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## **Economic analysis of carbon sequestration in northern red oak in the United States of America**

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The increase of carbon dioxide in the atmosphere and the possible greenhouse effect on global climate has become one of today's major environmental issues. This study investigated the profitability and potential of sequestering carbon in northern red oak (*Quercus rubra*) stands planted on abandoned agricultural and pasture lands in Virginia, USA. Forest Management Optimizer (FORMOP), a decision-support system tool, was used to determine the profitability and carbon storage potential of afforesting these lands. Variables employed included: site indices from 50 to 110 (base age 50), thinning intensities of 20, 25, 30 or 35% of basal area removal, rotations up to 80 years in length, and a choice of 0, 1 or 2 thinnings. Cash flow analyses were conducted on the results of each possible thinning and harvesting regime using real alternative rates of return (ARR) ranging from 2.5 to 15.0%. The price of carbon was assumed to be US\$0, US\$10, US\$50 or US\$100 per ton. A total of 1 919 886 operable thinning and harvesting combinations and cash flow analyses, including soil expectation values, were calculated. Results indicate that when carbon is priced at US\$10 per ton, a landowner who has a real ARR of 7.5% will generate maximum net present worths of -US\$229.28 and US\$101.76 per acre on site index 50 and 110 land, respectively. On site index 80 land, the total amount of carbon sequestered during the optimal management regimes ranges from 29 to 64 tons per acre.

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## **Developing Canada's national forest sector carbon accounting system**

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The rate of carbon accumulation in the global atmosphere can be reduced by decreasing the emissions from fossil-fuel burning and by increasing the net carbon uptake in terrestrial (and aquatic) ecosystems. The Kyoto Protocol seeks to accomplish both. Canada is developing a national forest sector carbon monitoring, accounting and reporting system in support of its international obligations to report greenhouse gas sources and sinks. The system synthesizes data from many sources, including: a new national forest inventory and existing regional inventories; growth and yield information derived from a large network of sample plots; change statistics on change agents such as wildfire, insect disturbances and forest management activities; and land-use change, obtained from a range of sources including remote sensing. Computer simulation models are used to inte-

grate this information to estimate carbon stocks, changes in carbon stocks and the emissions of greenhouse gases. A key component of the system is the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS2) which will enable analyses at four spatial scales (national, provincial, forest management unit and stand). The model will be used to assess carbon-stock changes between 1990 and the present, and to predict future carbon-stock changes, under a wide range of assumptions about management activities and natural disturbance rates. The system is designed to be compliant with the reporting requirements under the Kyoto Protocol and other international agreements. Moreover, applied at the scale of operational planning, the simulation models will enable forest managers to include carbon consequences of proposed management alternatives among their criteria for management choices. The Canadian approach may be of interest to other northern countries developing forest carbon tracking systems.

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## **Are forest plantations contributing to the sustainable development of tropical countries?**

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Forest plantations are greatly on the increase in tropical and sub-tropical regions, particularly by reason of the growing demand for wood products. These plantations are nonetheless controversial as to their positive or negative effects. This paper first examines the different ecological, social and economical controversy components surrounding the plantations, and then analyses the potentially positive impacts of forest plantations based on a few examples. A greater reckoning of the social issues involved in the creation and management of plantations, their integration into local and international fields, and the emergence of new financing tools and mechanisms are all assets to a greater and more effective participation of forest plantations in the sustainable development of tropical countries and of their populations.