

# **Effects of carbon sequestration rewards on forest management - *an empirical application of adjusted Faustmann-Formulas***

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This paper assesses effects which different economic instruments for rewarding carbon sequestration services might have on forest management. Economic incentives - addressing forest enterprises - are taken into account in forest valuation and management planning and may therefore result in changes of forest management, especially in changes of the rotation period. In this paper four different incentive schemes are considered, i.e. three activity related carbon certificates - each based on a different accounting approach - and one public subsidy on regeneration - offering lump-sum payments per hectare.

The forest valuation method used for calculation is based on the land expectation value (LEV) related to the Faustmann-Formula, which was adjusted for the value of carbon sequestration services. Changes in the optimal rotation period are expected to be induced by the amount and interactions of carbon and timber prices, harvesting and regeneration costs, and discount rates.

The findings reveal that carbon certification tends to change the optimal rotation age. Depending on the carbon price level, the rotation period is increased in all crediting approaches, but with different intensity. The duty to account for carbon emissions resulting from wood removals has the most significant effect on the optimal rotation age. When wood removal is charged with carbon debits, the increase of rotation period by rising carbon prices is boosted additionally by rising interest rates. Different thinning regimes however have only little effect on the time of maximum LEV under carbon crediting schemes.

For all crediting approaches the LEV increases as the carbon prices increase. The same effect occurs for lump-sum payments per hectare dependent on the subsidy amount, but without influencing the optimal rotation age.

**Keywords:** carbon credits, economic incentives, land expectation value, forest rotation age, forest management

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