A PRELIMINARY EFFORT TO EVALUATE THE WILLINGNESS OF NONINDUSTRIAL PRIVATE FOREST LAND OWNERS TO PRACTICE OPTIMUM CARBON SEQUESTRATION REGIMES IN MISSISSIPPI

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Abstract

Intensive forest management is one of the strategies to sequester atmospheric carbon in terrestrial ecosystems. Few studies have evaluated maximum carbon sequestration strategy for nonindustrial private forest (NIPF) lands in Mississippi. The study will evaluate optimum carbon sequestration strategies ideal for NIPF lands. The data will be derived from a review of the literature and NIPF mail survey. Results will report landowners willingness to implement practices that maximize carbon sequestration. Initial findings from the literature have shown that joint production of timber and carbon requires relatively longer rotation lengths.

Introduction

Forest carbon sequestration is considered an important way of reducing the concentration of CO_2 in the atmosphere. As shown in figure 1, however, trees can be both sources and sinks of atmospheric carbon. Forest management practices that would delay harvesting and produce saw timber could store greater amounts of atmospheric carbon for longer period than a pulpwood rotation. Mississippi's forest land cover 18.6 million acres, and the NIPFs own nearly 66% of the timberland. Given the substantial acerage of timber land, the management practices of NIPF are important for maximum forest carbon sequestration in Mississippi. Few studies have evaluated the forest management practices for optimum carbon sequestration in NIPF timberlands in Mississippi. Whether the NIPF landowners of Mississippi would be willing to practice optimum carbon sequestration regimes in their timberland is still unknown.

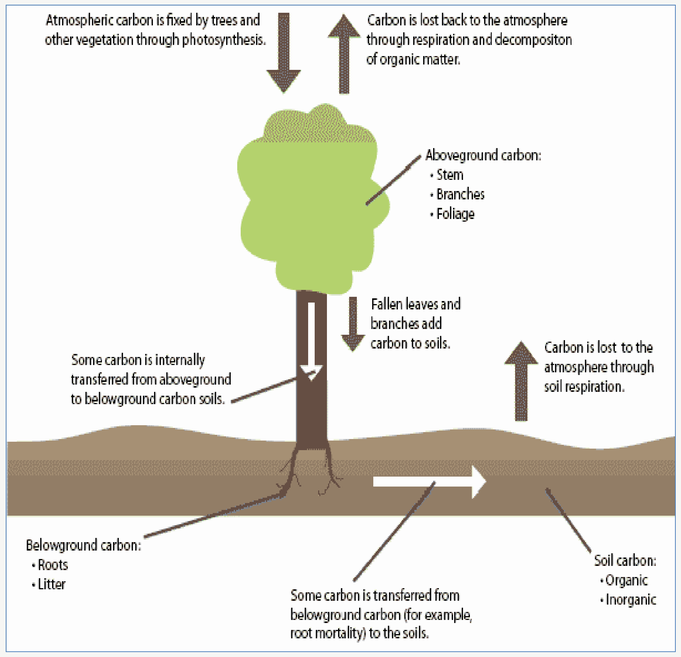

Figure 1: Carbon synthesis and storage in different forms (www.google.com)

Objectives

- Identify and evaluate alternative optimum forest management practices for the NIPF lands
- Identify and evaluate the current forest management practices of NIPF woodlands in Mississippi
- Evaluate NIPF landowners willingness to accept alternative silvicultural practices that promote carbon sequestration in Mississippi

Methods

A. Literature review: The data required to meet the objective one will be derived from a review of the literature. The studies that evaluate various silvicultural and site treatments for maximizing carbon accumulation will be cited and tabulated for further analysis.

B. Simulation: From the above data, the optimum carbon sequestration scenarios will be simulated in PTAEDA3 software. The economic return and the carbon amount sequestered by each regime will be calculated for different combinations of silvicultural treatments and site qualities.

C . Mail Survey: The survey questionnaire will be mailed to NIPF land owners who own greater than 100 acres of forest land in Mississippi. The questionnaire will assess their current socioeconomic, biophysical, and the attitudinal characteristics as well as their willingness to implement alternative optimum sequestration practices.

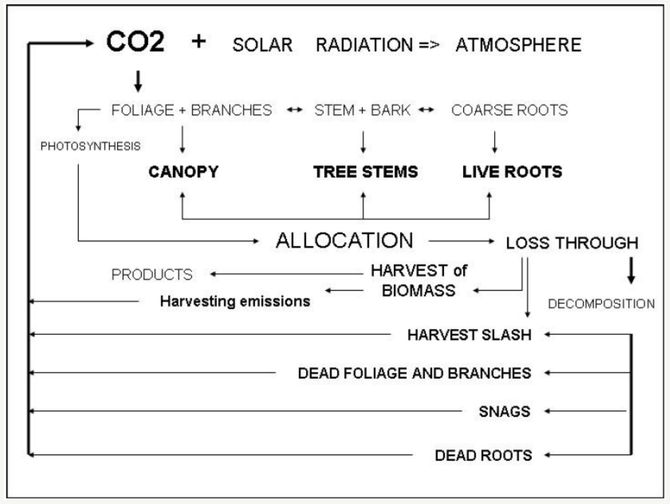

Figure 2: Forest module for carbon sequestration and emission (Manriquez, A.C. 2002)

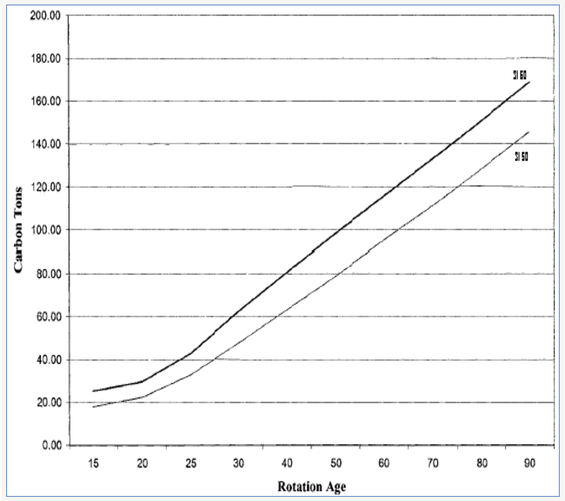

Figure 3: Carbon amount at different age and site quality (Cason, J.D. 2006)

Data analysis: The regression relation will be established between the socio-economic, biophysical and the attitudinal characteristics of the landowners. The logit model will be applied to analyze the willingness of landowners with their socio-demographic characteristics.

Preliminary Results

Table 1: Carbon storage and net present value (NPV) of the four optimum regimes found in the literature

Regime	Rotation	Thinning age (yr)	Thinning type	site index	Planting density (ft)	NPV ($/ac)	Carbon (tons)	Citation
1	41	25.36	below	70	8 × 10	2878	-	Huang and Kronard (2002)
2	52	47	below	60	8 × 10	2183	-	Huang and Kronard (2002)
3	50	-	-	30	-	456	-	Nepal et al. (2012)
4	60	-	-	50	6 × 10	-	125	Cason, J. D. (2006)

Table 1 presents the preliminary findings from review of the literature. Rotation length, thinning strategy, site factors and planting density are principal strategies to increase carbon sequestration. Optimal rotation for joint production of timber and carbon often becomes longer than the timber only production because longer rotations produce more biomass. Thinning frequency inversely relates to NPV . The table will include results from more studies in future.

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