Best Practices for Coastal Louisiana

New Partners for Smart Growth
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Fregonese Associates
The Best Practice Manual

– Strategies that are appropriate to Louisiana’s unique geographies and cultures.
– Empowering local decision makers
– Community scale tools and strategies
– Building scale tools and techniques
Development near water: Elsewhere, USA
Coastal Landscape
Higher land near river banks
Over time, water levels have risen...
Roadways and settlement in the region clustered along riverbanks...
Historic building patterns...
Historic building patterns...
Historic building patterns...
Historic building patterns...
Historic building patterns...
Water levels have continued to rise...
Communities struggle to adapt...
Options include elevating....
Elevating and fortifying...
And abandoning when absolutely necessary
Louisiana's Coastal Regions

- Chenier
- Alluvium
- Upper Riverbanks
- Middle Riverbanks
- Lower Riverbanks
- Delta plain
Tying Strategies to the Geotypes

<table>
<thead>
<tr>
<th>Strategy Matrix</th>
<th>GEOTYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>DELTA</td>
</tr>
<tr>
<td>Planning and Education Strategies</td>
<td>LR</td>
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<tr>
<td>Emergency response plans</td>
<td>MR</td>
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<tr>
<td>Evacuation routes</td>
<td>UR</td>
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<tr>
<td>Infrastructure Design Strategies</td>
<td>CHENIER</td>
</tr>
<tr>
<td>Protect roads and street networks</td>
<td>ALLUVIUM</td>
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<tr>
<td>Protect electrical networks</td>
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<tr>
<td>Elevate infrastructure hubs</td>
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<tr>
<td>Water Management Strategies</td>
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<tr>
<td>Employ sustainable water management</td>
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<tr>
<td>Conserve and restore wetlands</td>
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<tr>
<td>Levees and berms</td>
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<tr>
<td>Community planning design</td>
<td></td>
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<tr>
<td>Elevate multiple buildings</td>
<td></td>
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<tr>
<td>Site and Building</td>
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<tr>
<td>Planning and Education Strategies</td>
<td></td>
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<tr>
<td>Educate home and business owners</td>
<td></td>
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<tr>
<td>Relocate strategically</td>
<td></td>
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<tr>
<td>Site Design Strategies</td>
<td></td>
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<tr>
<td>Secure the structure</td>
<td></td>
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<tr>
<td>Floodproof and secure the building envelope</td>
<td></td>
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<tr>
<td>Prepare the property</td>
<td></td>
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<tr>
<td>Elevate living space above DFE</td>
<td></td>
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<tr>
<td>Utilize adaptive and temporary structures</td>
<td></td>
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<tr>
<td>Utilize floating houses</td>
<td></td>
</tr>
<tr>
<td>Sitting homes, businesses and civic buildings</td>
<td></td>
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<tr>
<td>Using native plants for protection</td>
<td></td>
</tr>
</tbody>
</table>
Strategy Format

• Where is each strategy most applicable?

Key for connecting strategies to geotypes

Protect Roads and Street Networks

Raising roads three or more feet of fill can usually protect them from local flooding. However, if the roads are regional serving or contain a control-of-access point flood protection may require more than fill. Elevating roadways on pilings is another effective option. Pilings allow water to flow freely under the road and ensures that roads have good drainage.

Protect Electrical Networks

In the event of a storm or flooding, uninterrupted access to electricity is vitally important for the safety and well-being of communities. Emergency management, public safety and utilities, hospitals and medical facilities, and homes and businesses rely on consistent electric service to power.
• **Prevent flooding** – Build levees; Sediment diversion; Strengthen borders of flood prone areas; Armor and fill

• **Adapt to occasional flooding** – Develop community-wide approaches that adapt to occasional floodwaters; Develop resiliency; Minimize property damage from flooding

• **Relocate when absolutely necessary** – Relocate part or all of a community to a more stable area
Prevent flooding – global examples

• Build **barriers** to fortify borders of flood-prone areas

• Use **natural processes**: sediment diversion to rebuild land area; wetland restoration to prevent land loss
Prevent flooding: barriers

**Delta Works**

*Netherlands*

**Major engineering project (1950-1997) to shorten the Dutch coastline and reduce miles of needed dikes**

Source: DeltaWorks.org
Prevent flooding: barriers

Netherlands
Seawall protecting against a storm surge

© Bosch Slabbers
Prevent flooding: barriers

Sand Dunes (natural)
Prevent flooding: barriers

Dikes (man-made)
Prevent flooding: barriers

Bangladesh
Retractable brick walls can be moved as necessary to protect the community
California
Prevent flooding: barriers

Delta Works

Netherlands
Prevent flooding: pump
Prevent flooding – watery city

**Tigre Delta, Argentina**

*The city relies on waterways and boats for transportation.*
Source: Columbia University Planning Studio

