Policy Brief

Northern Multifunctional Forests

Healthy, multifunctional forests are needed to meet multiple societal demands. The bioeconomy, an economy based on renewable biological resources in forests and other land-cover types and relying on sustainable bio-based solutions, can together with increased circularity provide an avenue towards building a more sustainable future. However, there is a 'trilemma' built in when continuously using forests in a more intensive way; How can conflicting sustainability goals be balanced? How can enhanced carbon storage and sequestration, increased use of wood-based products to substitute fossil-based raw materials, and maintained forest biodiversity with capacity to deliver environmental and ecosystem services, simultaneously be met?

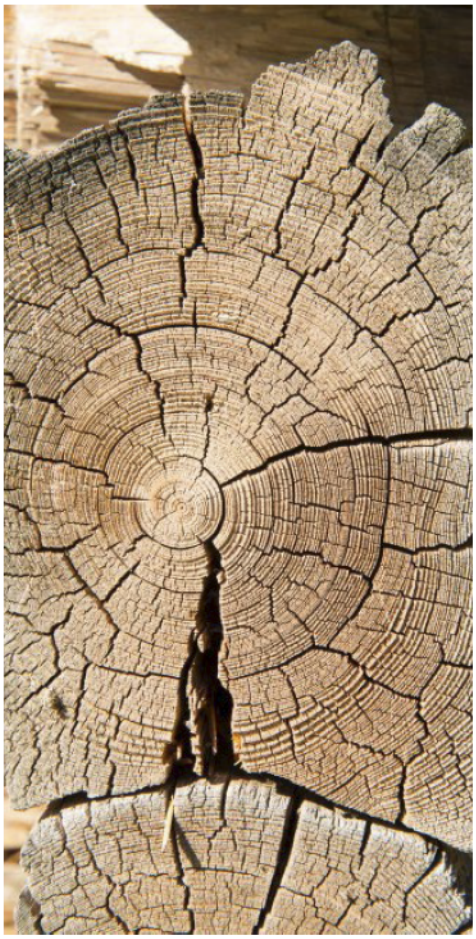
Northern Forestry

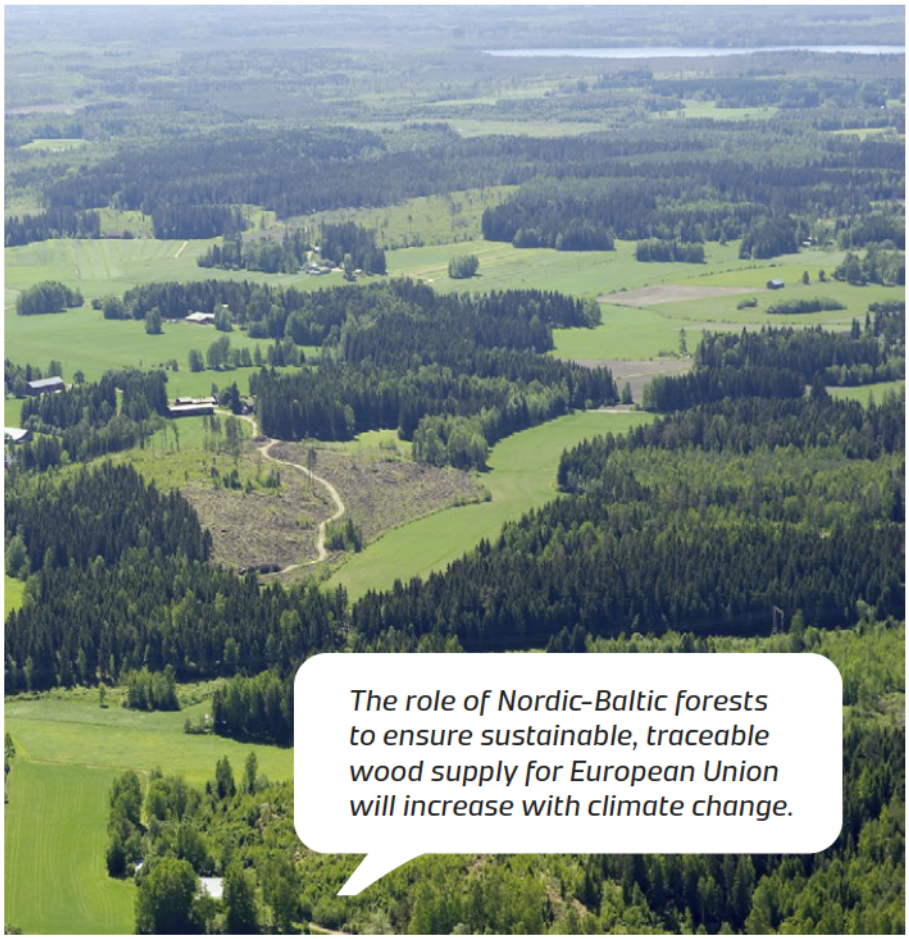
Forests are a key element in the Nordic-Baltic landscape. About 70% of the land cover in Estonia, Finland, Latvia, Lithuania, Norway and Sweden can be classified as forests. Historically, forests have provided construction material for housing, heating and important industrial products like charcoal, tar, resins, potash and pulp. The Nordic-Baltic forest landscape is a reflection of an active forest management and governance during the 20th century aimed at restoring standing timber volumes and optimising the economic value of wood production. Today's forest landscape consists of a mosaic of stands of different age, tree species, productivity classes, and sizes intermixed with semi-open and open land.

