populations of species necessary for community maintenance
- Normal function for stage of ecological development, recognizing that character and functions may/should change with time
- Suitably integrated into the landscape
- Potential threats from surrounding landscape removed
- Sufficiently resilient to endure normal periodic stress
- Self-sustaining

*Based on SER’s Attribute Listing (2004)*
Coastal Louisiana

What are the individual and synergistic benefits of the various restoration measures, how do they compare, and is it worth the investment?
Premise

Social & economic systems are part of the ecosystem – not the other way around