SCIPP RESEARCH BRIEF - EMERGING CLIMATE THREATS TO THE MISSISSIPPI RIVER DELTA: MOVING FROM RESTORATION TO ADAPTATION

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OVERVIEW

The Mississippi River Delta (MRD) is increasingly threatened, with over 25% of wetlands being lost in the past 100 years due to extensive engineering along the Mississippi River and climate change. This study sought to develop a better understanding of the threats and potential adaptation measures within the MRD. As the MRD plays an important role in the surrounding ecosystems and local economy of southern Louisiana, such an understanding is vital.

THREATS TO THE MRD

Precipitation extremes are predicted to become both more intense and more frequent in a changing climate. This is because temperature and water vapor content are directly related. As the atmosphere warms, its water vapor capacity increases, and the potential for short-term, high intensity precipitation grows.

Tropical cyclones are expected to become more intense due to climate change, although impacts to storm frequency remaining uncertain. The potential for these future storms to undergo rapid intensification or stall near the delta, will further increase chances for severe flooding and runoff.

Increased discharge from the Mississippi River and its tributaries also enhances flood risk and delta runoff. The Bonnet Carré Spillway, designed to protect New Orleans from severe flooding, is being opened with increasing frequency. The water released from the spillway floods the delta and removes additional sediment.

In coastal areas, projected sea level rise and subsidence will lead to further loss. High subsidence rates in the delta are influenced by both non-human and human processes.

QUICK INFO

STUDY AREA

- Mississippi River Delta (MRD), southern Louisiana

OBJECTIVES

- Examine major threats to the MRD
- Determine potential best practices for delta and flood protection along the southern Louisiana coast

IMPLICATIONS

- MRD protection plans should shift from restoration to adaptation given the current rate of change in the delta

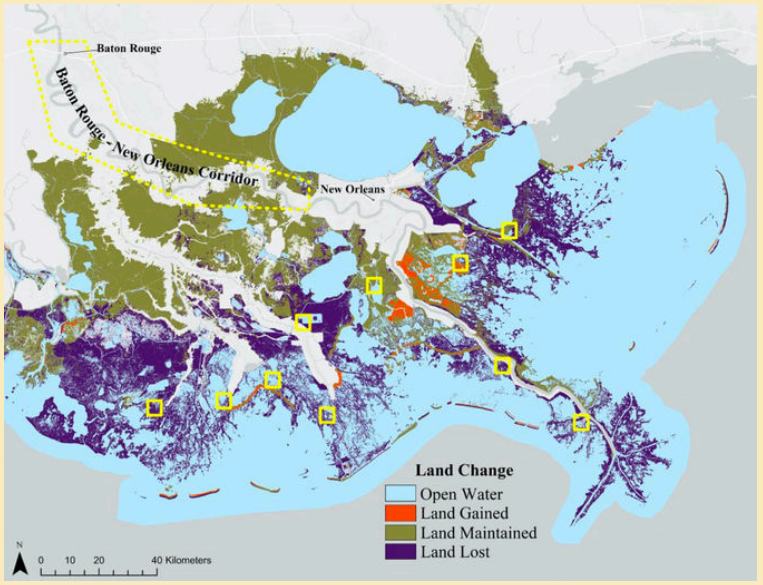

Figure 1. Current and future conditions in the MRD. Purple regions represent the potential land lost due to climate change. (Day et al., 2024)

CLIMATE ADAPTATION STRATEGIES

1. Defining defensive baselines

Defensive baselines indicate where land is a predetermined height (>2m) above mean sea level. Any development should be completed within this boundary to minimize flooding risk.

2. Diverting river water

Additional river outlets may be needed to reduce the flooding threat posed by the opening of the Bonnet Carré Spillway. These diversions will reduce water levels and deposit sediment in vulnerable areas, allowing for some wetland development.

3. Protecting the Mississippi River corridor

The Baton Rouge - New Orleans corridor contains most of Louisiana's population and economic activity. Emphasis should be placed on protecting this corridor from climate impacts.

4. Strengthening protection for New Orleans

New Orleans' history of engineering and expansion make it prone to frequent flooding. By strengthening the lakefront of Lake Pontchartrain and developing leveed polders, structures could be raised above seal level, reducing flooding potential.

5. Protecting the fishing industry

Fishing communities are exceptionally vulnerable to flooding because of their location. By placing levees around these communities, a multibillion dollar industry can be protected.

Access the full journal article: Day, J.W., Y.J. Xu, B.D. Keim, V.M. Brown, L. Giosan, M.E. Mann, and J.R. Stephens, 2024: Emerging climate threats to the Mississippi River Delta: Moving from restoration to adaptation. *One Earth*, **7**(4), 558-571, https://doi.org/10.1016/j.oneear.2024.03.001.

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