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The water quality and quantity effects of biofuel operations in pine plantations of the southeastern USA

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Abstract Working alongside operational trials, a comprehensive research programme was developed to evaluate sustainability, life-cycle analysis, soil productivity, wildlife, and water resource impacts. The hydrology field studies consist of three sets of forested watersheds, each with mid-rotation pine reference, switchgrass (*Panicum virgatum*) interplanted, typical silvicultural, and switchgrass only sub-watershed treatments. Two of the three locations will also have a woody biomass understory treatment. Each of the 14 sub-watersheds is instrumented and collecting detailed hydrology, water quality, and climate data. While these on-going, detailed studies are necessary for understanding processes such as field evapotranspiration and nutrient cycling, three shorter-term, complementary studies of intercropped sites were completed: groundwater table response and soil compaction in artificially drained blocks in North Carolina; soil moisture response and soil compaction in an uplands site in Mississippi; and sediment production across operational tracts in Mississippi and Alabama. The results of these three studies are presented, along with the large watershed plan and status, and implications under possible climate change scenarios.

Key words silviculture; switchgrass; intercropping; biofuels; sustainability; erosion; evapotranspiration