Coastal Zone Management Practices along Muddy Deltaic Environments:

Strategies for Development of a Sediment Management Plan

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committed to our coast
Presentation Today ...

- Barrier Island System of Louisiana
- Land Loss and Sediment Needs
- Various Sources of Sediment
- Sediment Management Strategies & Plan
Barrier Island System of Louisiana

- BIs though dynamic are degrading (55% decline in 100 years, @ 155 acres/yr.)
- Soft engineering option or “Dynamic Preservation”
- Health of BI System is related to the health of broader ecosystem
Land Loss – Accommodation - Sediment Need

- ~6000 years to build ~6250 mi² of the MRDP
- Historical land loss (1930) =~1883 mi²; Accommodation = ~3.8 BCY
- Future land loss (2060) =~770/1750 mi²; Accommodation =~1.7/3.5 BCY
- Sediment Needs = 5.5 to 13 BCY *(Depending upon the sediment types or cut to fill ratio)*
Sediment Sources

- Mississippi River
- Atchafalaya River
- Renewable Sand Deposit
  ~39/151 MCY
- Maintenance Dredging Sediment
  ~25.5 MCY/year of sediment DISPOSED
- Sediment Load
  40-125 MCY/year
  mostly lost to the ocean

Nearshore & Offshore Sediment Sources

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LOUISIANA SEDIMENT MANAGEMENT PLAN (LASMP)

Regional Sediment Management
- Diversions
- Sediment Resources
  - Sediment Deposits
  - Sediment - Maintenance Dredging
  - Contained Disposal Facilities (CDFs)
- Sediment Evaluation
  - Evaluation of potential areas
  - Delineation of sediment source/Borrow Area
  - Offshore/Nearshore (State/Federal Waters)
  - Rivers: Lower Miss River/Atchafalaya River

Sediment Management Tools
- Protocol of exploration
- Guidelines for sediment searches (DSSM)
- LA Sand Resources Database (LASARD)
- SOP for data acquisition
- Operational Sediment Budget (OSB)
- LA Sed Allocation Allotment Plan (LASAAP)

Sediment Borrow Area
- Monitoring & Management (BAMM)
  - Evolution through time
  - Infilling rate
  - Slope Stability Issues
  - Hypoxia
  - Optimal Utilization
  - Location vs. project
  - Location vs. pipeline

Programmatic Monitoring
- Adaptive Management
  - SWAMP
  - BICM
  - Met-Oceanic Data - WAVCIS
  - Eustatic Sea Level Rise
  - Subsidence

Policy/Regulation
- Federal Standard
- Pipeline/O&G
- Cultural Resources
- Environment Issues
- Sea Level Rise Policy

Coordination with Stakeholders
- State, Federal, NGO

- LCA Miss River Delta Mgmt Study
- Atchafalaya Basin Sed Mgmt Plan
- Others

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Sediment Management Tools

- **Evaluation of Sediment Resources**
  1. **Protocol of exploration**: Guidelines for sediment searches (DSSM)
  2. **Geoscientific & other Data Management (GIS platform)**
  3. **Quantification of Sediment Dispersal Pattern in the littoral zone**
  4. **Operational Sediment Budget (OSB)**
  5. **Matching sediment sources and sediment needs (projects)**
  6. **LA Sediment Allocation & Allotment Plan (LASAAP)**
Delta Sediment Search Model (DSSM)

GENERAL GUIDELINES: EXPLORATION FOR SEDIMENT RESOURCES FOR COASTAL RESTORATION

Recommended Citation

1. Review of Existing Literature and Data Sources
2. Preparation of Systematic Action Plan
   Incorporation of available data from (1).
3. State and Federal Permitting
   Preliminary Physical Sampling
   Regional Bathymetric Survey
4. Reconnaissance Geological and Geophysical Surveys
   Magnetometer Survey
   Seismic Survey/Subbottom Profiling
5. Review of Magnetometer Data
   Sidescan Sonar Survey
6. Identification of Target Areas for Detailed Exploration
   Detailed Geophysical Survey
   Seismic/Subbottom Profiling
   Bathymetric Survey
7. Detailed Geophysical Survey
   Sidescan Sonar Survey
8. Detailed Geotechnical Investigation
   Detailed Sampling
9. Cultural Resource Investigation
   Magnetometer Survey
10. Evaluation of Geophysical Data
   Laboratory Analyses
   Lithology, sampling, grain size analyses
11. Evaluation of Geotechnical Data
12. Review of Magnetometer Data
13. Borrow Area Delineation
    Calculation of sediment volume
14. Reporting and Deliverables
   Geotechnical Report
   LASARD Deliverables

