QUANTIFYING IMPACTS OF CLIMATE AND LAND USE CHANGE ON THE WATERS OF THE SUWANNEE RIVER BASIN

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The Suwanee River is a large wild river that traverses Georgia and Florida and empties into the Gulf of Mexico where it supports economically and culturally important coastal ecosystems. The quantity and quality of the waters of the Suwannee River Basin (SRB) and associated coastal ecosystems are heavily influenced by the climate and land use within the region. While there is a substantial agricultural and silvicultural footprint within the river's watershed, the population density is relatively low. However, it is projected that development pressure and agricultural intensity will dramatically increase in the coming decades. Additionally, there are large uncertainties in the future climate for this region. Understanding impacts of such climate and land use changes is critical for the sustainable management of the basin's water resources and ecosystems. In this study, we develop and simulate various climate and land use scenarios using a landscape hydrologic model (SWAT-MODFLOW) and quantify their impacts to the waters within the SRB. The implemented scenarios were co-developed with stakeholders and can be qualitatively classified to the following categories: 1) Agricultural intensification/expansion; 2) Urban expansion; 3) Restoration/conservation; and 4) Climate extremes. Climate projections were obtained from Coupled Model Intercomparison Project Phase 5 global climate models downscaled by Multivariate Adaptive Constructed Analogs technique. Hydrological impacts were assessed by quantifying changes in aquifer recharge and levels; riverine and spring nitrate concentrations, water temperature, and river discharges across the basin, with a particular focus on freshwater flows to coastal ecosystems. Results indicate that water quantity is most significantly impacted by changes in climate, while water quality is most significantly affected by changes in land use. Our analysis also included "bookend" scenarios within each of the scenario categories which could potentially be used to inform the possible maximum effectiveness of proposed large-scale water and land management policies.

PRESENTER BIO: Dr. Reaver is a Research Assistant Scientist at the University of Florida Water Institute. He has expertise in hydrology, ecology, complex system dynamics, and mathematical modeling. At the Water Institute, he applies his multi-disciplinary experience to the understanding of hydrological, ecological, and social dynamics in karst watersheds.