

Integrated Water Resource Management
for Increased Resilience:
*Linking the Urban Environment to the
Natural Ecosystem*

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&

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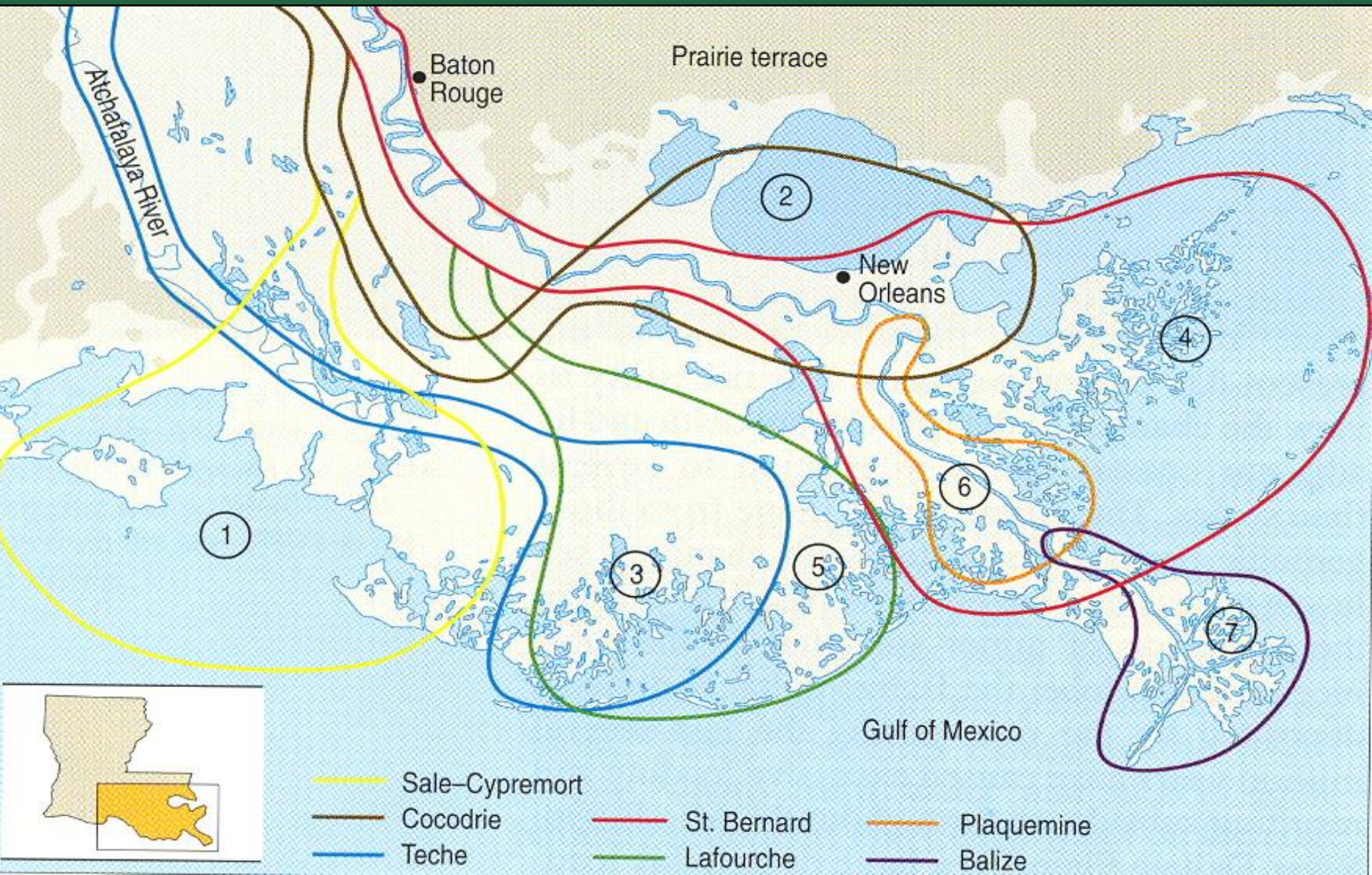
Integrated Water Resource Management for Increased Resilience

- Mississippi Delta and Vulnerability
- Dependence on the natural environment
- St. Bernard Parish
- Integrated water resource management
- Integration of human society with the natural environment

