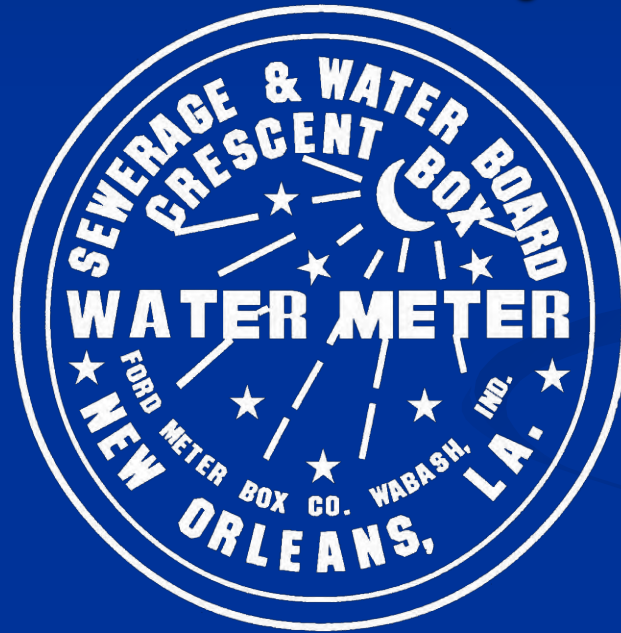


Wetlands, Wastewater Infrastructure, and the Recovery



Sarah K. Mack

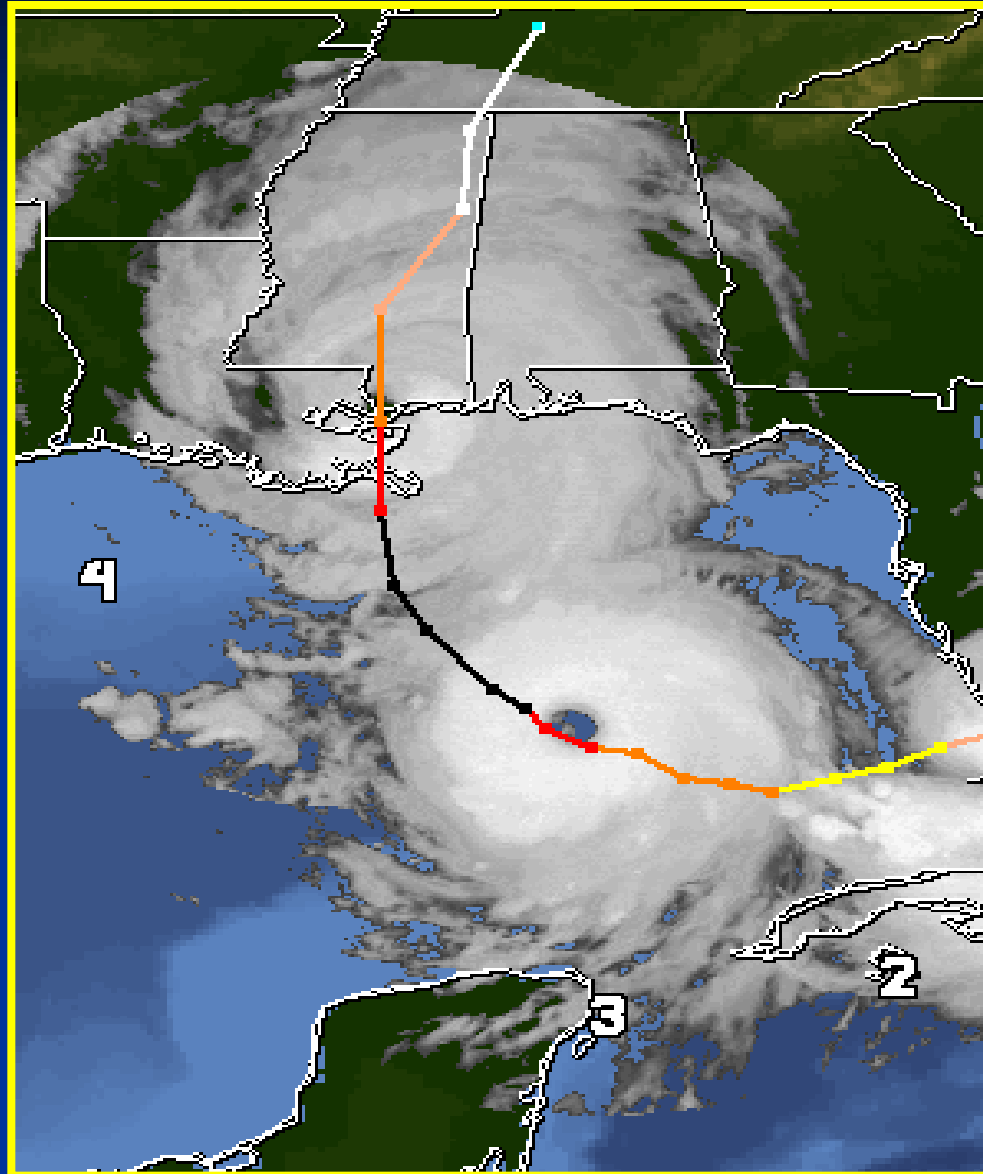
Environmental Scientist

Wetlands, Wastewater Infrastructure, and the Recovery

- Long Term Planning and Recovery of Critical Infrastructure
- Wastewater Infrastructure Design Using Wetland Assimilation
 - Multiple Benefit / Multiple Stakeholder Approach
- Opportunities for Policy Change



Hurricane Katrina August 28-29, 2005



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In the presence of
extraordinary actuality,
consciousness takes the
place of imagination

Wallace Stevens









East Bank Sewage Treatment Plant

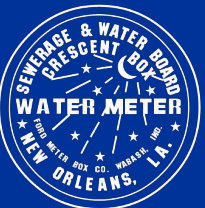
- Urgent Need for Restoration
- FEMA- Pre-Katrina Conditions
- 2 Year Time Frame for Restoration
- Estimated \$70 Million for Restoration



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Facing the Future

- Population?
- Solids
- Nutrients
- Mitigation
- 50% Less Revenue



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Driving Factors of Recovery

- Public Safety
- Economic Recovery
- Multi-Objective Management
 - Hazard Mitigation Objectives Coincide with Stakeholder Objectives
 - Multiple Benefit



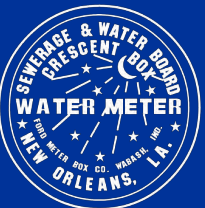
Sustainability

- Disaster- The ability to survive future disasters with minimum loss of life and property
 - Hazard Mitigation
- Environment-Meet the needs of the present without compromising the ability of future generations to meet their own needs
 - Global Climate Change
 - Energy

