Sea Level Change in Coastal Louisiana: Implications for Coastal Resilience and the Mid-Barataria Sediment Diversion

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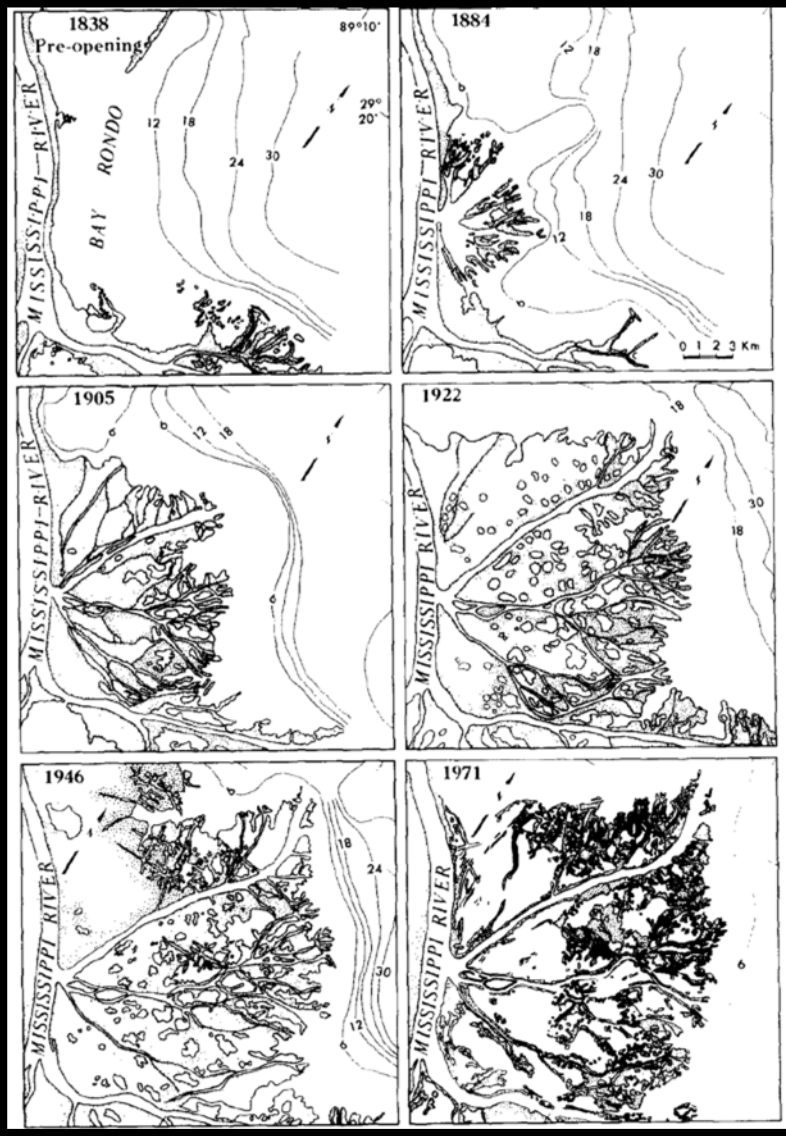
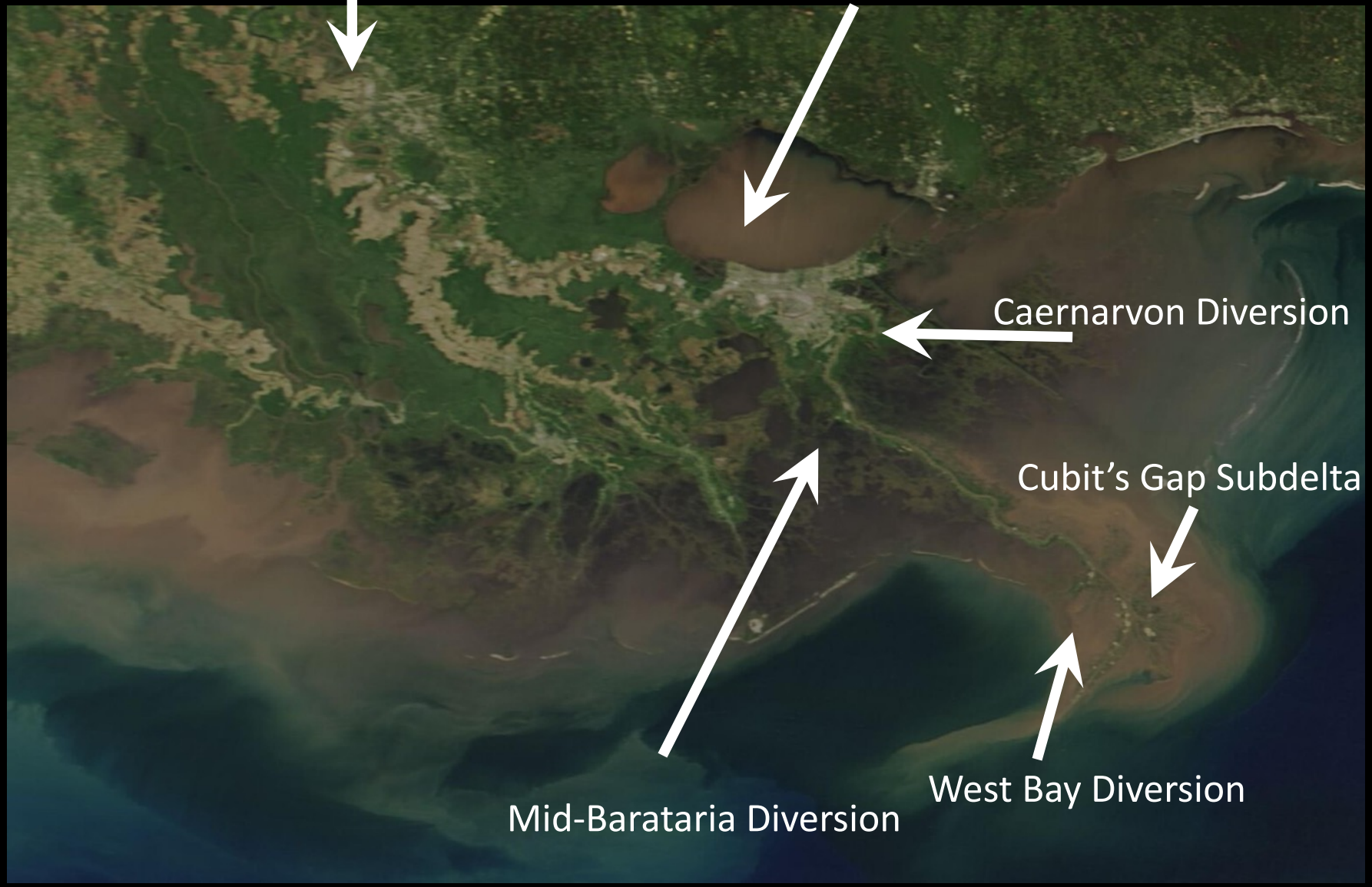
The Mid-Barataria is designed to mimic the natural processes processes that originally built the Mississippi River Delta.

