Vladimir Melnik / AdobeStock

Policy Brief

How Climate-Smart Forestry could benefit climate change mitigation in Russian forests

Key messages

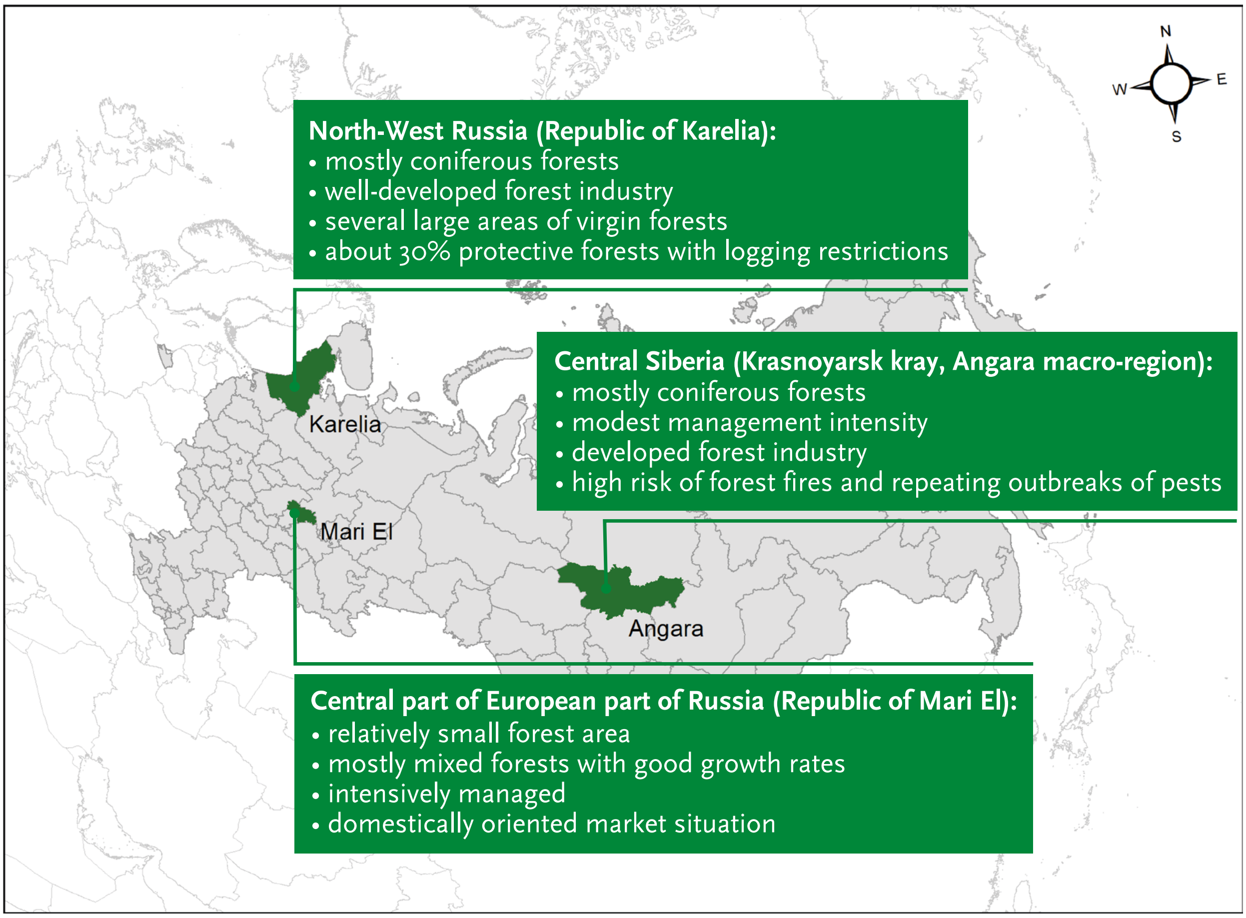
- Climate-Smart Forestry is a holistic approach that aims to connect climate change mitigation with adaptation measures, enhance the resilience of forest resources and ecosystem services, and meet the needs of a growing population.
- Introducing better adapted tree species and high-quality breeding materials is a key measure to enhance the resilience of Russian forests to climate change and increase carbon storage. Their use can increase the productivity and reduce susceptibility of forests to disturbances.
- Increasing the share of thinnings in total wood removals maintains forest cover and allows to select better performing trees. Increasing the share of thinnings contributes to maintaining a larger forest carbon sink.
- Increasing the protected forest areas in Russia should contribute to maintaining biodiversity and carbon stocks and can help to concentrate the sustainable management investments in other areas.
- Using harvested wood sustainably for use in long-lived wood products or with large substitution benefits will increase the mitigation benefits of Climate-Smart Forestry.
- Climate-Smart Forestry requires a mix of regionally relevant measures to achieve the full mitigation potential by forests and the forest sector. These measures need to consider both forest ecosystems and wood use simultaneously and include activating management in accessible forests and protecting primary forests and other forests with high biodiversity values.

