Framework for the Basin-Wide Socio-Economic Analysis of Four Proposed Sediment Diversions

August 4, 2015
Overview of Presentation

- Literature Review
- Scenarios Being Analyzed
- Major Tools Being Utilized
- Biophysical & Socio-Economic Analysis Boundaries
- Socio-Economic Analysis Methodology
- Six Impact Categories
  - Economic Impact Analysis
  - Ecosystem Service Valuations
  - Social Interpretations
- Output of Analysis
- Feedback on Draft Framework from Panel
- Completion Timeline
Framing of Socio-Economic Analysis Methods

Biophysical & Landscape Changes

SOCIO-ECONOMIC ANALYSIS FRAMEWORK

Impacts to Ecosystem Services, Economies, & Social Systems

Input  Translation  Output
Six Scenarios Will Be Analyzed

Scenario 1: Future without diversion action
Scenario 2: Future with only Lower Breton Diversion
Scenario 3: Future with only Lower Barataria Diversion
Scenario 4: Future with only Mid Breton Diversion
Scenario 5: Future with only Mid Barataria Diversion
Scenario 6: Future with all 4 diversions operating simultaneously
Major Tools Informing This Analysis

**Performed by Others**
- Delft3D
- Ecopath with Ecosim (EwE)
- Comprehensive Aquatic Systems (CASM)

**Biophysical Drivers**

**Performed Under this Analysis**
- Ecosystem Valuation Toolkit (EVT)
- IMPLAN Model

**Socio-Economic Analysis Tools**
Biophysical Analysis Area
Socio-Economic Analysis Area
Overview of Methodology

Economic Results

- IMPLAN Input by Economic Sector
- Inputs by Sector:
  - Changes in Costs, Expenditures, and Sales for six impact categories.
- Resulting Impacts by Sector and Parish:
  - Sales, Job Creation, Tax Revenue, Income Generation
Socio-Economic Analysis Impact Categories

1. Commercial Fisheries
   - Fisheries harvest by location
   - Landings by Parish
   - Revenue flows and jobs
   - Cultural importance

Biophysical Data

Spatial Allocation

Economic Analysis

Social Interpretation

Quantitative Results

Qualitative Results

Ecosystem Service Values

Environmental Parameters

Land Cover Classification

CPRA Biophysical Models

Quantitative Results

Qualitative Results

Quantitative Results

Impact Category Classification

Ecosystem Valuation Tools

Economic Analysis

Quantitative Results

Social Implications

Review
2. Water Supply

- **Biophysical Data**
  - Salinity, water level, total suspended solids, nitrate

- **Spatial Allocation**
  - Municipal and private water supplies

- **Economic Analysis**
  - Business resilience, influenced productivity change, and increased utility costs

- **Social Interpretation**
  - Cost of living changes
Socio-Economic Analysis Impact Categories

3. Navigation

- **Biophysical Data**
  - Relative change in dredging volume

- **Spatial Allocation**
  - Dredging activity

- **Economic Analysis**
  - Dredging costs

- **Social Interpretation**
  - Employment, beneficial use of dredged material
Socio-Economic Analysis Impact Categories

4. Recreation

- **Biophysical Data**
  - Land cover, recreational fishing catch

- **Spatial Allocation**
  - EwE sub-basins

- **Economic Analysis**
  - Revenue flows and jobs

- **Social Interpretation**
  - Cultural importance, quality of life
Ecosystem Service Valuation (ESV)

ESV Results:

- Monetary values for 21 ecosystem service categories
  - Based on published primary studies
  - Benefits beyond market revenue flows
  - Indicative of the land cover type value (non-market)
Ecosystem Service Classification

1. **Provisioning Services**
   • Provide ecosystem goods that can be physically quantified and monetarily valued

2. **Regulating Services**
   • Provide benefits through the natural control of ecosystem processes

3. **Supporting Services**
   • Provide refuge and reproductive habitat to wild plants and animals

4. **Information Services**
   • Provide humans with meaningful interaction with nature
21 Standard Ecosystem Service Categories

- **Provisioning Services**
  1. Food
  2. Medicinal Resources
  3. Ornamental Resources
  4. Energy and Raw Materials
  5. Water Supply
  6. Biological Control
  7. Climate Stability
  8. Air Quality
  9. Moderation of Extreme Events
  10. Pollination
  11. Soil Formation
  12. Soil Retention
  13. Waste Treatment
  14. Water Regulation

- **Regulating Services**
  15. Habitat and Nursery
  16. Genetic Resources
  17. Natural Beauty
  18. Cultural and Artistic Inspiration
  19. Recreation and Tourism
  20. Science and Education
  21. Spiritual and Historical

