

# Project *brief*

Thünen Institute of Forest Ecosystems und Thünen Institute of Forestry

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## Subsidization of small-scale private forests in Europe needs a clearer definition of objectives

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- **Climate change impacts reduce sustainable raw wood utilization options in small-scale private forests in Germany, extensification is expected to increase the effect.**
- **Small-scale private forest owners in Europe consider the economic, social and ecological values of their forest to be equally important, but national support systems differ considerably.**
- **Subsidization should clearly define whether the contribution of small-scale private forests to raw wood production for bioeconomy or whether biodiversity conservation should be supported.**

### Background and objective

About 60 % of Europe's forests are managed by small-scale private forest owners (SSPFO) with a farm size of less than 100 ha. SSPFO are of great importance for the raw material supply of a sustainable bioeconomy and for the economic power in rural areas. In addition, small-scale private forests (SSPF) provide important ecosystem services and are habitats for plants and animals.

The future importance of small-scale private forests in Europe will be strongly determined by the changing ownership structures and objectives of the SSPFO, the increasing demand for wood, and higher requirements for forest management. On the other hand, there are increasing risks due to climate change. The joint project "*Valorising small scale forestry for a bio-based economy (ValoFor)*"<sup>1</sup> was aimed at investigating the potential contribution of small-scale private forests to a wood-based bioeconomy. The study area included large parts of Europe through the cooperation of forestry research institutions in Finland (LUKE), Sweden (Umeå Univ.), Germany (Thünen Institute), Austria (BFW) and Slovenia (SFI). The Thünen Institute contributed to the climate-sensitive growth simulation and the economic assessment of different management strategies of SSPFO under climate change. This project brief presents the related results.

### Study approach

Based on forest growths simulations we evaluated the effects of different management strategies on ecosystem services like wood production, biodiversity, carbon budgets in SSPF. Four

management strategies were defined with the project partners to be modeled under different climate scenarios (IPCC RCPs):

- „Business as usual“ (BAU, normal management) without climatic influence, with RCP 4.5 and RCP 8.5
- „Close to nature“ (LOW, extensive) with RCP 8.5
- „Increasing profitability“ (HIGH, intensive) with RCP 8.5
- „No management“ (PASSIVE, no use) with RCP 8.5

**Figure 1: Tree species change is a part of the „Close to nature“-management strategy.**



Source: A. Bolte, Thünen-Institut

Forest dynamics was modeled for Germany using the simulation program WEHAM (forest development and timber resource modelling). Both mortality and growth depending on the IPCC climate scenarios RCP 4.5 and 8.5 were integrated as new model components. The results delivered the sustainable raw wood utilization potential in SSPFO and enabled analyses of ecological, social and economic effects of varied management.

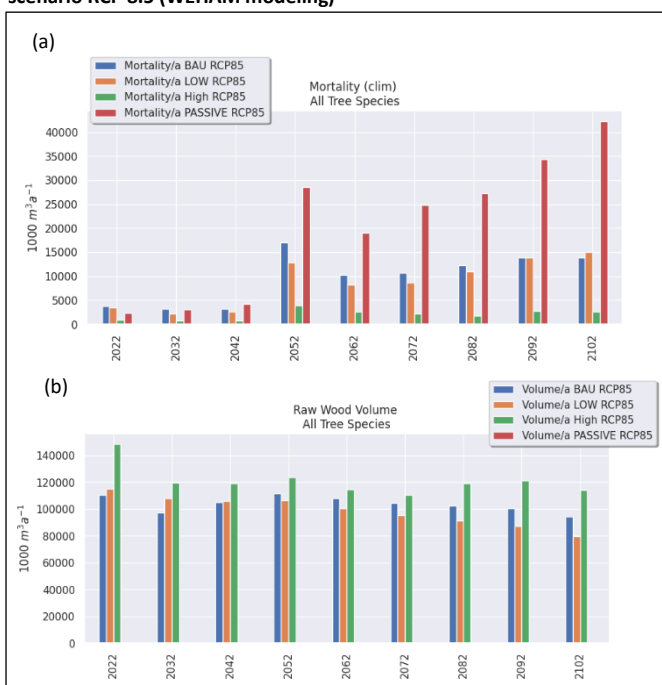
<sup>1</sup> Funding: German Federal Ministry of Food and Agriculture (BMEL) by the Fachagentur Nachwachsende Rohstoffe e. V. (FNR) within the EU ERA-NET programme *Forest Value*

The attitudes and objectives of SSPFO regarding their forest management were analyzed with extensive surveys in the five partner countries Finland, Sweden, Germany, Austria and Slovenia (n=2,524, of which 307 in Germany). Literature analyses and expert interviews helped to derive key operational figures of typical SSPFO in the partner countries. Based on this, we evaluated the results of the forest development simulations on the potential volume of raw wood of the scenarios in terms of forest economy.