Coastal Development in Louisiana
Adapt to occasional flooding

- Community approaches to live with occasional flooding
  - Structural responses that *avoid* or *allow* floodwaters
  - Develop resilience to occasional flooding, prepare property and vital infrastructure
  - Build strong communities where flooding is a nuisance, not a disaster
Adapt: controlled flooding

Netherlands

CANALS allow for controlled flooding into pasture lands as needed
Adapt: accept occasional floodwaters

Venice, Italy
Residents prepare for floodwaters entering buildings and public spaces
Adapt: activities and attitudes

Tourists in Venice

Floating markets of Vietnam
Relocate

- Relocating part or all of a community away from flood danger may be the best option in some scenarios
  - Cost to stay > cost to move
  - Use of temporary or low-cost structures
  - Seasonal or vacation inhabitation
Mekong Delta, Vietnam:

As part of LIVING WITH FLOODS program, the Vietnamese government has begun relocating flood-prone, high-risk communities to “residential clusters” on higher ground.
Relocate

Po Delta, Italy

Abandoned fishing villages
Relocate

After decades of frequent flooding, water encroachment, and land subsidence, they faced the painful decision of whether to stay or go.

**Isle de Jean Charles, Louisiana**

* Biloxi-Chitimacha-Choctaw tribe

Images: NOLA.com
Strategies for Structures

- **Berm and armor** to protect structures and keep water out.
- **Elevate with stilts or pole structure** to move structures above floodwaters.
- **Flood proofing** of buildings so that they can be readily cleaned and returned to active use quickly.
- **Temporary structures** that can be rebuilt with relative ease because of lower investment costs.
- **Floating structures** either permanently on the water or on land that can float when/if needed.
Building Elevation

Common Strategy

*Innovative and traditional development patterns and styles avoid flood damage*

Around the world, entire communities are raised on stilts to avoid structural flooding, while accommodating the occasional land flooding.
Building Elevation

Coastal Louisiana
Building Elevation

Pier Foundation
Building Elevation
Maximum Protection Level is Three Feet

- One-Way Valve
- Sewer
- Flood Proofed Walls
- Closures for Openings

Dry Floodproofing
Wet Floodproofing

- Furnace and Utilities Relocated
- Appliances Moved or Wrapped in Waterproof Bags
- Opening to Let Water In
http://tinyhouseblog.com/pre-fab/habitaflex/
Floating Structures
Floating Structures

The FLOAT House, New Orleans
Implementing Best Practices
Data Resources and Small Area Planning
Data Access and Planning Resources

For Federal, State and Regional; Community; and Site and Building Scales

The information on this page represents current data and resources available at the time of this publication. Please note new resources and updated data are frequently available.

## What Kinds of GIS Data Are Out There?

<table>
<thead>
<tr>
<th>DATA TYPE</th>
<th>AGENCY</th>
<th>FREE ONLINE?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Layers</td>
<td>Parishes, ESR, Geocommunity.com</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Aerial photography</td>
<td>Parishes, State, ESR</td>
<td>Yes</td>
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<tr>
<td>Transportation network (road, railroads, airports)</td>
<td>Parishes</td>
<td>Yes</td>
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<tr>
<td>Parcels</td>
<td>Parishes</td>
<td>Yes</td>
</tr>
<tr>
<td>Urbanized areas</td>
<td>Parishes, Census TIGER Files</td>
<td>Yes</td>
</tr>
<tr>
<td>Political</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoning</td>
<td>Parishes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Land Use</td>
<td>Parishes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Political Boundaries</td>
<td>Parishes, Census</td>
<td>Yes</td>
</tr>
<tr>
<td>Population (historic, present, forecasts)</td>
<td>US Census</td>
<td>Yes</td>
</tr>
<tr>
<td>Local, Parish and State Planning</td>
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<td></td>
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<tr>
<td>Louisiana Speaks (2007)</td>
<td>LSDC</td>
<td>Yes</td>
</tr>
<tr>
<td>Parish Plans (Land Use, Econ Dev, etc.)</td>
<td>Parishes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Transportation Plans</td>
<td>Parishes</td>
<td>Sometimes</td>
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<tr>
<td>Coastal Master Plans</td>
<td>DNR “SONRIS”</td>
<td>Yes</td>
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<tr>
<td>Hazard Mitigation</td>
<td></td>
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<tr>
<td>Levees (large and small scale)</td>
<td>DNR “SONRIS”</td>
<td>Yes</td>
</tr>
<tr>
<td>Planned and completed state and federal restoration projects</td>
<td>DNR “SONRIS”</td>
<td>Yes</td>
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<tr>
<td>Natural Systems</td>
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<td></td>
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<tr>
<td>Land cover</td>
<td>LSDC</td>
<td>Yes</td>
</tr>
<tr>
<td>Rivers and waterways</td>
<td>FEMA, LSDC</td>
<td>Yes</td>
</tr>
<tr>
<td>Advisory Base Flood Elevations (ABFEs)</td>
<td>FEMA</td>
<td>Yes</td>
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<tr>
<td>Floodplains/DFIRM (where available)</td>
<td>FEMA, LSDC</td>
<td>Yes</td>
</tr>
<tr>
<td>Land loss</td>
<td>USGS</td>
<td>Yes</td>
</tr>
<tr>
<td>Geology</td>
<td>USGS</td>
<td>Yes</td>
</tr>
</tbody>
</table>

