

IMPACT OF LAND COVER ON GROUNDWATER QUALITY IN THE UPPER FLORIDAN AQUIFER IN FLORIDA, UNITED STATES

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Although agricultural lands are generally assumed to correlate negatively with groundwater quality, the intricate relationship between general land cover and contaminant concentrations present in an aquifer may vary substantially; contingent upon the land type, interacting factors, and scale considered. The Upper Floridan Aquifer (UFA) is a primary source of potable water supply for the state of Florida. The Suwannee River Water Management District (SRWMD), located in northcentral Florida, relies exclusively on the UFA for water supplies. Over much of the SRWMD in the UFA is unconfined, rendering it vulnerable to contamination from surface sources. This study analyses groundwater concentrations of Nitrate-Nitrogen ($\text{NO}_3\text{-N}$) and Potassium (K) from shallow wells across the SRWMD for assessing the effect of different land covers on groundwater quality over time. Annual potentiometric surface maps were used to delineate semicircular recharge zones of 500 m, 1000 m, and 2000 m radii upstream of sampled well stations. Proportions of agriculture, forest, and urban lands were identified for each buffer zone using USDA Cropland Data Layer. Multivariate regression models were developed to infer relationships between land cover and $\text{NO}_3\text{-N}$ and K concentrations. Results show significant associations among land cover type, water table height, and groundwater quality parameters. Specifically, we find a large proportion of agricultural cover consistently associated with larger increases in groundwater pollutant loads relative to urban or forest cover across all models, after controlling for depth to water table. Our study suggests a need for widespread adoption of cost-effective agricultural best management practices (BMPs) that could help in securing regional water supply.