- **Supporting Services**

- **Information Services**

Additional diagrams show the relationships between ecosystem services and parameters such as economic impact analysis, social implications, environmental parameters, and biophysical models.
ESV Land Cover Classification

Legend
- Socio-Economic Analysis Area
- Coastal Land Cover
  - Classification for Socio-Economic Analysis
    - Green: Freshwater wetlands
    - Light blue: Brackish wetlands
    - Red: Saltwater wetlands
    - Yellow: Non-wetland & other
    - Orange: Water: SAV
    - Purple: Water: Marine
    - Blue: Water: Other

Source: Earl, DigitalGlobe, GeoEye, Earthstar Geographics, CHS/WorldView 3, USDA, USGS, Aerogrid, Planet Labs, MDA, and the GIS User Community
5. Ecosystem Services

- Vegetation cover, salinity
- Land cover type and acreage per parish
- Benefit transfer value per acre and total
- Key informational services gained or lost. Natural beauty, cultural importance.
6. Storm Protection

**Biophysical Data**
- Wetland morphology

**Spatial Allocation**
- Wetland formation per parish

**Economic Analysis**
- Benefit transfer value per acre of wetland

**Social Interpretation**
- Increased sense of security for residents and businesses.
Social Results:

- From existing social science literature, local surveys, and local development plans
- Descriptive results and interpretations of quantitative results
- Informative measure for CPRA to consider for outreach & planning
# Output of Analysis

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Economic Results</th>
<th>Ecosystem Service Results</th>
<th>Social Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sales</td>
<td>Job Creation</td>
<td>Tax-Base Contribution</td>
</tr>
</tbody>
</table>

This table represents the results of an analysis for different scenarios, with columns for Sales, Job Creation, Tax-Base Contribution, Income Generated, Ecosystem Service Results, and Social Results. The entries include symbols indicating positive (+) or negative (-) outcomes, with question marks representing uncertainties.
Feedback on Draft Framework

- Primary Social Indicators
- Overlap Between Economic Impact Analysis and Ecosystem Service Valuation
- Error Estimation
- Validation of Framework with Implemented Diversions
# Primary Social Indicators

<table>
<thead>
<tr>
<th>Social Indicators*</th>
<th>Impact Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commercial Fisheries</td>
</tr>
<tr>
<td>Employment</td>
<td>X</td>
</tr>
<tr>
<td>Finance</td>
<td>X</td>
</tr>
<tr>
<td>Institutional and Legal Protection</td>
<td>X</td>
</tr>
<tr>
<td>Public Services</td>
<td>X</td>
</tr>
<tr>
<td>Human Health</td>
<td>X</td>
</tr>
<tr>
<td>Community</td>
<td>X</td>
</tr>
<tr>
<td>Access to Natural Resources</td>
<td>X</td>
</tr>
</tbody>
</table>

*List expands to approximately 45 indicators, which will be informed by EVT, IMPLAN, and socio-economic literature*
Economic Impact Analysis and Ecosystem Service Valuation

Bar chart showing economic values for different ecosystem services:
- Water supply
- Fisheries
- Navigation
- Recreation
- Storm Protection
- Wetland Ecosystem Services

- Non-market Value (ESV)
- Market Value (EIA)
Error Estimation

**Biophysical Drivers:**
- Three statistical performance metrics for Delft3D, EwE, and CASM parameters
  - Percent root mean square error (RMSE)
  - Correlation coefficient
  - PBIAS (Addresses over-/under-prediction)

**Socio-Economic Analysis Tools:**
- Sensitivity analysis with respect to RMSE of critical biophysical parameters
- Validation with respect to implemented diversions for identification of potential errors
Validation of Framework with Implemented Diversions

Legend:
- Davis Pond Freshwater Diversion
- Caernarvon Freshwater Diversion
- Proposed Sediment Diversions

Location Map

Davis Pond Freshwater Diversion (Source: USACE)
Caernarvon Freshwater Diversion (Source: USACE)
Considerations for Evaluating Results

Groupings of Results:

- Evaluate each alternative independently.
- Evaluate each scenario against FWOA.

Questions We’ll Be Asking:

- What major trends are evident over the 50-year analysis period?
- What values or magnitudes are significant thresholds for evaluating results?
- What important nuances can we discern in sub-categories of 3 major output types?

End Goal:

- Provide valuable socio-economic results to inform CPRA’s decision(s) about diversions
Completion Timeline

December 2014: Project Kickoff
January 2015: Literature Review Complete
January - July 2015: Framing of Socio-Economic Analysis Methods
August - December 2015: Perform Socio-Economic Analysis of Six Diversion Scenarios
Mid-October 2015: Preliminary Results
Mid-December 2015: Final Report Due