State of Louisiana

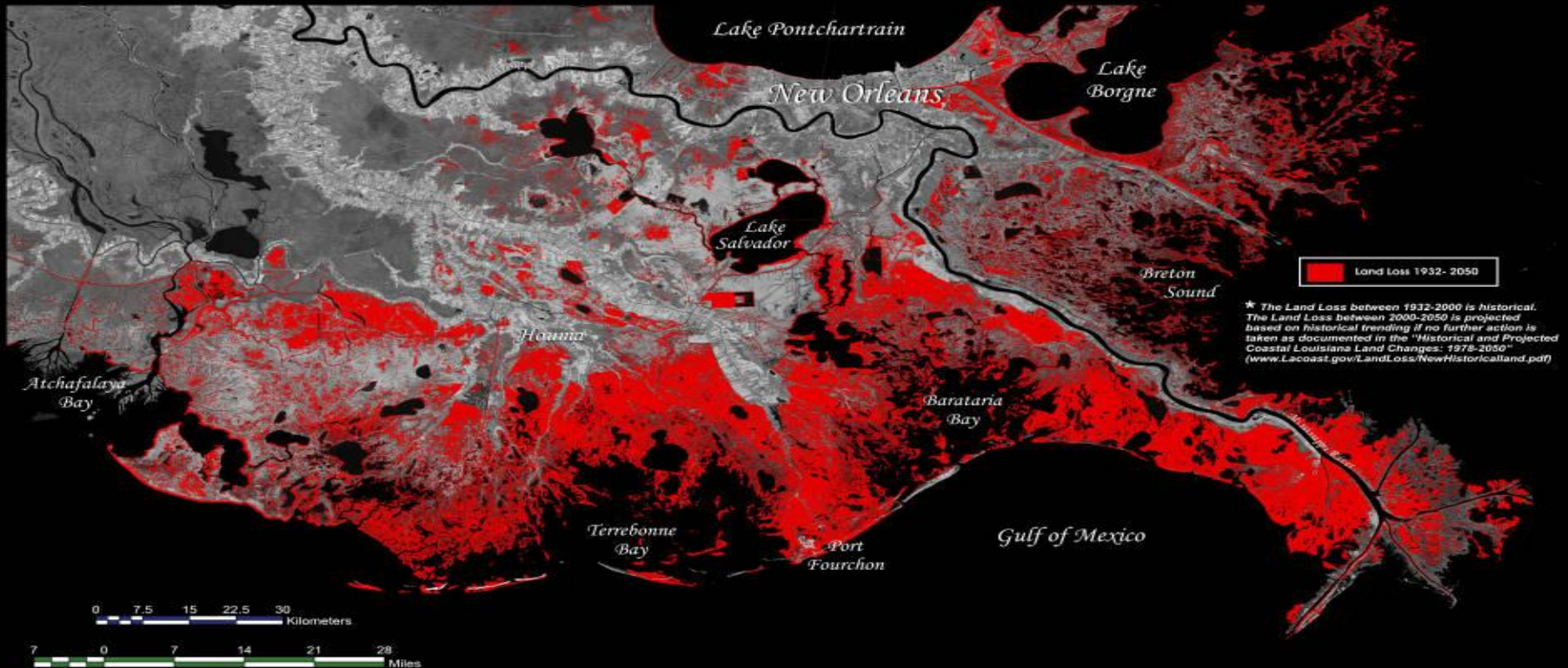


Over the last 5,000 years, switching of the Mississippi River channel formed the present day delta



Southeast Louisiana Land Loss

**Historical and Projected Land Loss in the Deltaic Plain*



Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years. From 1932 to 2000, coastal Louisiana lost 1,900 square miles of land, roughly an area the size of the state of Delaware. If nothing more is done to stop this land loss, Louisiana could potentially lose approximately 700 additional square miles of land, or an area about equal to the size of the greater Washington D.C.- Baltimore area, in the next 50 years.



