HYDROLOGIC/SPATIAL MODELING APPROACH TO EVALUATING MARSH DIEBACK

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The objective of this work is to couple climate, hydrologic, and landscape models to assist researchers in evaluating the role of recent climate conditions in contributing to marsh dieback. The modeling will integrate processes occurring at basin spatial scales and decade time scales in a way that will allow dynamic feedback to occur between hydrologic and ecological processes. The individual models have been calibrated using historic atmospheric, hydrologic and landscape data, and have been used to evaluate the interaction of landscape changes and hydrology. However in the past work little attention was given to climatic processes. The models will be used to reconstruct the variations in water level and salinity that have occurred during the last 10 years throughout the coastal wetlands of Louisiana. Along with observed weather conditions, the modeling results will provide boundary conditions for advanced site-specific biological models that simulate ecological processes at higher resolutions than is possible with regional models. In a forecasting mode, the modeling could also be used as a management tool to provide early warnings of impending climate conditions that could contribute to future marsh dieback. Due to the enormous computational challenges posed by these models, modern distributed computing platforms will be utilized and the modeling will be optimized using state of the art compiler techniques so that the full potential of available hardware would be fully realized. The simulations will be performed on the 32-node Beowulf distributed computing cluster being operated at the Louisiana Water Resources Research Institute (LWRRI) at LSU.