

# Sequester or Harvest – the Optimal Use of Managed Forests to Mitigate Climate Change

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Forests as carbon reserves and as sources of renewable materials are vital for the greenhouse gas balance of the earth. Numerous studies have assessed the biological and economic potential of forests for mitigating climate change. Several of them have evaluated the benefits of utilizing forest resources for material needs while some show that certain types of forests might provide greatest benefits when left uncut. This study analyses the optimal mitigation and economic benefits of forests and shows under which circumstances it is optimal to store carbon into forests or to utilize forests for material and energy. The study shows that the solution to this problem depends on two parameters: Forest carbon utilization benefits (avoided fossil emissions when wood is utilized) relative to fossil emission costs, and the annual value of forest carbon storage (which is connected to the interest rate). Boreal Scots pine and Norway spruce stands are used as cases in the analysis. A numerical simulation-optimization model provides optimum forest management or non-management. For typical parameter values, forest carbon utilization benefits need to be 0.5 to 1.0 relative to emission costs to merit forest harvesting. The higher the interest rate, the higher the required carbon utilization benefit. Wood material substitution in construction often implies high carbon utilization benefits (higher than wood energy substitution) and in that case the optimum forest management for the climatic goal becomes rather similar to optimum management for the economic goal.

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