For more information about the land loss analysis or to see an animated time series of wetland change, visit www.LaCoast.gov/LandLoss



Data Sources:
1932-1956 Land Change Analysis
U.S. Army Corps of Engineers, New Orleans

1956-1990 Land Change Analysis
1978-2050 Land Change Analysis
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Lafayette, LA

Prepared by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Lafayette, LA

Map ID: USGS-NWRC 2005-16-0001
Map Date: December 6, 2004

Dependence on Natural Environment

- Reduce the impacts of hurricanes
 - Flooding
 - Storm Surge
- Ecological niches = livelihood options
 - Fishing
 - Hunting
 - Ranching
 - Farming
 - Limited vulnerability to loss of any one activity
 - Economic resiliency
- Culture – cuisine, music, and language

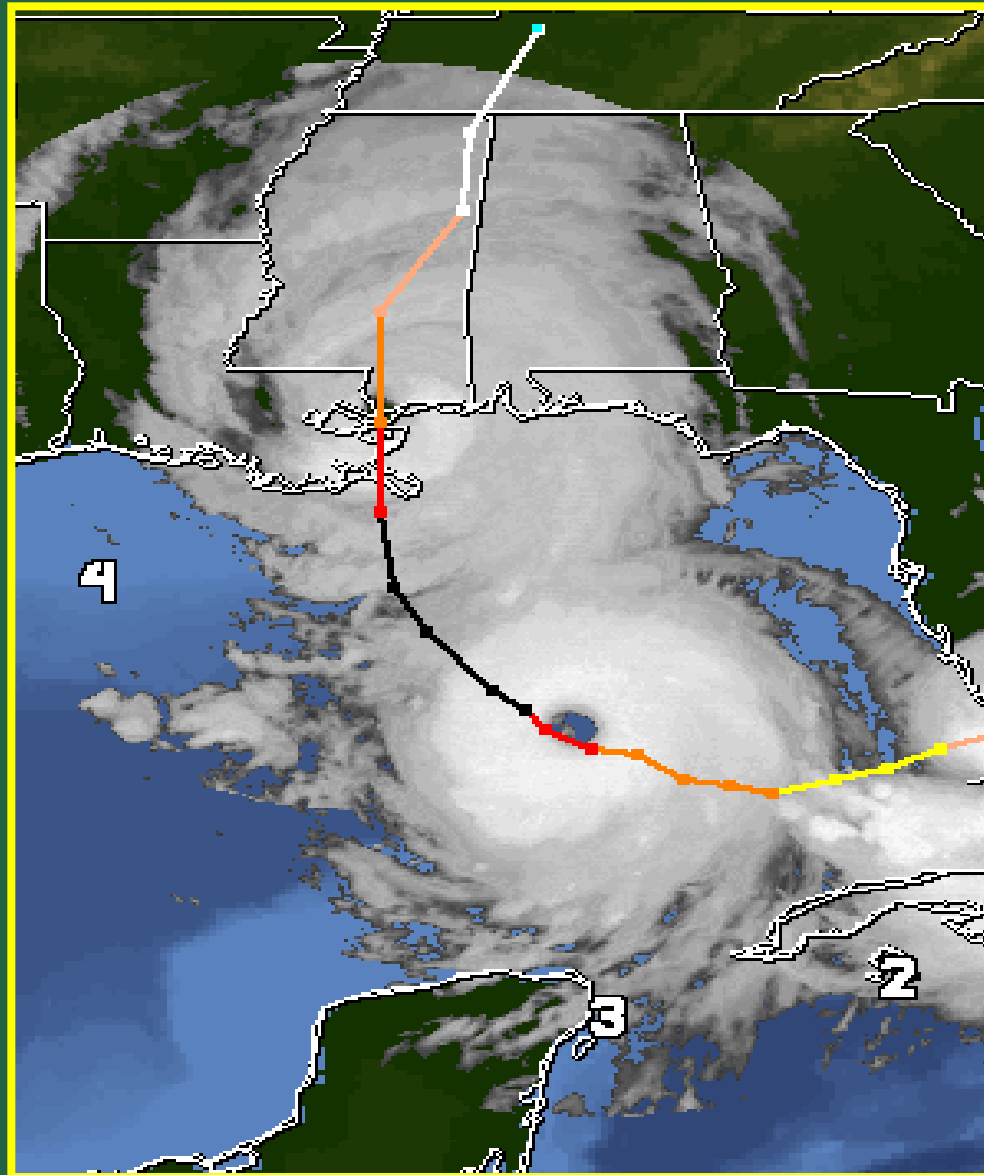
Global Climate Change

Central Gulf Coast Most Vulnerable in the U.S.

- More intense flooding from hurricanes
- Coastal inundation and degradation
- Direct effects to coastal biota
- 1-1.5 meters of relative sea level rise in 21st century
- More intense rainfalls
- More droughts
- Saltwater intrusion

Sustainable Water Resource Management!