> *"Due to active forest management and silviculture, the amount of wood in Nordic-Baltic forests has more than doubled during the past 100 years."*

Carbon storage and sequestration

Forests store and sequester large amount of carbon aboveground in tree stems, twigs, and branches, in field- and bottom-layer vegetation, and belowground in stumps, roots, associated fungi and as soil organic matter. In upland boreal forests, less than 50% of the stored carbon is allocated to trees that typically are harvested once a century. Depending on environmental conditions, the soil biota and its chemical composition, soil carbon can be sequestered for millennia.





Quantifications of storage and sequestration in forests are to large extent dependent on how system boundaries are defined in time and space. The time perspective is crucial to consider as forest management operates on the scale of multiple decades; i.e. measures taken today will have consequences far into the future. With a balanced age distribution across the landscape, forests are a carbon sink that can be maintained over the long-term. Over the short-term, cleared areas and regenerated young forests are carbon sources, whereas growing middle aged stands (20–80 years old) have a high carbon uptake. As the stand matures, net carbon uptake decreases but, in some cases, also old-growth boreal forests can have a net carbon uptake, and old-growth forests store large amounts of carbon.

> *"Forests sequester and store a huge amount of carbon; at least half of this carbon is stored in soils."*

If extracted biomass is used in long-term products, such as buildings and construction material, carbon will be stored for a long time. This will substitute less climate friendly material from fossil resources. If extracted biomass is used in short-term products, such as paper and bioenergy, harvesting returns biogenic carbon to the atmosphere sooner. Long-term stored carbon in unmanaged forest does not contribute to substitution of fossil materials and energy sources. Older unmanaged forests with lots of deadwood might have higher risks for uncontrollable release of carbon by natural disturbances, which are increasing in frequency as climate is changing.

Wood supply

During the past 100 years, standing timber volume has increased by over 50% in the Nordic-Baltic region, despite substantial logging during the same period. This is due increased growth stimulated by active forest management, e.g., tree breeding programmes and improved silvicultural methods, as well as favourable climatic conditions. In some countries the forest area has also increased by afforestation of open and semi-open areas. Continued rich wood supply relies on active silviculture, in particular revegetation of cleared areas, pre-commercial thinning of young forests and early thinnings. Wood biomass production capacity can be increased through continued intensive management. Favourable climatic conditions for forestry in future in the Nordic-Baltic region in comparison to other part of Europe emphasizes its role as supplier of renewable material for the European Union.

Biodiversity

Biological diversity defines the capacity of biological life to adapt and evolve in a changing environment. By contributing to a more holistic view on economic development, the circular bioeconomy also relies on protecting biodiversity and important forest ecosystem services other than wood biomass provisioning.

Habitat loss and fragmentation, including edge effects into remaining old growth patches, is the single most important impact of forestry on flora and fauna besides direct in situ effects and overall impacts on climatic, edaphic and hydrological integrity.

Evaluating impacts of forest habitat loss, transformation and fragmentation on biodiversity becomes more difficult when considering soil biodiversity, where knowledge currently is scarce. Planning afforestation efforts to mitigate habitat fragmentation is a complex issue, particularly in the view of a changing climate, where the best methods differ depending on multiple attributes and local, national and pan-national contexts. In general, future sustainability research is urgently needed on spatial and temporal connectivity of biodiversity, carbon budgets, productivity and ecosystem resilience based on multifunctional forest strategies.

Conclusions

Ecosystem goods and services contributing to social welfare are supplied from healthy and multifunctional ecosystems. Nordic-Baltic forests have provided ecosystem services and benefits throughout the human history and still do today. A significant share of Nordic-Baltic forest sector production is exported elsewhere, which ensures that the benefits of using forests are shared with other European regions as well as globally.

To reach the objectives of the Green Deal, measures, including regional adaptations, must focus on both protection and use of forests. There is a great potential in the use of wood-based products to substitute fossil-based raw materials, which should not be missed. Management to improve the quality as well as the resilience of forests provisioning to social welfare relies on multiple-use strategies in the view of future and potentially unknown demands on products, services and business opportunities. A forest-based circular bioeconomy has great potential to contribute to the European Green Deal.

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Intensive forestry can lead to habitat loss and fragmentation; this must be considered when planning future forestry.

PROFOR

Promoting sustainable forestry in a growing bioeconomy

PROFOR – a research network promoting sustainable forestry and use of forests in a growing bioeconomy, including Estonia, Finland, Latvia, Lithuania, Norway and Sweden.

Funded by

SNS
Nordic Forest Research

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ISBN 978-952-380-141-7 (print)
ISBN 978-952-380-142-4 (online)
http://urn.fi/URN:ISBN:978-952-380-142-4