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Abstract

Global concern over increasing carbon dioxide (CO₂) concentrations in the atmosphere, which may lead to possible future climate changes, have generated interest in offsetting CO₂ emission by storing carbon in forests and utilizing forest biomass as renewable energy to replace fossil fuels with biofuels. Options for the sequestration of carbon and substitution of bioenergy for fossil fuels need to be examined from economic and biological perspectives. In order to provide useful and timely information concerning carbon sequestration and potential biofuel production, this study investigated loblolly pine and determined the financially optimal management regimes (maximizing land expectation value) and biologically optimal management regimes (maximizing mean annual increment), the amount of carbon stored in long-lived wood products, the available forest logging residue that can be used for biofuels, and their potential energy values. Results indicate that for average sites the biological optimum management regime would annually sequester 0.17 more tons of carbon in long-lived wood products and produce 0.23 more tons of biomass suitable for bioenergy production per acre (energy value of 2.93 GJ/ac/yr) than those of the financially optimal management regime. The difference in equivalent annual annuity between these two management regimes is $20.80 per acre per year.