Monitoring Living Shorelines in Mississippi: Integrating Outcomes for Broader Restoration Success

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Living Shor El ines
NRDA Early Restoration

St. Louis Bay
2.3 miles

Hancock County marsh
5.9 miles

Back bay of biloxi
1.8 miles
Phase III - Hancock County Marsh Living Shoreline

Objectives
1. Reduce Wave Energy
2. Reduce Rate of Shoreline Erosion
3. Support habitat utilization

Monitoring Parameters to Address Objectives
- Dimension (Reef): elevation, area
- Dimension (Marsh): marsh edge, slope
- Oyster Density
- Non-bivalve invert infauna and epifauna
Phase IV — Living Shorelines and reefs in Mississippi estuaries

Objectives
1. Build breakwaters that are sustained
2. Reduce Shoreline Erosion
3. Support habitat utilization

Monitoring Parameters to Address Objectives
- Dimension (Reef): elevation, area
- Dimension (Marsh): marsh edge, slope
- Infauna and epifauna biomass, sp comp
Moving the needle of restoration — Project Level

Data Collection
Monitoring parameters

Database Management
Insert standardized data into Restoration Database

Project Implementation

Analyze Data
- Performance criteria
- Data from similar projects

Adaptive Management
- Corrective actions
- Inform future projects
Moving the needle of restoration — bigger picture

Telling a Gulf-Wide Story
- Be Consistent
- Be Compatible

Scalable
Consistency + Compatibility = Scalability

Addressing the “Want” vs “Need”

Conceptual Monitoring Framework
- Consistent
- Compatible
- Scalable
- Flexible
- Validated
- Cost Effective
Where do we start?

What data types are needed?
There is a huge amount of information to collect for every project.

How much will it cost?
Balance the “want” vs “need”.

Win-Win Scenario
Scientifically valid and can inform decision making down the road.

Too much monitoring very expensive

To little monitoring to be useful
Monitoring Framework

1. Consistent, Compatible, Scalable
   - Backbone Data Collection

2. Time
   - Sustainability

3. Telling a better story
   - Ecosystem Services

4. Addressing unknowns
   - Critical Uncertainties
Monitoring Framework – Tier 1

- Tier 1 is the minimum requirement for monitoring for all projects, programs, and activities
- Identified broad consistent data types across all projects that will ensure:
  - Document progress
  - Showcase results
  - Project objectives are achieved
- Data types are consistent, scalable, and provide opportunities to link to:
  - Sustainability
  - Ecosystem services
  - Comprehensive ecosystem success

Backbone Data Collection
Monitoring Framework — Tier 1

Three Backbone Data Types:

1. **Extent**: X,Y,Z

2. **Density/Biomass**: Species specific measurement of success of planting or recruitment for a specific habitat restoration. Density should be calculated as number of individuals per unit area.

3. **Species Composition**: A simple measure of species richness of the community of the habitat restored.

With these three data types a number of analyses can be performed:

- Diversity metrics (Alpha [$\alpha$], Beta [$\beta$], Gamma [$\gamma$] diversity)
- Extent change analyses
- Community composition, abundance (i.e., oyster abundance $dn/dt \geq 0$)

Backbone Data Collection
Monitoring Framework — Tier 2

• Tier 2 is a set of data collection efforts that adds a sustainability metric to the associated project, program or activity

• These data build on Tier 1 data to capture the success of the project towards sustainability of the restoration effort

• Sustainability metrics are habitat type specific, and consistent among similar project types across the Gulf.

• LS Example: Salinity
  • Too low: lack of oyster recruitment and viability of oysters
  • Too high: predation from oyster drills
• Tier 3 is a further set of data collection efforts that build on Tier 1 and 2 to provide selective ecosystem service benefits

• These data collection efforts can be tied to values data / public perception data to provide true ecosystem services

• Ecosystem service data collection can occur two ways:
  • Specific metrics to a specific service (ecosystem service)
  • General metrics to enhance knowledge about ecosystem service tradeoffs (habitat condition / resilience)
Ecosystem Services Can Include:

1. Raw materials (including marine food production, wildlife, timber, oyster shell)
2. Biodiversity
3. Carbon sequestration
4. Flood protection
5. Water quality
6. Aesthetics
7. Education and Environmental Knowledge
8. Recreation and Tourism
Monitoring Framework — Tier 3

Living Shoreline Habitat

Tidal Exchange  Fisheries Production

Ecosystem Services
Monitoring Framework — Tier 4

- Tier 4 are data collection efforts that build on the Tiers 1-3 to address critical uncertainties associated with the project, program, or activity.
- Data needs would be front loaded through prior gap analysis or management/planning effort.
- These data are meant to improve the science of restoration specifically about impacts related to the specific restoration project, program, or activity.
- Example: Impacts of freshwater diversions on secondary production.
BRINGING IT ALL TOGETHER

GOAL: Establish a restoration database to include all monitoring information associated with Deepwater Horizon funded projects which will be accessible and discoverable by the entire restoration community.

Restoration database
Discoverable, Accessible, & usable data

NRDA
End — Thank You