## Community Scale Online Resources

- Louisiana Statewide Data Catalog (LSDC)
  [http://agic.lsu.edu/datacatalog/search.asp](http://agic.lsu.edu/datacatalog/search.asp)
- Atlas: The Louisiana Statewide GIS
  [http://atlas.lsu.edu/](http://atlas.lsu.edu/)
- FEMA Hurricane Katrina Data
- LAGIC Hurricane Response Mapping
  [http://AGIC.lsu.edu/hurricanes](http://AGIC.lsu.edu/hurricanes)
- “SONRIS” Louisiana Department of Natural Resources
  [http://sonris-www.dnr.state.la.us/sonris.portal_1.htm](http://sonris-www.dnr.state.la.us/sonris.portal_1.htm)
- Census TIGER Files
  [www.census.gov/geo/www/tiger](http://www.census.gov/geo/www/tiger)
- USGS Louisiana Data
- USGS Land Cover data
- U.S. Maps and Data

## Site and Building Scale Resources

- International Code Council
  [www.iccsafe.org/](http://www.iccsafe.org/)
- Flood Insurance maps and requirements
  [www.msc.fema.gov/](http://www.msc.fema.gov/)
- Local zoning and land use codes
  [http://cpex.org/work/louisiana-land-use-toolkit](http://cpex.org/work/louisiana-land-use-toolkit)
Agencies Involved in Coastal Water Management Issues

Overseeing coastal development and water management is a shared responsibility among federal, state, and local governments. Many agencies at all three levels have roles in managing water and coastal development. In addition, non-governmental agencies are involved in managing and improving Louisiana's coastal areas.

**FEDERAL AGENCIES**

It is important to be aware of the key federal agencies that provide an overall framework and set baseline standards for coastal development and coastal emergencies. The impacts of these agencies range from the Federal Emergency Management Agency (FEMA) issuing base flood elevations, to the U.S. Corps of Engineers providing risk reduction measures and administering the Section 404 program to the Environmental Protection Agency (EPA) providing guidance and environmental criteria over many resource issues.

- Department of Agriculture
  - Natural Resources Conservation Services

- Department of Commerce
  - National Oceanic and Atmospheric Agency (NOAA)
  - NOAA Weather Service and River Forecast Center

- Department of Defense
  - U.S. Army Corps of Engineers

- Department of Homeland Security
  - Federal Emergency Management Agency (FEMA)
  - U.S. Coast Guard

- Department of the Interior
  - U.S. Bureau of Reclamation
  - U.S. Fish and Wildlife Service
  - U.S. Geologic Survey Wetlands Research Center

- Executive Office of the President
  - Council on Environmental Quality

- U.S. Environmental Protection Agency

**STATE AGENCIES**

- Governor's Office of Coastal Activities
- Office of Coastal Protection and Restoration
- Department of Environmental Quality
- Department of Wildlife and Fisheries
- Department of Natural Resources
- Department of Health & Hospitals
- Department of Transportation and Development
- Department of Insurance
- Department of Economic Development
- Department of Agriculture and Forestry

**REGIONAL ORGANIZATIONS**

- Regional Planning Districts (8)
- Levee districts
- Tri-Parish Partnership for the Atchafalaya East Watershed Group (Upper Terrebonne Basin)

**NON GOVERNMENTAL ORGANIZATIONS**

- Louisiana State University
- Tulane University
- Restore or Retreat
- Coalition to Restore Coastal Louisiana
- Environmental Defense
- The Nature Conservancy
- Barataria - Terrebonne National Estuary Program
- EPA's Gulf of Mexico Program
- Lake Pontchartrain Basin Foundation
- America's Wetland
- Ducks Unlimited
A resource for planners – or anyone creating a coastal planning process

- Recommendations for developing a planning process
  - Purpose and boundary
  - Community participation
  - Develop guiding principles that define successful outcome
  - Assessment – opportunities and constraints, technical analysis
  - Plan elements or issues to be addressed
Planning process recommendations

- Assessment – opportunities and constraints, technical analysis
- Infrastructure
- Land use
- Flooding
- Land loss
- Community assets
Land Use
Transportation
Economic Development
Housing
Parks, Trails and Open Space
Pulling it all together – how to use this manual

– Examine your challenges and opportunities, look at the manual’s vignettes, pick community and structural strategies that make the most sense for your community
Thank you

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