Hurricane Katrina August 29, 2005



St. Bernard Parish

- 2162 square miles, 83% is water
- 367 square miles of land, 94% is wetland
- Physically, ecologically and economically significant wetlands
- Loses 1,721 acres of wetlands per year



10 M SPOT Satellite Image: 2 Sept 2005



St. Bernard Parish

- 99.9% of housing stock flooded during Katrina
- Murphy oil spill
- Population of 35,897 - 47% less than 2000
- Associated loss of tax base
- Less federal funding due to population decrease
- Loss of staff up to 50% in some departments
- Difficulty attracting new skilled technical staff
- Must maintain the same infrastructure
- 2010 oil spill



Mississippi Delta in 2100. Blum and Roberts (2009)
Nature GeoScience.

Increasing Resilience

- *Resilience* the capacity to absorb the shocks of extreme events without disrupting the economy, natural resources, and social systems of a community
 - Depends on physical infrastructure, social infrastructure, and the natural environment
- Need to adapt to an already-changing climate
 - Hurricane protection
 - Off-set relative sea level rise (RSLR)
- Adaptation of vulnerable human and ecological systems
 - Integrate human society with natural environment
 - Strategic retreat

Integrated Water Resource Management

- Coordinated development and management of water, land, and related resources to integrate structural and nonstructural control measures with natural and human-made water resource systems.
- Identify and evaluate innovative, site-specific water resource management practices at the local level to increase community resiliency in conjunction with larger regional coastal restoration efforts.

Integrated Water Resource Management

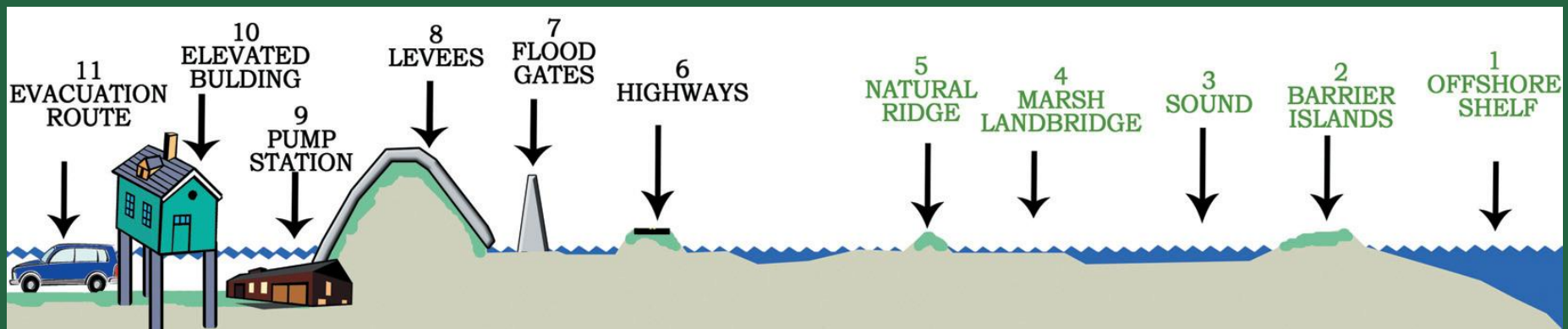
- Reduce repetitive loss of structures due to flooding
- Increase the health, quality of life, and sustainable livelihoods of St. Bernard citizens
- Reduce the need for new large scale/conventional storm water infrastructure
- Improve the environmental quality within the urban environment
- Provide a land use / water management implementation strategy

Largest Urban Greening Initiative

- Provide new zoning and ordinance recommendations that incorporates:
 - Existing green space
 - Louisiana Land Trust (LLT) properties
 - Increase buffer areas for residential neighborhoods adjacent to industry
 - Integrated water resource management
 - Hurricane resilience
 - Visualization of future resiliency scenarios
- Implement using environmental finance

Multiple Lines of Defense Strategy

- A planning methodology that integrates manmade and natural defenses which directly impede storm surge or reduce storm damage.
- Targeted coastal restoration for flood protection AND space for water inside levees



Source: Lake Ponchartrain Basin Foundation

NATURE'S SURGE BUSTER

Scientists with the LSU Hurricane Center say Hurricane Katrina provided graphic proof of how marshes and wooded wetlands provide natural armor that can save levees during storms.