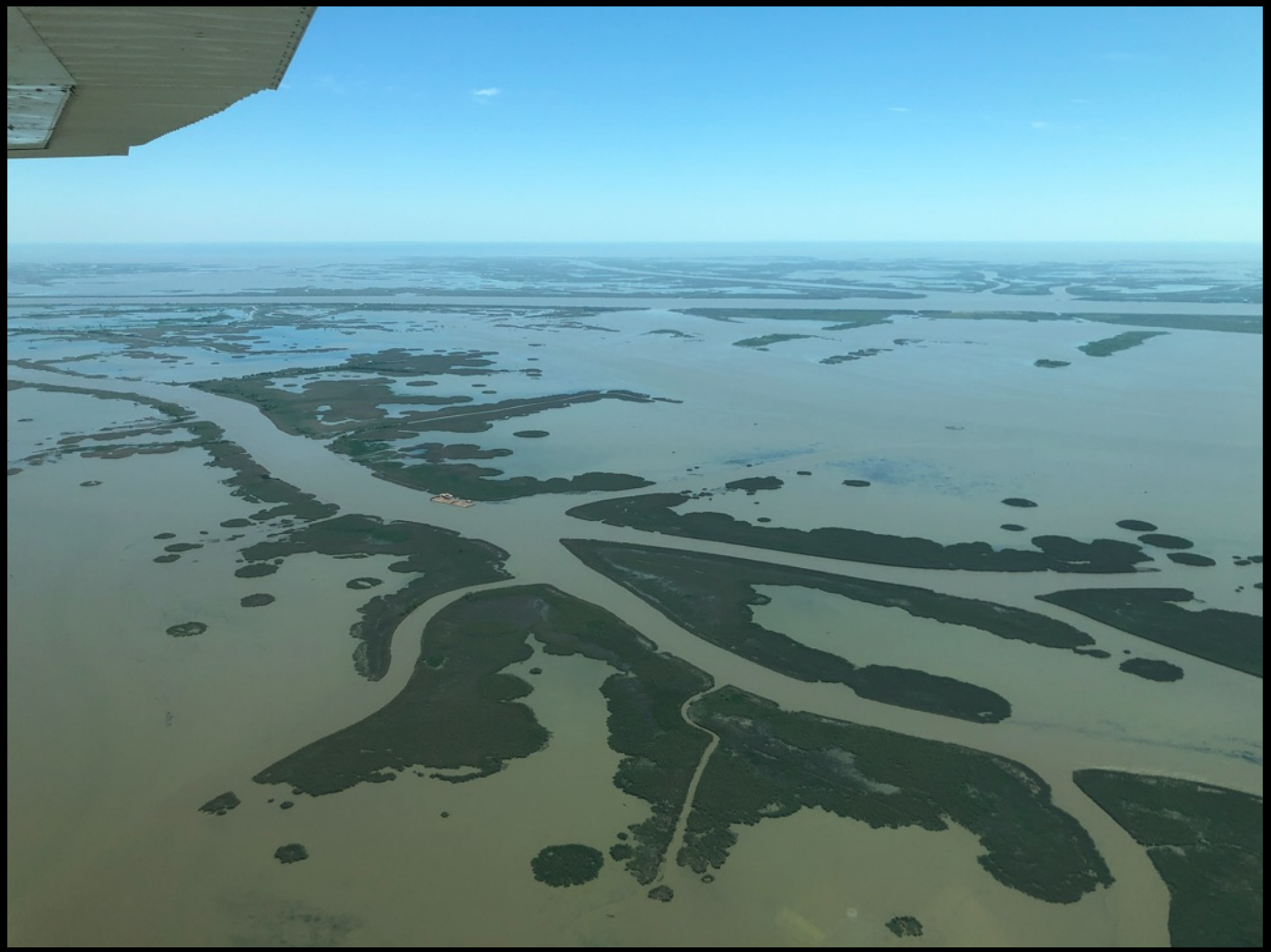


Wells and Coleman (1987)



Selected Diversion-Like Setting In The Mississippi River Delta

The mid-Barataria Diversion is large- it will deliver up to 75,000 cfs of water, at a cost of $1.4 to 2.0 billion. However, these numbers should be viewed in context.