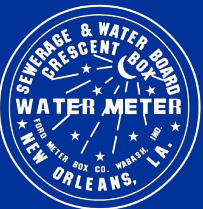
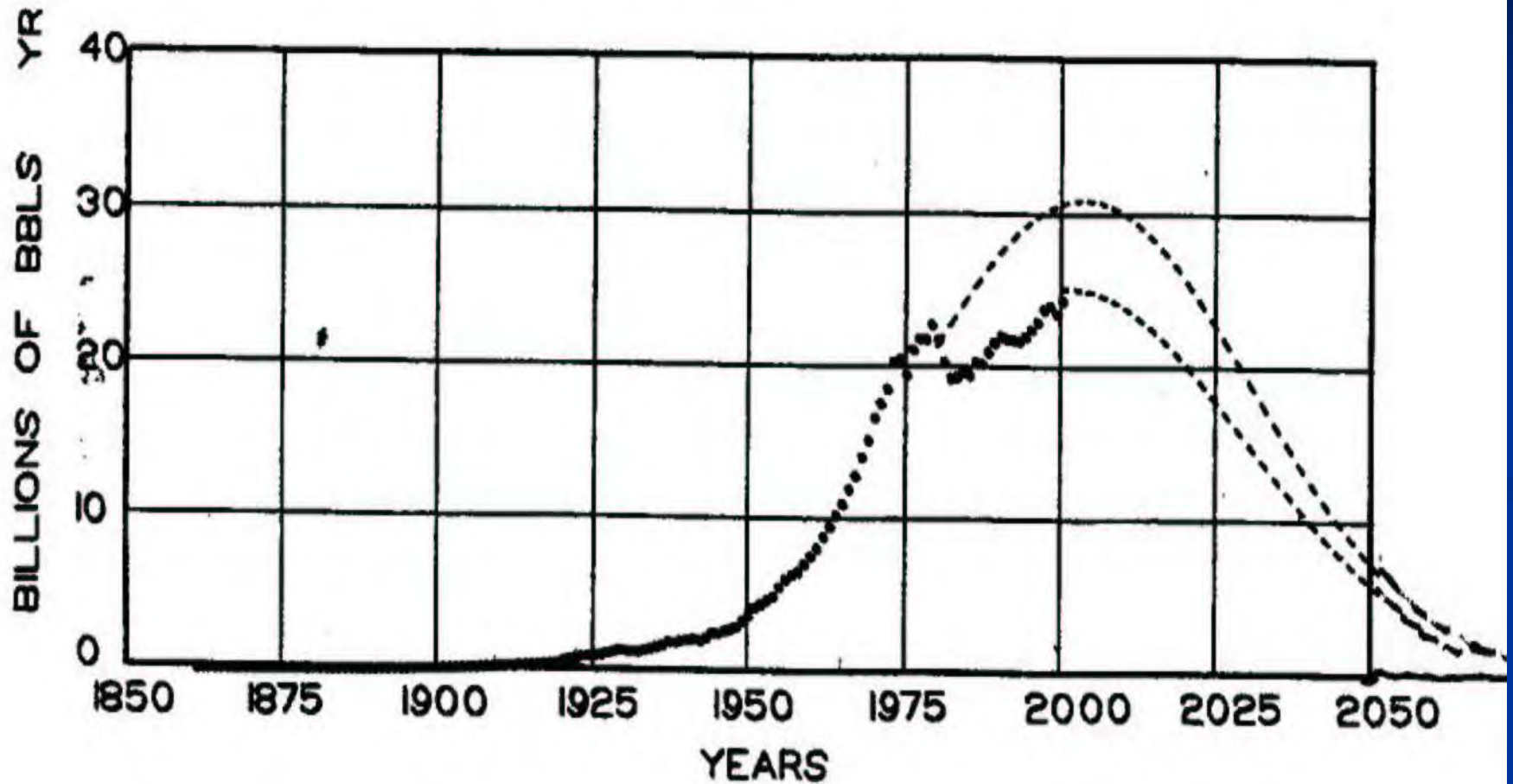


Global Climate Change

- Adaptation of vulnerable human systems.
- Need to adapt to an already-changing climate
 - Relative Sea Level Rise (RSLR)
 - Increased Tropical Storms