WITHOUT WETLANDS, LEVEES ARE PUMMELED

Large sections of the MR-GO levee that had little or no wetlands separating them from Lake Borgne disintegrated.



WETLANDS TAKE THE BRUNT OF THE STORM

The 20-Arpent Canal levee remained standing. The difference was the buffer of marsh and wooded wetlands, researchers said.



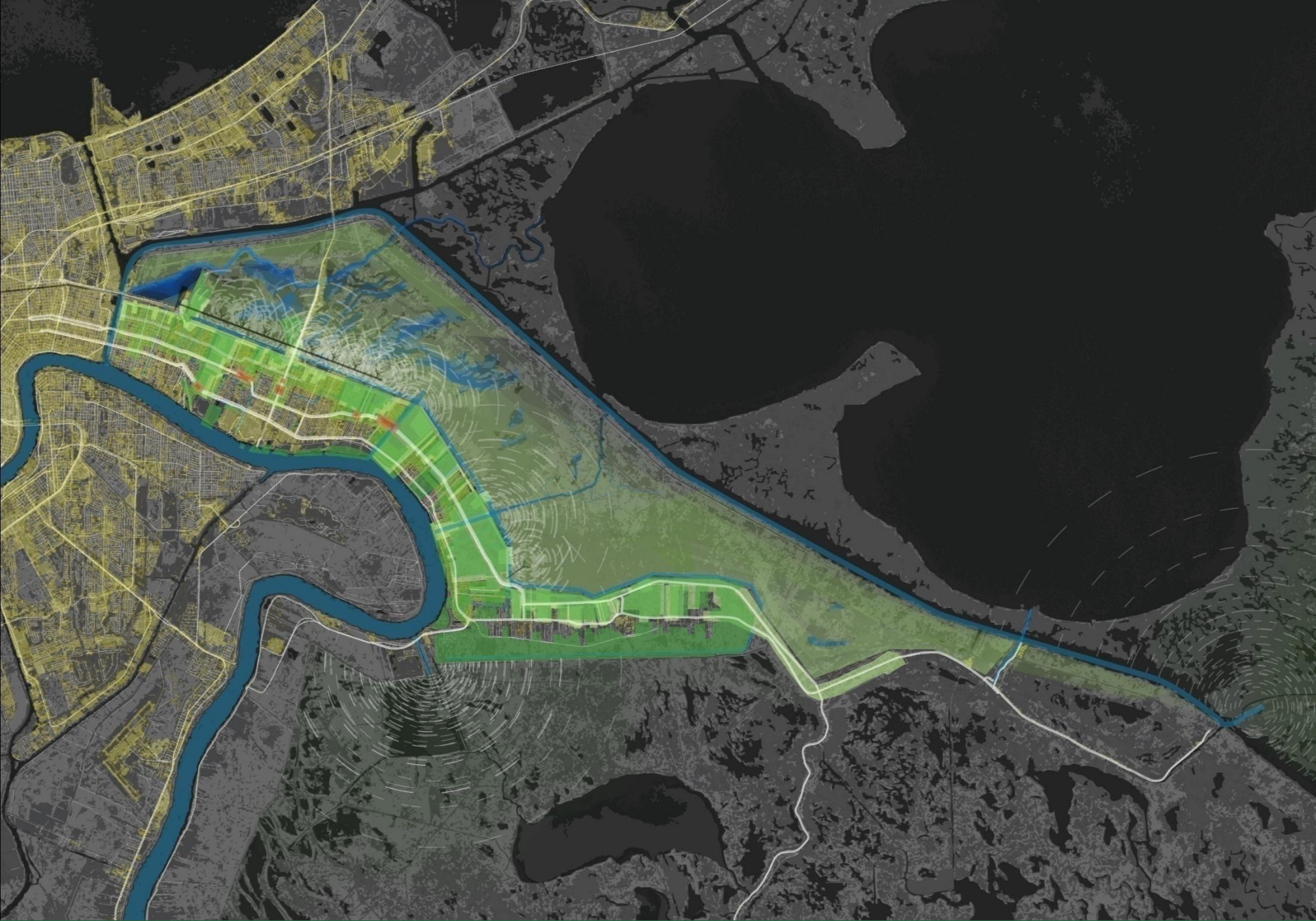






Cypress Restoration of Bayou Bienvenue Central Wetland Unit





Land vulnerable to flood

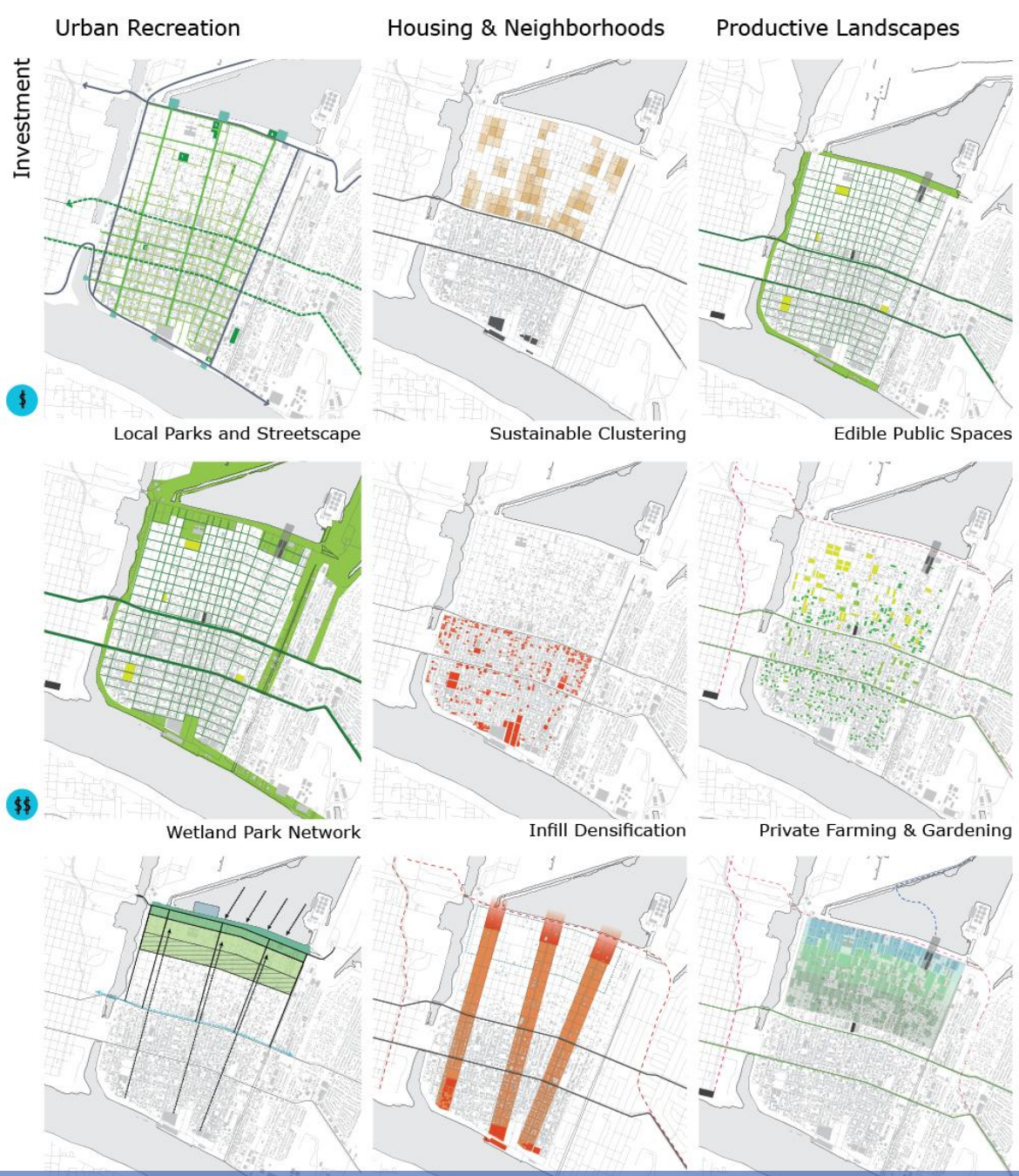


High Land for Responsible Development

LSU Coastal Sustainability Studio



The Lower 9th Ward: Building A Resilient Neighborhood **BU Coastal Sustainability Studio**



