DEVELOPMENT OF ORGANIC CARBON POOLS IN WETLANDS CREATED ON RECLAIMED LIGNITE MINE SOIL

Author: Robin E. Stapleton

Organic carbon storage and cycling is vital for the functional success of created wetlands. The purpose of this study was to examine the relationship between created wetland age and organic carbon accumulation and carbon flux through soil respiration. Seven created wetlands ranging in age from newly created to twenty-years-old were selected from the reclaimed areas at the TXU Mining Martin Lake lignite mine in Panola County, Texas. Four transects containing three plots each were placed parallel to the moisture gradient in representative locations around each wetland to facilitate sampling from the range of moisture conditions present. Organic carbon content (OC) in the water, vegetation, litter layer, and soil was analyzed to estimate carbon storage in each pool. CO_2 flux from the soil was measured with a portable infrared gas analyzer to determine mean soil respiration rate. Soil respiration and the understory vegetation, O-horizon, and water TOC were measured four times during the year to account for seasonal variation. Results indicate that as the created wetlands age, soil respiration and all the measured carbon storage pools except soil OC increased. Soil carbon to 25 cm depth decreased with wetland age at the same rate that the other carbon pools increased, such that all the wetlands had essentially the same amount of organic carbon per unit area. The decrease in soil OC is believed to be due to decomposition of incorporated lignite in the mixed overburden mine soil. Relationships between wetland age and the vegetation and detrital carbon pools, as well as between age and soil respiration appear to be stronger during the summer months. This was probably due to increased biological activity and primary production in warmer temperatures. Wetland morphology was observe to effect the duration and area of inundation in created wetlands, which in turn impacts their carbon storage potential.

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Department of Forestry
Stephen F. Austin State University
Nacogdoches, Texas 75962