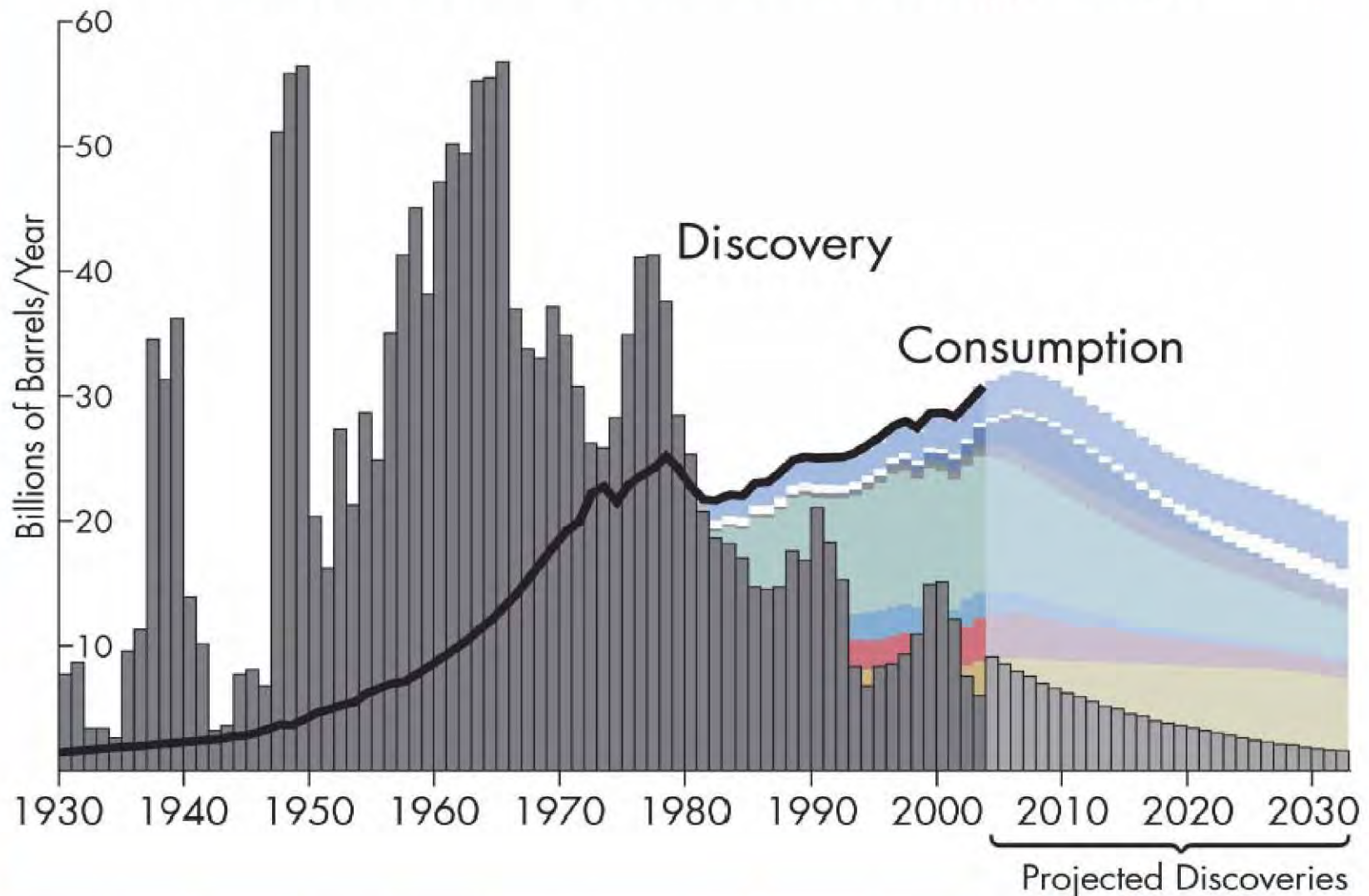


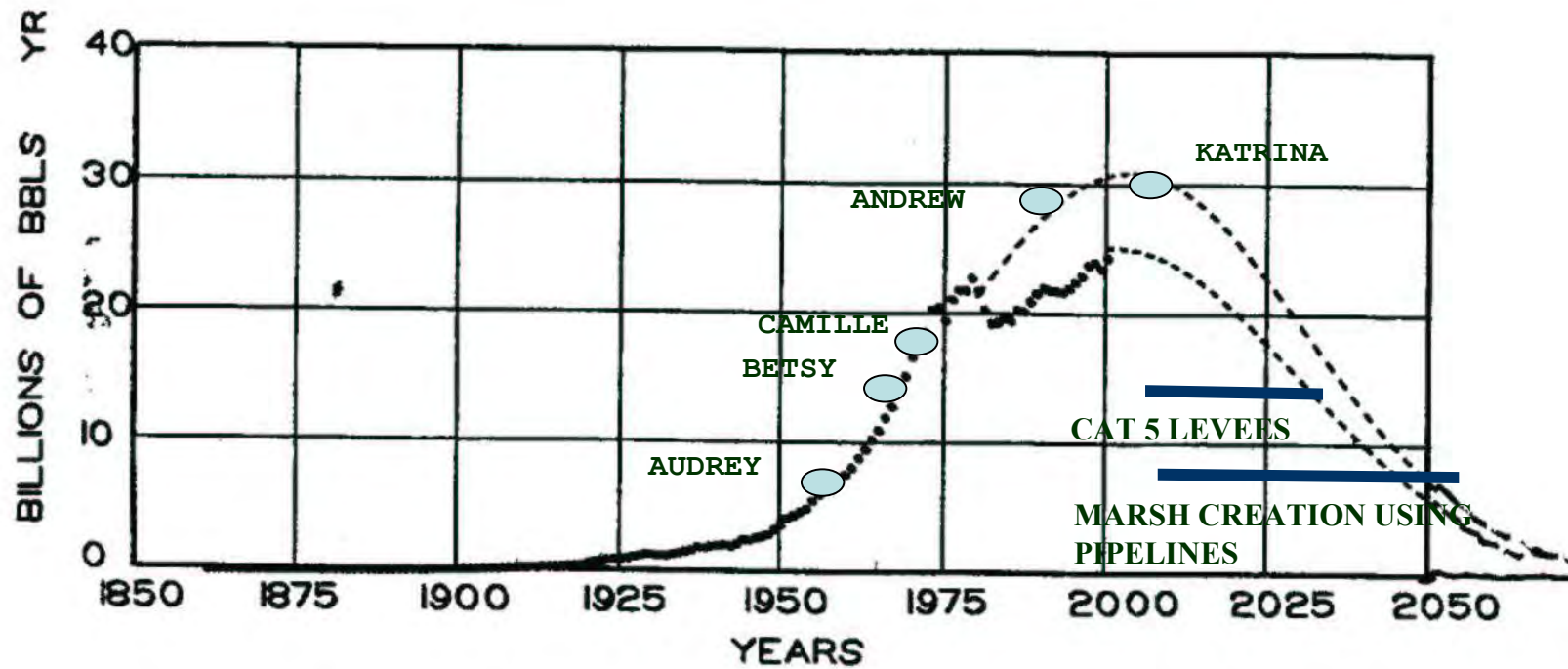
HUBBERT'S PEAK



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Peak Oil – The Growing Gap





Adaptation Measures & the Poor

- Enhanced natural resource measures benefit the poor more than large scale structural measures!
- Poor are the most dependent on natural resources.
- Poor tend to live in more vulnerable locations.

Source: IDNDR



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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 PUNNELED

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.





5 2 10PM



Environment Is Our Best Asset

- Wetlands most productive ecosystems.
- Will contribute proportionally more to the human economy in the future.
- Offset impacts of global climate change
 - Relative Sea Level Rise
 - Increased Tropical Storms
- As fossil fuels become scarce natural energies will become more important.



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10 M SPOT Satellite Image: 2 Sept 2005