The West Bay Mississippi River Diversion is an ungated structure intended to build ~ 14 square miles of land by diverting 25,000 ~ 50,000 cfs. It was constructed in 2002 for ~ $51,000,000, with additional maintenance and actions thereafter.

The Bonnet Carre Spillway is a flood control structure that can carry up to 250,000 cfs.

It was built in 1932 for $14.2 million ($272,000,000 in 2021 dollars). It’s ecological benefits are modest, and it can lead to water quality problems in Lake Pontchartrain.

Potential Trade-Offs Of The Mid Barataria Diversion

Positive

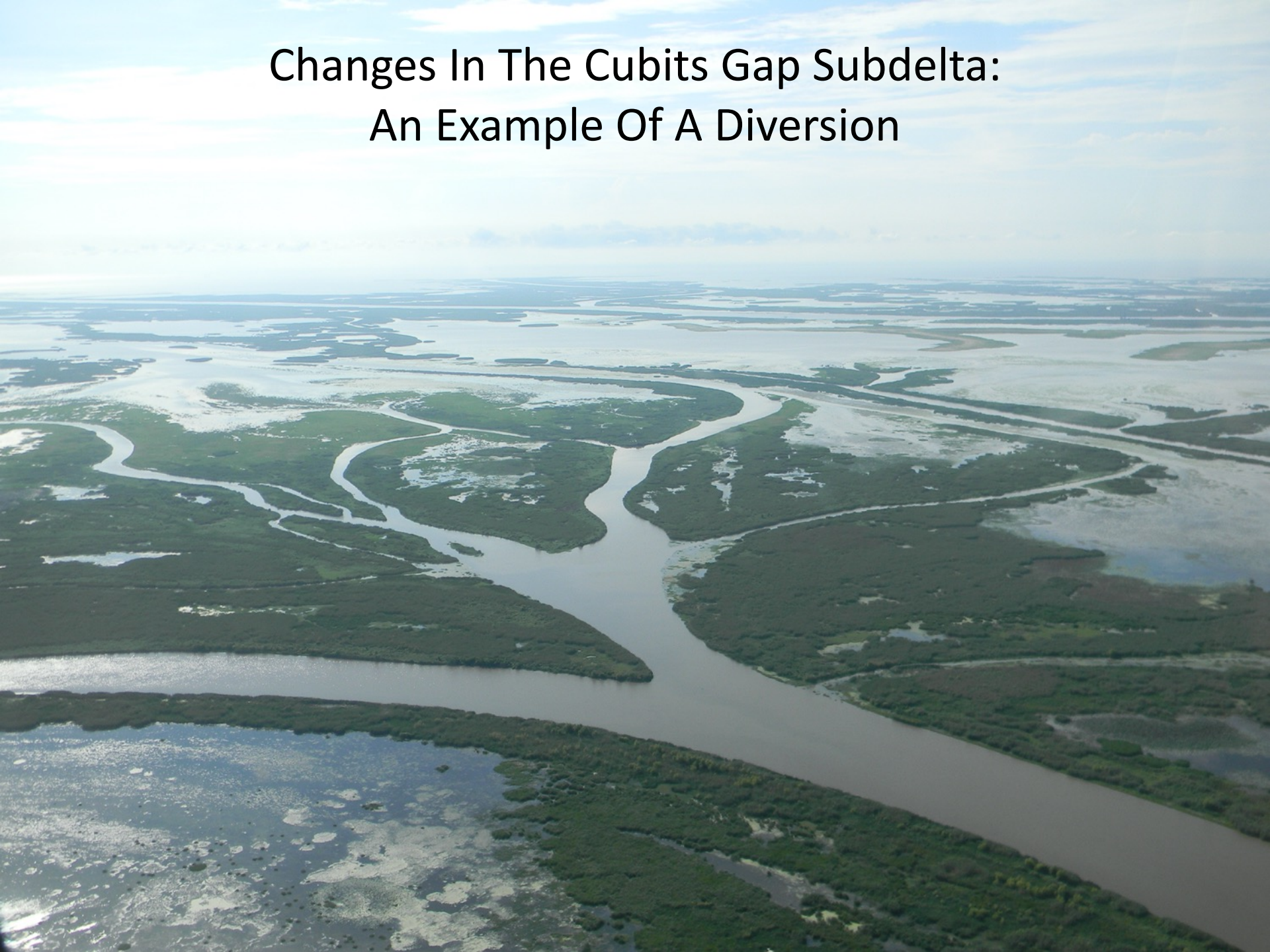
- Builds about 14-20 square miles of land.
- Reconnects the river to its delta. The sustained riverine input of sediment is critical for marshes to keep pace with sea level.
- Increase ecological productivity for freshwater dependent species.