Phase I
Phase II
Phase III
Phase IV
Phase V
Delineating a sediment borrow area is a time-consuming, phased process which needs permits, surveys (both regional and detail), EIS etc.
Louisiana Sand Resources Database (LASARD)

- Manage, archive, and maintain geological, geophysical, geotechnical and other related data pertaining to coastal restoration
- Centralize relevant data from various sources for:
  - identification & management of sediment sources
  - better coordination of restoration projects, and
  - to facilitate future planning for delineation and utilization of sediment resources

- 1500+ datasets identified, reviewed, formatted:
  - ADCP
  - Bathymetry (single & multi-beam)
  - Deposits/Borrow Areas
  - Geophysical Tracklines
  - Infrastructure (oil/gas)
  - Isopach
  - Magnetic Anomalies
  - Sediment Samples (vibracores & grab samples)
  - Shipwrecks/Cultural Resources
  - Sidescan Sonar (mosaics & contacts)
  - Topography
Guidelines and procedures have been developed for the standardization of geoscientific data.

Data formatting standards:
- Attribute table specifications developed for each data type
- FGDC compatible metadata

Data submittal standards:
- Data delivery grid
- File naming convention
1st Order Surficial Sediment Distribution Maps

- Sediment distribution maps developed based on existing geoscientific data in LASARD
- Initially developed to assist in planning for the 2012 Master Plan - Updated in 2015
Offshore Significant Sediment Resources

AVAILABLE
Sand and Mixed Sediment

Borrow Areas/Maintenance Dredging areas
A buffer of 1000 feet on each side of any P/L must be maintained while dredging sediment from a borrow area for restoration.
SHIP SHOAL COMPLEX

Only a portion of Ship Shoal sand resources are available for dredging, mainly due to P/L, debris, & cultural issues.

Western SS Blocks 84, 85, 98 & 99

Central Ship Shoal Blocks 88 & 89

Whiskey Island Restoration

Eastern Ship Shoal SP Blocks 12 & 13

Caminada Headland Restoration

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1. Bathymetric, Subbottom Profile, Side Scan Sonar, & Magnetic Data = 410.55 LM @ 154 ft
2. Magnetic Anomalies = 773 and Magnetic Clusters = 11
3. Sonar Targets = 12
4. Pipelines = 8 And Production Platforms = 6
South Pelto Blocks 12 & 13 – Sand Reserve

28.3 MCY of clean sand (0.15 to 0.2 mm; <5% silt) (13 to 20 ft thick)

Total Volume of 15 feet thick clean sand (without any debris or cultural issues) in 10 mi² area = 155 MCY
One mile long Abandoned P/L vs. Sediment

A decommissioned P/L, if abandoned in place, renders the surrounding sediment resources inaccessible

- It will occupy 5280 X 2000 feet = 10,560,000 sq. ft of significant sediment resources area.

- It will make about 10,560,000 x 10 feet = 105.6 million cubic feet OR 3.9 (~4) MCY of sediment INACCESSIBLE

- Economic value of sand from Ship Shoal $30 per cubic yard

- Total Economic Value of 4 MCY of sand made inaccessible by 1 mile long abandoned pipeline = $120 million
Final Thoughts...

- Greatest challenge in Sediment Management – common misconception
- Sediment are limited resources - Availability vs. Accessibility vs. Increase in cost
- Removal of abandoned pipeline will greatly help in opening up resources
- LASARD & DSSM help improve efficiency and cost-effectiveness, by optimizing the utilization of limited sediment resources
- Development of tools (OSB and LASAAP) will go long way in managing sediment
- Involvement of oil and gas industry in restoration is important.
- Importance of stakeholders participations
THANKS