WETLAND ASSIMILATION

DISINFECTED EFFLUENT

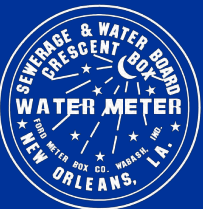
Fertilizer

Freshwater

Cheaper-Natural Energies

Restored Wetlands

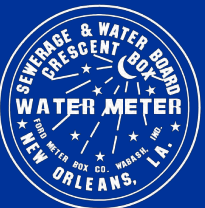
Storm Protection



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Wetland Assimilation

- Waste Assimilative Capacity
- Natural systems have the ability to “clean” waste up to a certain amount.
- Determined in feasibility



Thibodaux Wetland Enhancement



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Cypress Restoration of Bayou Bienvenue Central Wetland Unit



St. Bernard Parish





**ST BERNARD PARISH. CYPRESS SWAMP AT OUTFALL
OF THE GORE PUMPING STATION**

Process

- Funding
- Task Force
- Feasibility
- Design
- Implementation



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Funding

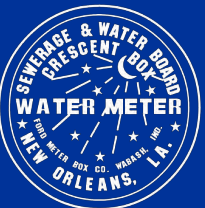
- Delta Regional Authority
 - \$400,000
 - Feasibility and Preliminary Design
- Coastal Impact Assistance Program-CIAP
 - \$10 Million
 - Phase I Implementation
- Implementation Funding Gap
 - \$30 Million