Negative

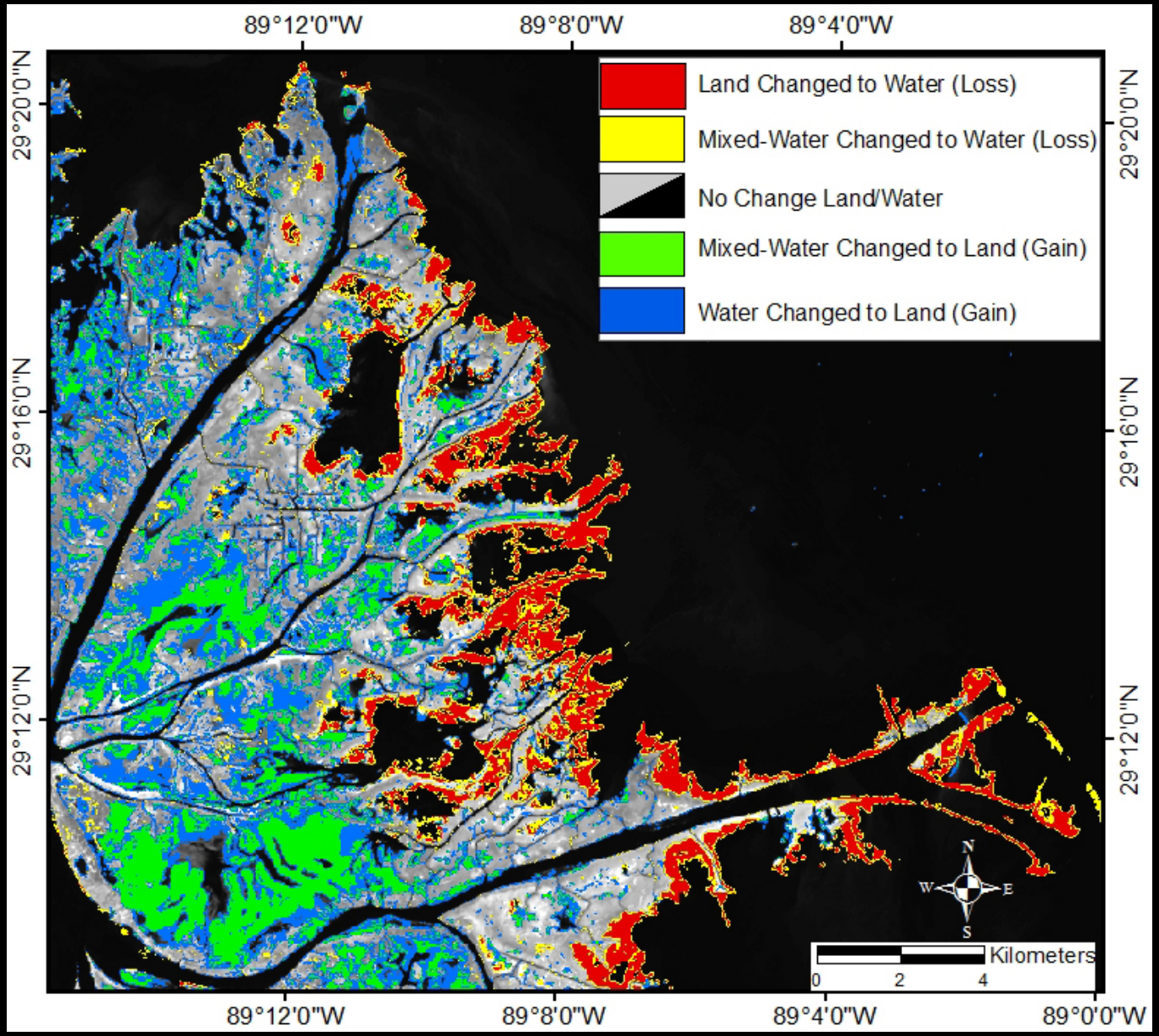
- Shoaling in the Mississippi River can result from a loss of stream power.
- The diversion structure could interfere with existing flood protection systems.
- Large inputs of freshwater could reduce productivity for some saltwater tolerant systems, particularly oysters.

Potential negative impacts were reduced, in part, through by designing a hardened, gated structure that allows for a managed flow of water. This enhanced design is partially responsible for the high cost relative to the West Bay Diversion.

