ENVIRONMENTAL SERVICES FROM AGROFOREST SYSTEMS: SUSTAINABLE BIOFUEL FEEDSTOCK PRODUCTION IN THE GULF SOUTH REGION OF THE UNITED STATES

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The Lower Mississippi Alluvial Valley (LMAV) is well suited for large-scale biofuel feedstock production because of its high rainfall, relatively long growing season, central location within the United States, and well developed agricultural infrastructure. Production of common biofuel feedstocks such as corn and soybean require significant inputs of fertilizer, pesticides, and water for irrigation. In addition these crops provide a minimal level of ecosystem services such as carbon sequestration, wildlife habitat, and water quality protection. The LMAV was once dominated by forests, but more than 66 percent of the forest land base has been converted to agriculture production. Conservation efforts have targeted the reforestation of marginal agricultural lands to restore many of the ecosystem services lost through forest conversion. Increased demand for biofuel feedstocks has the potential to limit or reduce the reforestation of these marginal lands. Agroforests could be a flexible and innovative cropping system that could be employed on marginal agricultural land to provide both cellulosic biomass feedstocks and ecosystem services. Agroforest systems composed of varying mixtures of feedstock species, such as cottonwood trees and switchgrass, have the potential to provide a suite of ecological services along with high cellulosic biomass production to meet a variety of management objectives, social constraints, and soil/site conditions. We summarize the potential of agroforest systems to increase biofuel production capacity for the United States, improve economies of economically faltering rural communities of the LMAV, and enhance environmental conditions, such as soil, water, and wildlife habitat quality.

KEY WORDS: biodiversity, nutrient cycling, carbon sequestration, water quality

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