Policy

- Incentives for Municipalities

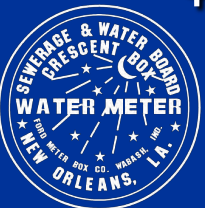
- Funding Mechanisms



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Regulatory Incentives

- NPDES- Discharge Permit
- 30 mg/L vs. 90 mg/L Total Suspended Solids (TSS)
- 100 MGD
 - \$2,737,500 solids handling for 30 mg/L permit
 - \$912,500 solids handling for 90 mg/L permit
- **\$1,825,000 Annual Savings**



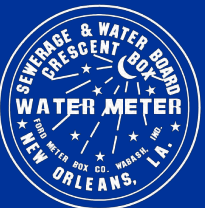
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**The Nation benefits
from the Louisiana
seafood, oil & gas, and
the port, at the expense
of our environment!**

Junior Rodriguez
St. Bernard Parish President

Carbon Sequestration

- Green plants remove (sequester) carbon from the atmosphere through photosynthesis to make biomass in the form of roots, stems, and foliage.

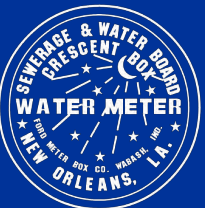


Carbon Sequestration

- Carbon Sequestration via Coastal Ecosystems – 10 metric tons/ hectare-year
- Carbon Burial and Sequestration Through Wetland Assimilation – 30 metric tons/ hectare – year
- Central Wetland Unit Assimilation/ Year (15,000 acres)
- **182,000 Tons Carbon Sequestration /Yr**
- **Equivalent to 33,000 Automobiles /Yr**

Source: Day et. al & EPA

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Cypress Restoration of Bayou Bienvenue Central Wetland Unit



Louisiana Wetland Loss

- 80% of the Nations Wetland Loss is in Louisiana
- 34 Square Miles of Marsh Loss / Year
- 100,000 Tons of Carbon Sequestration
- **Equivalent to Adding 18,000 Automobiles This Year**
- 700 Square Miles of Marsh Loss in 50 Years
- 2 Million Tons of Carbon Sequestration
- **364,000 Automobiles/Year**

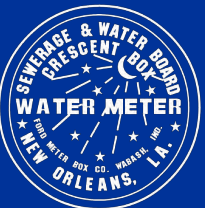
Source: www.Lacoast.gov/LandLoss/Newhistoricalland.pdf & EPA

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Greenhouse Gas Regulation

- Under development by the State of California
- Congress is debating the design of a Federal program
- Develop policy that benefits Louisiana in the greenhouse gas offset market!
- Regional Greenhouse Gas Initiative



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Multiple Benefits

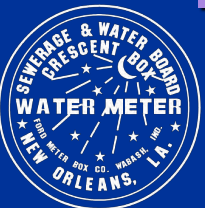
- Restore Critical Infrastructure
- Restore 10,000-15,000 Acres of Wetlands
- Improve Water Quality
- Protect Orleans and St. Bernard Parish
- Protect Public Health
- Carbon Sequestration
- Contribute to the Economy
- Financial and Energy Savings
- Protect the Culture



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World Model

- Size
- Recovery
- Policy
- Port Cities
 - River-Transportation
 - Sea Level Rise
 - Increased Tropical Storms



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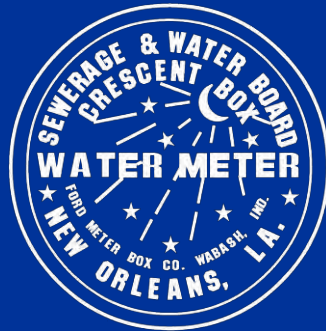
Recovery Recognition S&WB

- Innovative
- Environmental
- Economic



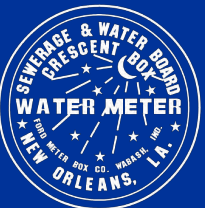
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Waste is a Resource Out of Place



References

- www.Lacoast.gov/LandLoss/Newhistoricaland.pdf
- www.epa.gov/otaq/420f05004.htm



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