Changes In The Cubits Gap Subdelta: An Example Of A Diversion



Land Loss Cubit's Gap Subdelta 2004-2015

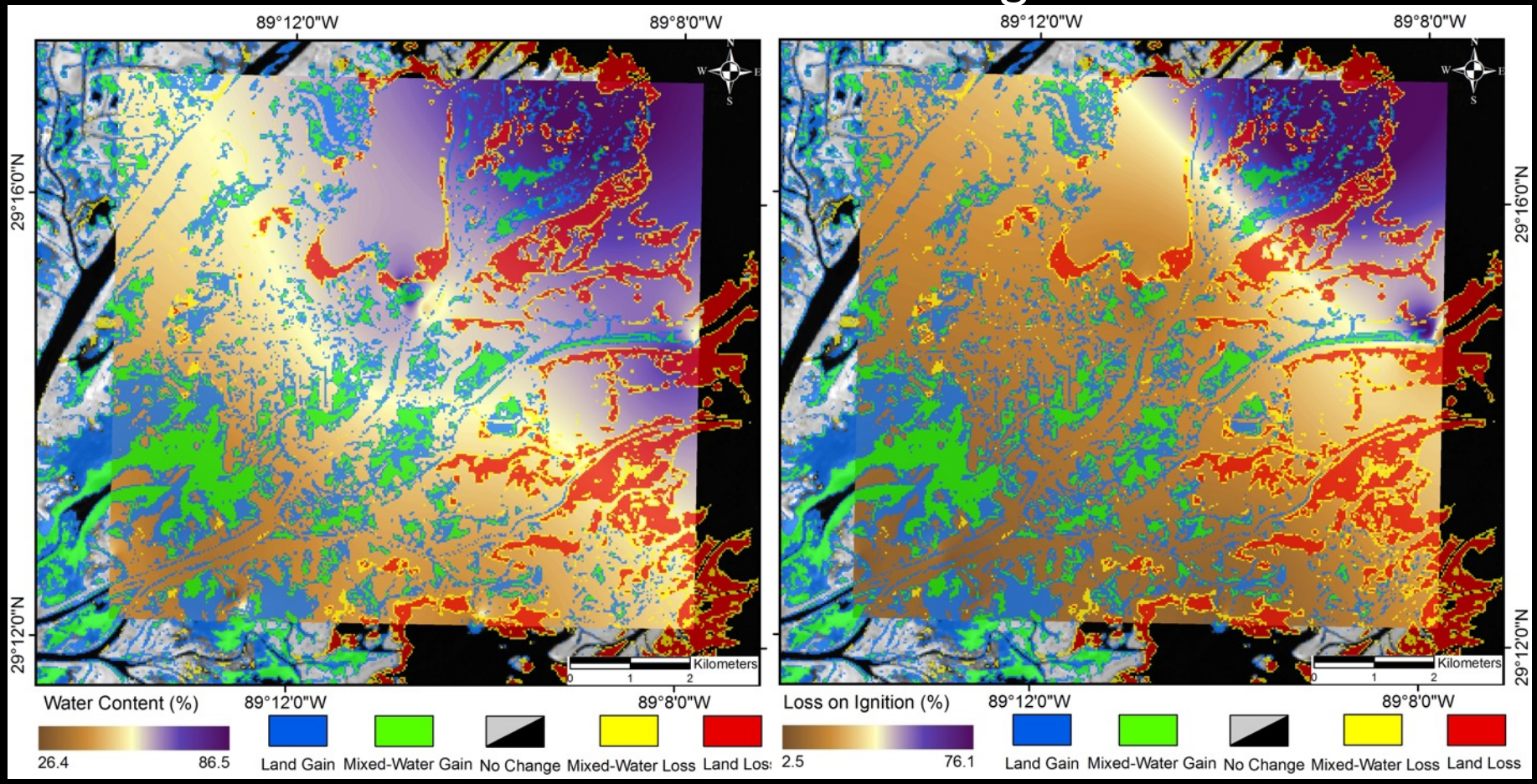


Amer et al., (2017)

Land Loss and Sedimentary Properties in the Cubit's Gap Subdelta

Water Content

Organic Content

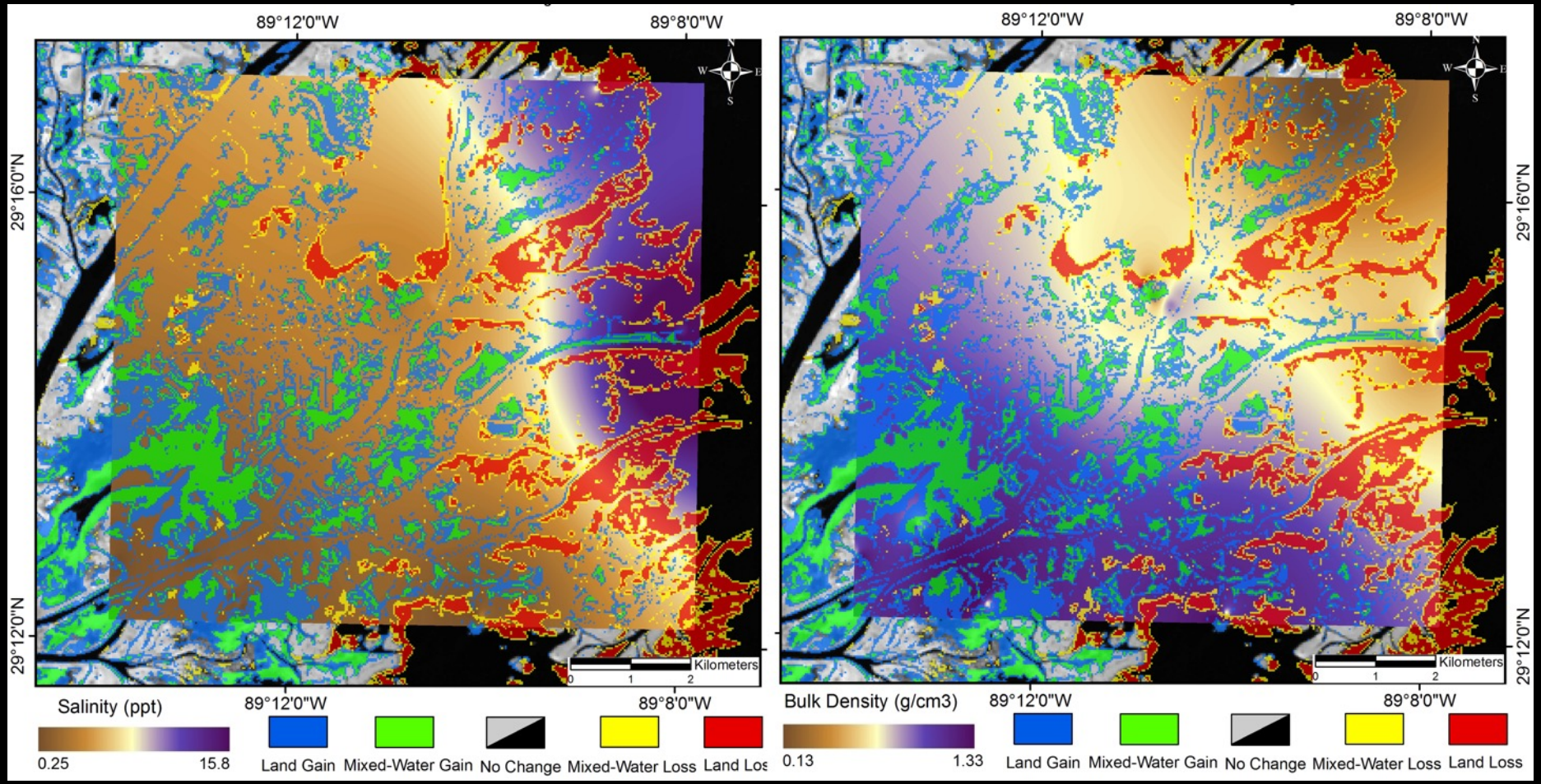


Amer et al., (2017)

