ENVIRONMENTAL AND ECONOMIC TRADEOFFS OF LAND USE AND MANAGEMENT IN THE FLORIDAN AQUIFER REGION

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Agriculture and silviculture are economically and culturally important to the region overlaying the Floridan Aquifer. However, these systems consume water and can be nonpoint sources of nitrate, affecting water quantity and quality in the Floridan Aquifer and associated ecosystems. Specific management practices (MP) applied at the farm- and forest-scale substantially influence aquifer recharge and nitrate leaching, and improved MP can reduce environmental impacts of production while also potentially improving yields. However, such MP typically require new equipment/technologies, often with high costs, potentially prohibiting adoption by producers or reducing economic viability. Quantifying the environmental and economic tradeoffs of MP is important for supporting their adoption and incentivizing environmentally favorable, but potentially economically unattractive, practices. In this study, we engaged with stakeholders in a participatory modeling process to develop and assess a range of MP and enterprise budgets for corn, peanut, carrot, hay, pasture-raised cattle, loblolly pine, slash pine, and longleaf pine in the Floridan Aquifer region. We used the Soil and Water Assessment Tool (SWAT) to simulate groundwater recharge, nitrate leaching load, and crop/forest yields. Economic analyses used enterprise budgets informed by SWAT outputs to compute net returns to the producer. Results were compared within a 3-dimensional tradeoff space (recharge-nitrate load-net returns). Results indicated clear tradeoffs between production systems, with row crops having the highest economic benefit and largest environmental impacts, while forest and forage had smaller economic benefit and lower environmental impacts. Importantly, improved MP dramatically reduced environmental impacts while maintaining similar or higher net returns. These observations suggest that improved MP can improve both the environmental and economic sustainability of agricultural and silvicultural production in the Floridan Aquifer region.

PRESENTER BIO: Dr. Reaver is a Research Assistant Scientist with the UF Water Institute. At the Water Institute, he currently applies his multi-disciplinary experience to the understanding of hydrological, ecological, and social dynamics in karst-dominated watersheds.