The Lower 9th Ward: Change Scenarios

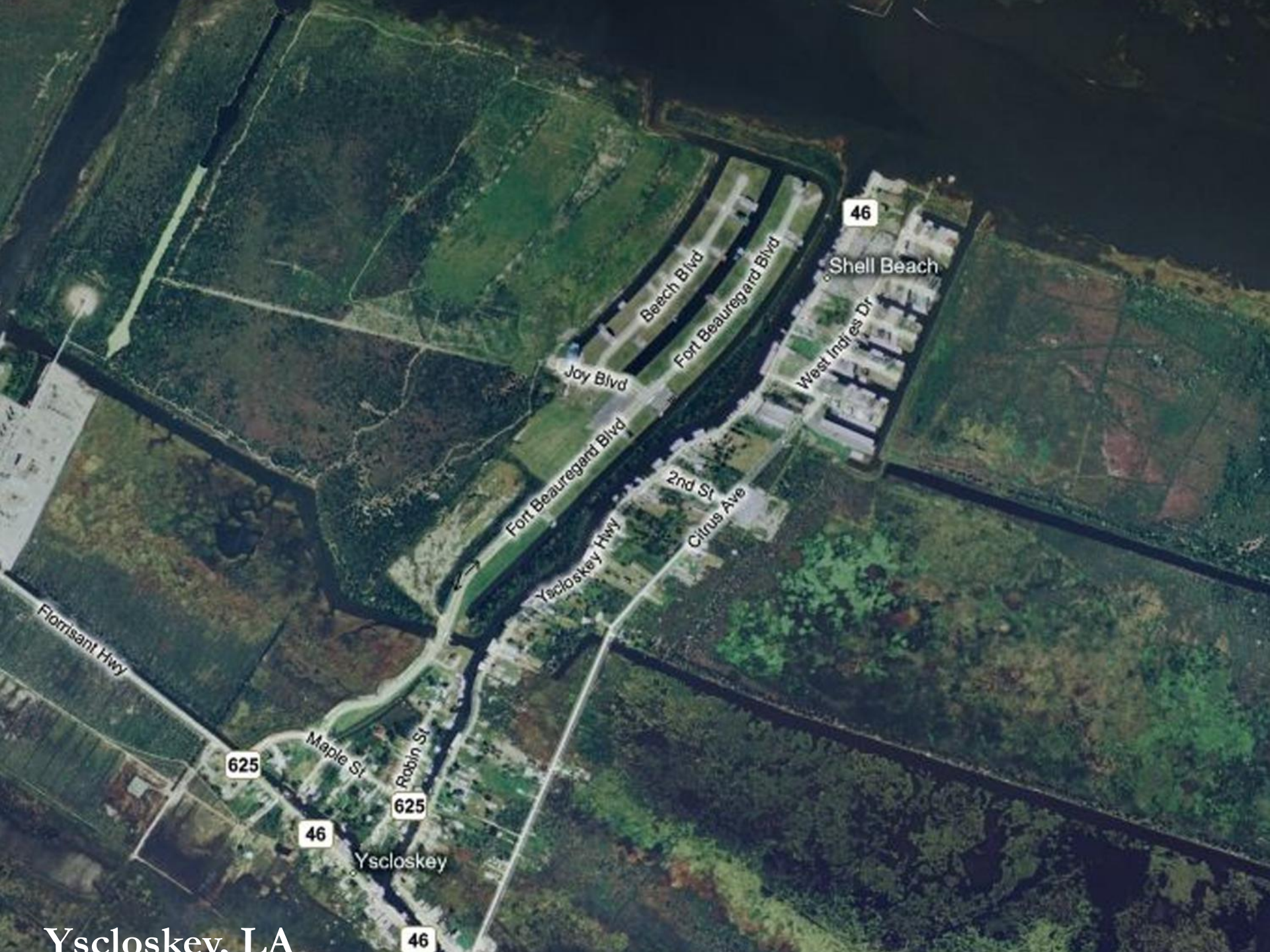


Bayou Bienvenue

Industrial Canal

N. Claiborne Ave

St. Claude Ave



Yscloskey, LA



Earthen Levee

Boat Slips

Concrete T-wall
With flood doors

Boat storage and small
commercial processing

Pedestrian bridge

Town center

Residences

Flomissant Hwy

Beach Blvd

Joy Blvd

Shell Beach

West Indies Dr

Maple St

Robin St

Scioskey

Challenges

- Policy mechanisms are not in place for large retreat from coast
- Funding – Potential for bankruptcy
- Historical distrust
- Attachment to place
 - Ancestors buried there
 - Land, homes, businesses and fixed assets citizens don't want to abandon
- Ability to work with landowners
 - Incentivization through environmental markets

Thank you

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