Land Loss and Sedimentary Properties in the Cubit's Gap Subdelta

Salinity

Bulk Density



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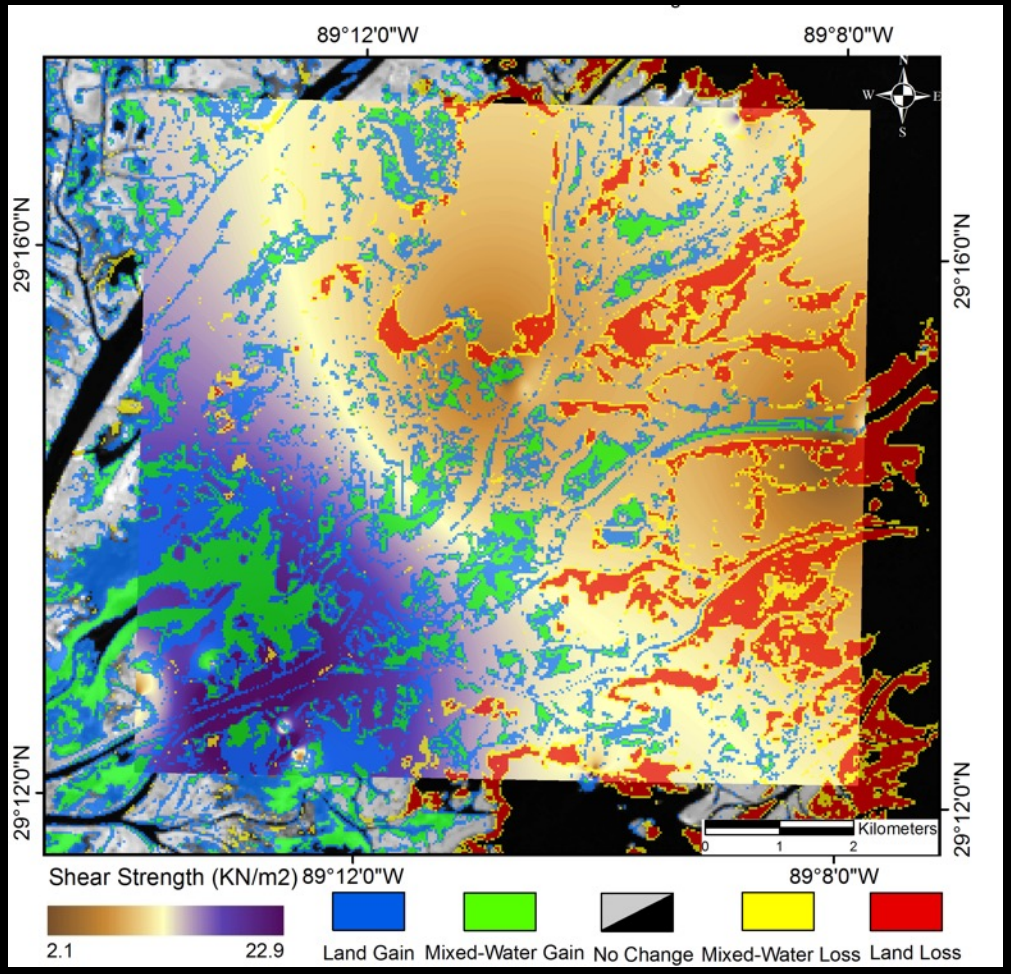
Land Loss and Sedimentary Properties in the Cubit's Gap Subdelta

