THÜNEN

Project *brief*

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Forest management strategies for climate change

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- **Active adaptation of forests to climate change demands significant financial investments by the present generation for the benefit of future generations.**
- **Despite high upfront investment costs, the "active climate adaptation" scenario proves to be more economically advantageous in the long run.**

Background and objective

Forest enterprises are confronted with the task of adjusting their silvicultural strategies to maintain operational profitability and invest in forests that are resilient to climate impacts. Our model-based research project aimed to model and economically evaluate the short- and long-term economic impacts of two silvicultural adaptation strategies to climate change in Germany.

Scenarios

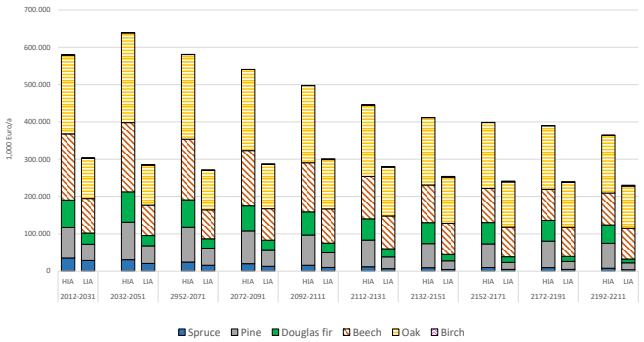
The two scenarios were modeled for the German forest: **High Intensity Adaptation (HIA) scenario**: In this scenario, active forest conversion occurs on calamity and regular final-use areas with tree species adapted to climate change by today's standards.

Low Intensity Adaptation (LIA) scenario: Here, a passive approach with natural succession is followed on all calamity areas and active tree species replacement is implemented only on regular utilization areas. On the succession areas, a long-term stocking with lower-yielding tree species is anticipated.

Results

The implementation of active forest climate adaptation measures on the designated calamity and final-use areas in the HIA scenario necessitates substantial annual investment costs for planting and pre-commercial thinning, ranging from 400 to 600 million €/a, whereas in the LIA scenario, these expenses are approximately 270 million €/a (Fig. 1). In both scenarios, there is a notable decline in timber stock compared to the current levels. This reduction also leads to a decrease in the carbon stock within the forest. In the HIA scenario, timber stock decreases by about 12%, whereas the LIA scenario sees a more significant reduction of around 45%. Consequently, the assessed value of the timber stock varies.

Figure 1: Investment costs for active planting [1,000 euro/a]



In the LIA scenario, the annual timber logging consistently declines over time. In contrast, in the HIA scenario, the annual logging remains relatively stable at approximately 80 m³/a. Conversely, in the LIA scenario, the annual timber logging amounts to around 55 million m³/a in the final simulation period. As a result, the silvicultural contribution margin in the HIA scenario averages around 2.2 billion €/a, surpassing the corresponding figure in the LIA scenario, which averages 1.7 billion €/a.

Conclusion

The simulation study indicates that a lack of action in terms of climate adaptation for the forest may result in diminishing timber stocks, reduced timber harvests, and a decline in forestry income. Nonetheless, active forest climate adaptation necessitates substantial financial commitments from the present generation, ultimately for the well-being of future generations. Given the numerous services that forests provide to society, it appears justifiable to provide financial support to forest enterprises.

Further Information

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