



Title: Water quality change by pulsed riverine water inputs to a coastal watershed in Louisiana

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Organization: Louisiana State University / CEI

State: LA **Region:** Southern

Year of Funding: 2002

Theme: Watershed Management

Situation: In the NUMAN project, we have studied the water quality and ecological impacts from diverting Mississippi River into coastal marshes of the Breton Sound watershed, Louisiana. The Caernarvon diversion has multiple objectives including maintaining a desirable salinity gradient, restoring deteriorating wetlands, and enhancing fisheries. Experimental pulses ranged from 185 cubic meter per second for high flow, and 15 cubic meters per second for low flow.

Objectives: Research objectives are: 1) defining sources and magnitudes of nutrients entering the watershed and their local variation within the watershed, 2) understanding biogeochemical cycling of nutrients over space and time, 3) determining if diversion can be managed for high nutrient uptake, 4) examining whether pulsing of water into the watershed enhances nutrient removal, 5) predicting nutrient concentrations and algal productivity using spatially explicit models, and 6) determining how management practices can be adapted for better nutrient control across the watershed.

Methods: Methods include: 1) estuarine hydrology, including marsh-channel interactions, 2) water quality transects, 3) nutrient flux studies using continuous flow-through systems and marsh flumes, 4) measurement of isotopic ratios in particulate organic matter (POM, C and N) and shrimp and bay anchovies (C, N, and S), and 5) model simulations.

Partnerships: The NUMAN project team is composed of 5 faculty members, and 4 research associates from 3 universities in Louisiana. Their backgrounds are estuarine ecology, hydrology, modeling and environmental management. The project is also supported by Louisiana Department of Natural Resources.

Research: The project team has been closely interacting to develop a holistic understanding of the watershed based on this interdisciplinary approach. Seven graduate students are involved in this project. We have also actively interacted with stakeholders. The Caernarvon Interagency Advisory Committee, a stakeholder decision-making committee, approved the pulsed diversion plan and is incorporating our results in their management schemes.

Resources: Based on successful results of the project thus far, we recently obtained additional research funding for 2 projects to work on nutrient cycling and stakeholder analysis at another diversion site in the Mississippi delta.

Results: Preliminary results are: 1) high pulses result in 30% of the diverted water flowing over the marsh; while low pulses are confined to channels; 2) substantial nutrient reductions and stoichiometric changes occur as water flows through the system; chlorophyll levels peak at mid-estuary, but are low otherwise; 3) high nitrate uptake in marsh cores; 4) effect on POM diminished half way down-estuary, impact on shrimp and anchovies was traced further down. Nutrients in the diverted water are being assimilated substantially, leading to increased productivity of the estuarine ecosystem.



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