Consequences of River Reconnection on Water Quality in Barataria Bay

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Coastal wetland loss in Louisiana is driven by a number of factors including sea level rise, subsidence, loss of river connection through levee construction as well as canal construction and geologic features. Louisiana has 40% of all coastal wetlands in the contiguous USA but experience 80% of the loss. Restoration efforts include reestablishing the connection of the coastal basins with the Mississippi River through diversion structures. The diversions will change the water temperature, salinity and nutrient concentrations in the receiving basins. Consequently, we will review recent research on diversion impacts on nitrogen and phosphorus cycling in both wetland soils and submerged sediments under changing conditions to better predict impacts of the under construction Barataria Sediment Diversion. The denitrification rates of the coastal marshes far exceeds that of the submerged sediments. However, the relative flooding time suggests that the marsh will only be flooded 35% of the time while the submerged sediments will be flooded 100% of the time. Hence, the lower rates of denitrification for submerged sediments may actually play a larger role in the nutrient removal of the incoming river water. Colder Spring water temperature has been shown to decrease denitrification rates and this is expected to occur during diversion operations since the maximum sediment is carried by the river on the rising limb of the first flooding event. The phosphorus loading from the Mississippi River will be dominated by the inorganic particulate fraction as the SRP levels are generally ~ < 0.1 mg/L. Additionally, the N:P ratio favors complete uptake of SRP with nitrate remaining by diatoms. The Equilibrium Phosphorus Concentration, the point at which P release equals P uptake by the sediment, is expected to change with the introduction of mineral, primarily Fe-Al bound Mississippi River sediment into the coastal basin containing organic phosphorus dominated wetland soils. Analogs such as Mardi Gras Pass can be used to better predict changes to the coastal basin.