PROJECTING FUTURE LAND USE AND CLIMATE CHANGE IMPACTS ON THE SUWANNEE RIVER ESTUARY

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The human population in Florida is projected to continue increasing over the remainder of the 21st century, resulting in urbanization and more intensive agriculture with higher water demands and increased nutrient inputs. This is likely to have downstream effects on coastal ecosystems, such that effective land and water management in Florida will require integrated and interdisciplinary approaches to address tradeoffs related to land-use over the watershed and coastal ecosystem services (water quality, habitat, fisheries, and recreation). Here, we present the Suwannee River Estuary Model (SREM), a spatially explicit trophic dynamic model designed to test the effects of nutrient inputs, temperature, salinity, and habitat change on coastal ecosystems, with emphases on forage species, fisheries, and hard clam aquaculture production. The SREM is calibrated against long-term monitoring data and linked to a hydrological model of the Suwannee River watershed, allowing us to project future land-use and climate effects in the estuary. The model predicts substantial change for economically valuable sportfish and aquaculture production across the scenarios considered thus far, which brackets the extremes in agricultural production and climate change. Feedback loops associated with nutrient inputs, water quality, and seagrass abundance also appear to be important drivers in this system. Thus, the SREM can serve as a tool to evaluate the effects of habitat and water quality/quantity on fisheries production, and the integration with watershed scale modeling serves as example for how to consider future large-scale water and land management in Florida.

PRESENTER BIO: Mike Allen is a professor of Fisheries and Aquatic Science in the School of Forest, Fisheries, and Geomatics Sciences at the University of Florida. His research has focused on population dynamics and ecology of fishes. He uses field studies and computer models to explore population dynamics of fishes that support important recreational fisheries. He has evaluated habitat requirements for fish populations, and identified fisheries management strategies for recreational fisheries in lakes, reservoirs, and marine environments.