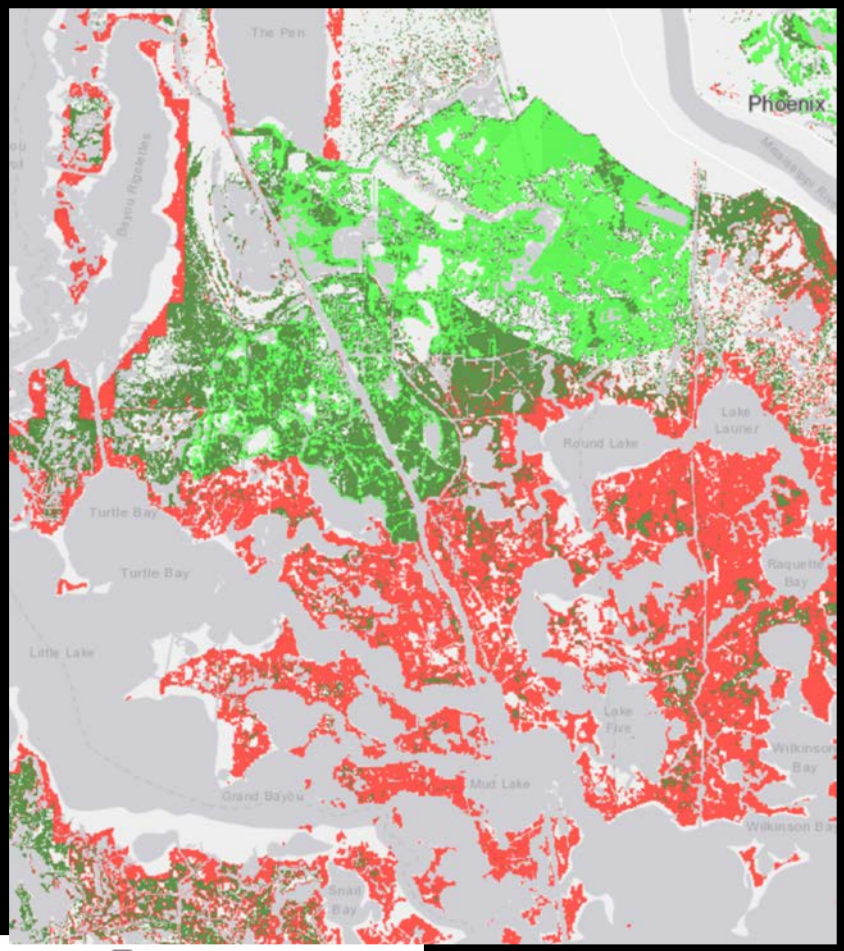


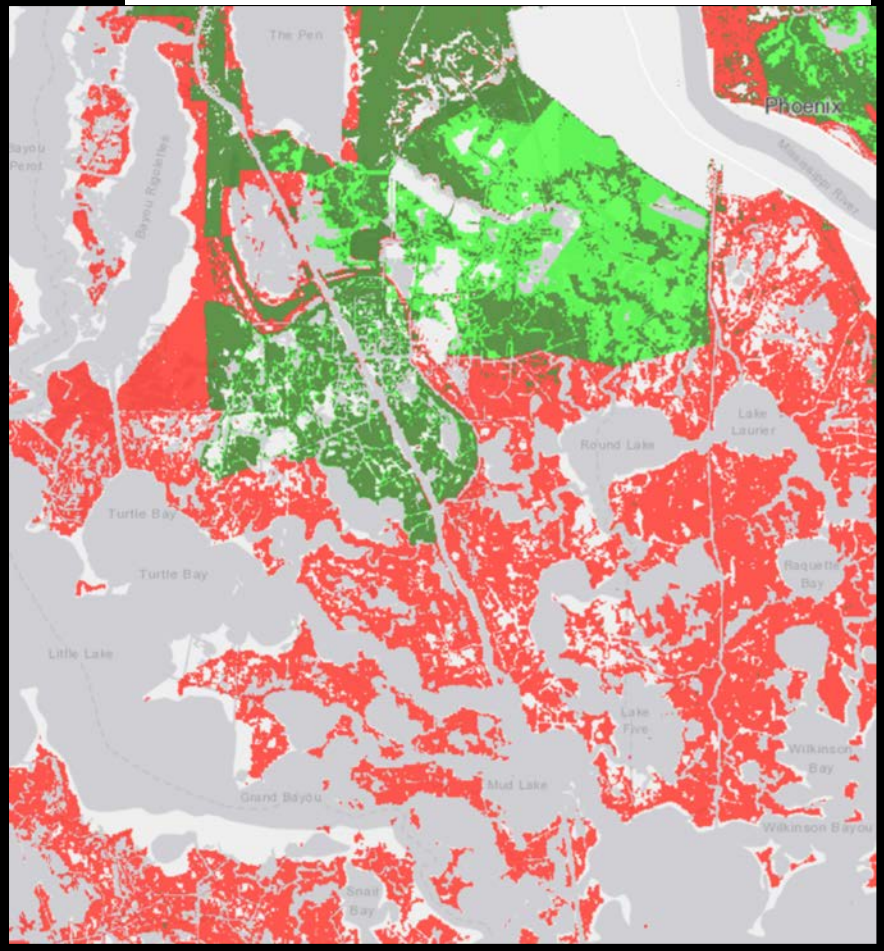
Amer et al., (2017)

Findings and Implications

- In the Cubit's Gap Subdelta, the resilience of wetlands to erosion appears to be coupled to proximity to the Mississippi River.
- Wetlands closest to the river have the highest mineral content, shear strength and bulk density and the lowest organic content, and the freshest soil salinity. The opposite was found in wetlands distal to the river.
- Results indicate that erosion/accretion dynamics are largely controlled by the delivery of mineral sediments from the Mississippi River.

The success of the Mid-Barataria Diversion depends, in large part on the rate of relative and global sea level rise.