## Results

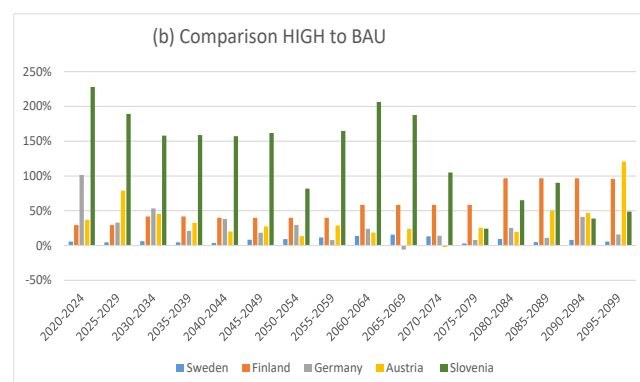
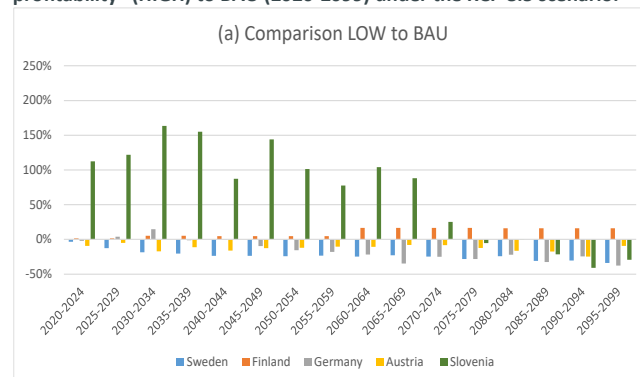
The results of the climate-sensitive forest development modeling (WEHAM) show a significantly increased climate-induced mortality for Germany under the RCP 8.5 scenario for all management strategies from 2050, but especially for the "No management" strategy (PASSIVE). It increases least for the "Increasing profitability" strategy (HIGH), in which greater damage-related mortality at older ages is avoided by earlier utilization (Figure 2a). Accordingly, annual utilization potentials (excluding deadwood) decrease with decreasing management intensity (HIGH to LOW). In the "No Management" strategy (PASSIVE), no utilization is assumed (Figure 2b).

**Figure 2: (a, top) Climate-induced mortality [1,000 m<sup>3</sup> a<sup>-1</sup>] and (b, bottom) raw wood utilization potentials [1,000 m<sup>3</sup> a<sup>-1</sup>] in Germany under different management strategies (BAU, LOW, HIGH, PASSIVE) under climate scenario RCP 8.5 (WEHAM modeling)**



The surveys of the SSPFO revealed similar attitudes and objectives in the five European countries despite different traditions: Social and ecological values are currently considered equal to economic values of forest management. However, the economic comparison of different management scenarios under climate change (RCP 8.5 scenario) and the consequences of deviating from the "business as usual" (BAU) scenario shows economic advantages for more intensive management for almost all countries (Figures 3 a, b).

**Figure 3: Relative change in contribution margin of the scenarios (a) "Close to nature" (LOW) to "Business as usual" (BAU) as well as (b) "Increasing profitability" (HIGH) to BAU (2020-2099) under the RCP 8.5 scenario.**



## Conclusion

The changed framework conditions of climate change limits the options for sustainable raw wood production in small-scale private forests and for sustainable resource supply for the bioeconomy. An intensification of the use of raw wood is impeded both by a high awareness of many SSPFO for the ecological values and partly by current funding conditions. European funding policy should therefore decide whether the SSPFO contribution should focus on increasing raw wood contribution to the bioeconomy or intensifying ecosystem services like biodiversity conservation. An intensification of both, on the other hand, does not seem feasible.

## Further Information

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### Runtime

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### Publications

Rosenkranz L, Peters MJ, Seintsch B (2022) Betriebskennzahlen für fünf europäische Länder. AFZ Der Wald 77(23):14-18

Haeler E, Bolte A, Buchacher R, et al. (2023) Forest subsidy distribution in five European countries. Forest Pol Econ 146:102882, DOI:10.1016/j.forpol.2022.102882.

Westin K, Bolte A, Haeler E, et al. (2023) Forest values and application of different management activities among small-scale forest owners in five EU countries. Forest Pol Econ 146:102881, DOI:10.1016/j.forpol.2022.102881

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