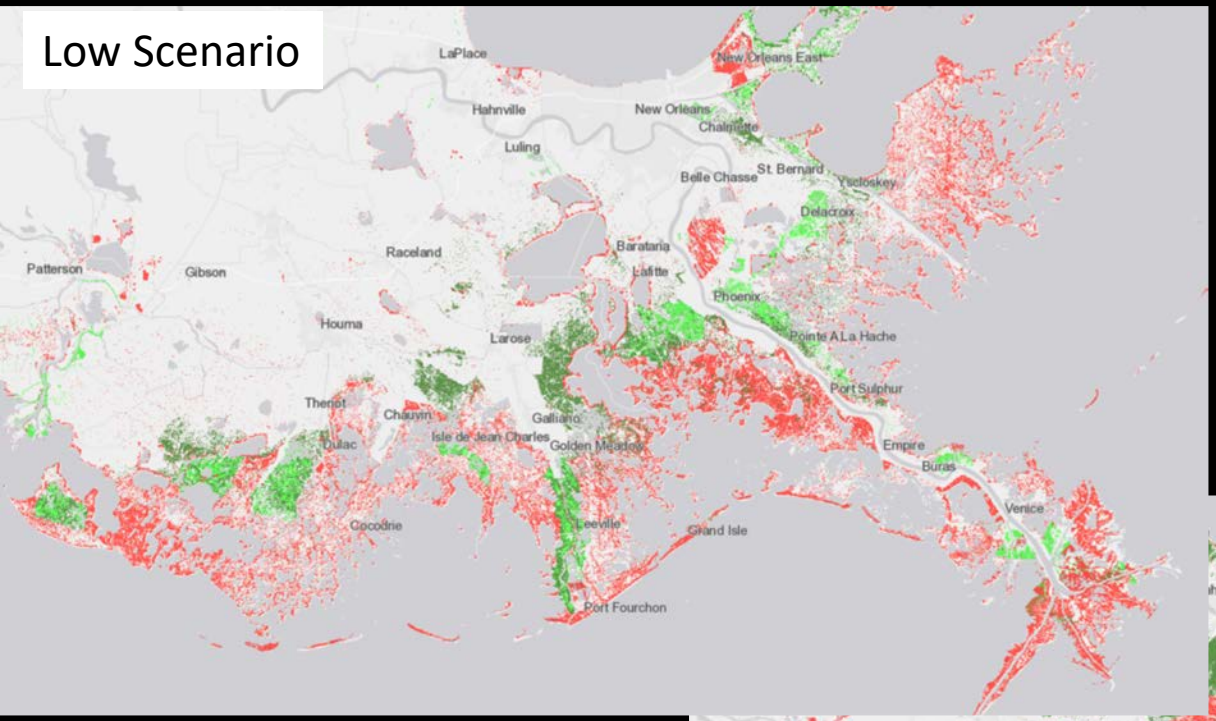


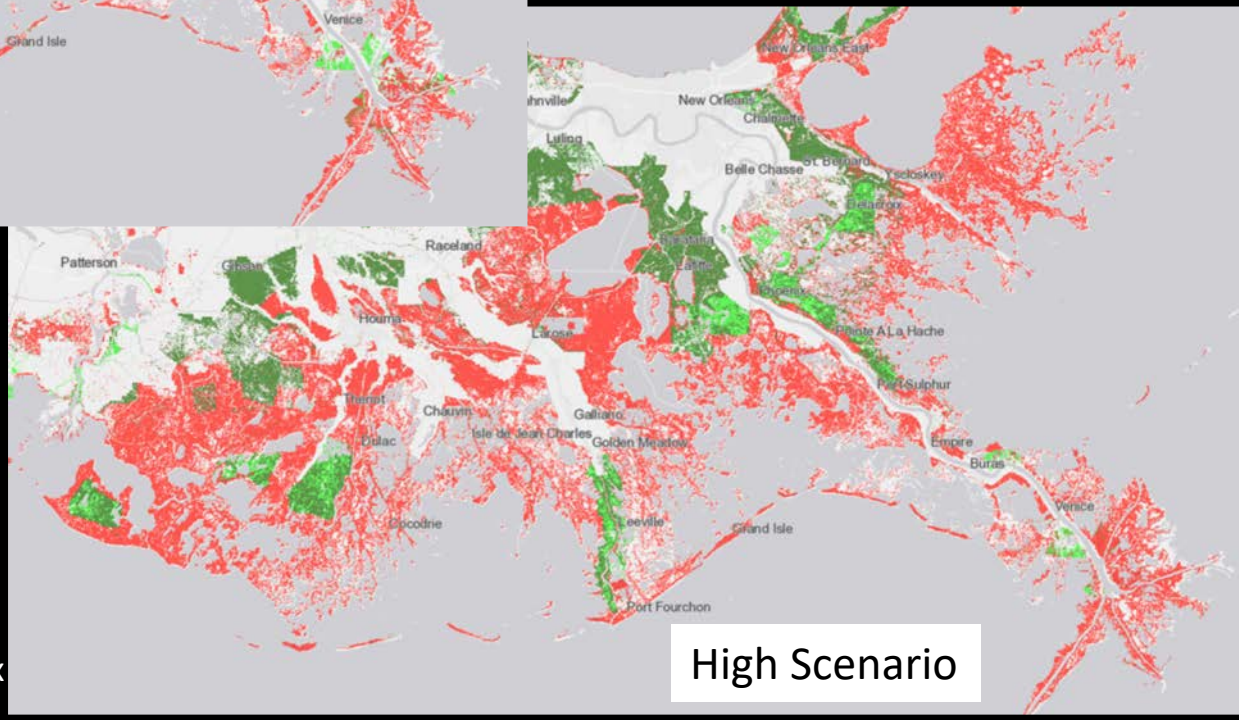


Note: These land change maps include all projects in the mid-Barataria region, not just the diversion.

https://www.lacoast.gov/crms/Home.aspx

The rate of relative sea level rise is a critical control on the success of Louisiana's Coastal Master Plan.





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Findings

- The Mid-Barataria Diversion diversion will move up to 75,000 cfs of water and create about 14-21 square miles of land.

- Studied from other locations suggests that systems like the Mid-Barataria can build land that is resilient to hurricane impacts.

- The long-term success of this diversion depends, in part, on how fast global sea level rises and the decisions people make that influence that rate.