Climate-Smart Forestry – a holistic approach

Climate-Smart Forestry is a holistic approach to guide forest management. It aims to connect climate change mitigation with adaptation measures, enhance the resilience of forest resources and ecosystem services, and meet the needs of a growing population. Climate-Smart Forestry builds on the concepts of sustainable forest management but has a strong focus on climate and ecosystem services. It has three mutually reinforcing components:

- Increasing carbon storage in forests and wood products, in conjunction with conserving biodiversity and provisioning other ecosystem services.
- Enhancing the health and resilience through adaptive forest management.
- Using wood resources sustainably and to substitute non-renewable materials associated with higher greenhouse gas emissions.

Three case studies across Russia



To understand how Climate-Smart Forestry could provide climate benefits across Russia, we elaborated a portfolio of measures for three case studies and assessed their impacts through a scenario analysis on carbon storage in forest biomass and wood products, as well as on material substitution effects. All Climate-Smart Forestry measures were implemented in the scenarios at a pace that was judged realistic, but still with additional effort towards climate mitigation compared to the current forest management practices in Russia.

Findings

The estimated benefits provided by Climate-Smart Forestry for climate change mitigation vary from region to region and depend on the management that is currently applied and was considered to continue in the future. Climate-Smart Forestry improved the overall CO_2 balance (additional sink in forest ecosystems and avoided emissions through material substitution effects) in all three case studies (Table 1), although the effects appear relatively small. A key factor is the difficulty to quantify what happens in absence of modified forest management, a counterfactual situation in which forests may become more susceptible to the impacts of climate change such as extreme events and natural disturbances.

More active forest management particularly affects the development of the forest biomass carbon sink in the coming decades. For all three case studies, a larger share of thinnings, regeneration with improved breeding materials, improved harvest efficiency and other measures contribute to increasing the forest carbon sink. For the case studies in the republics of Mari El and Karelia, the use of harvested wood for long-lived wood products (e.g., construction materials) or for wood-based products that are associated with lower emissions over their life-cycle (e.g., wood-based textile fibres) also contribute to a net reduction in CO_2 emissions compared to a development without such measures. This happens through the storage of carbon in wood products or through avoided emissions when wood is used for a product instead of other more energy and emission-intensive, non-renewable materials (e.g., concrete, steel, plastics, petroleum-based fibres). However, in the Angara macro-district, harvest levels had to be decreased to reach sustainable levels. Together with the other measures, this reduced harvest level improves the forest biomass carbon balance but worsens the carbon balance of wood products and may lead to wood products being substituted by products associated with higher greenhouse gas emissions. Importantly, the exact material substitution effect will depend on the type of wood product, the type of non-wood material that is replaced and the post-use fate of the wood. Properly accounting for substitution effects – and attributing them to the forestry sector – is crucial to define optimal (forest management) strategies to mitigate climate change.

The introduction of better adapted tree species and high-quality forest genetic breeding materials is a key measure to enhance the resilience of Russian forests to climate change and increase carbon storage. Forests dominated by coniferous species (such as pine, spruce, and larch) could be regenerated with improved breeding materials of the same species with higher growth rates. Such growth gains can be large based on experiences in the Baltic and Nordic countries. Natural regeneration is the dominant means of forest regeneration in the three case studies, but artificial regeneration may be needed for introducing better adapted tree species and better breeding materials, thus requiring a change in current forest management practices.

Thinnings are currently executed in Russian forests to a very limited degree but increasing the share of wood coming from thinnings could result in significant gains in carbon storage. This is because the forest cover is maintained, and high-quality wood products can be produced. Thinning more will not negatively affect the total roundwood production volumes, as we see from the results for Karelia and Mari El. To implement the Climate-Smart Forestry measures in practice, a change is thus needed to how forests are currently managed.

Conclusions

Forests can contribute to climate change mitigation targets and, at the same time, allow for a more effective forest utilization. A mix of measures will be needed to achieve the full mitigation potential by Russian forests and the forest sector, which should consider both forest ecosystems and wood use simultaneously. Such a mix would include activating management in accessible forests and protecting primary forests and other forests with high biodiversity values. Altogether, the results from the three case studies illustrate the possibilities and the limitations of Climate-Smart Forestry in Russia. The generally limited productivity of Russian forests, the required rate of implementation, the difficulties of implementing better practices in the field, the remoteness of many areas in combination with limited transportation network and very long hauling distances will make it in practice very difficult to implement all the measures as analysed here. Developing regional action plans including required investment funding is an important first step.

Table 1. Summary of the average annual additional mitigation impacts over a 50-year period due to Climate-Smart Forestry (Mt CO_2/year). A negative number denotes an additional climate mitigation effect vis-à-vis business-as-usual.

Case study		Republic of Karelia	Republic of Mari El	Angara macro-district
Forest area included (mill. ha)		9.3	1.4	13.6
Additional mitigation in pools	Living biomass	-4.81	-0.27	-4.83
	Wood products	-0.10	-0.19	1.00
Material substitution		-1.34	-0.10	2.21
Total mitigation effects for the whole region (Mt CO_2/year).		-6.25	-0.56	-1.44
Total mitigation effect (Mg CO_2/ha/year)		-0.67	-0.51	-0.11

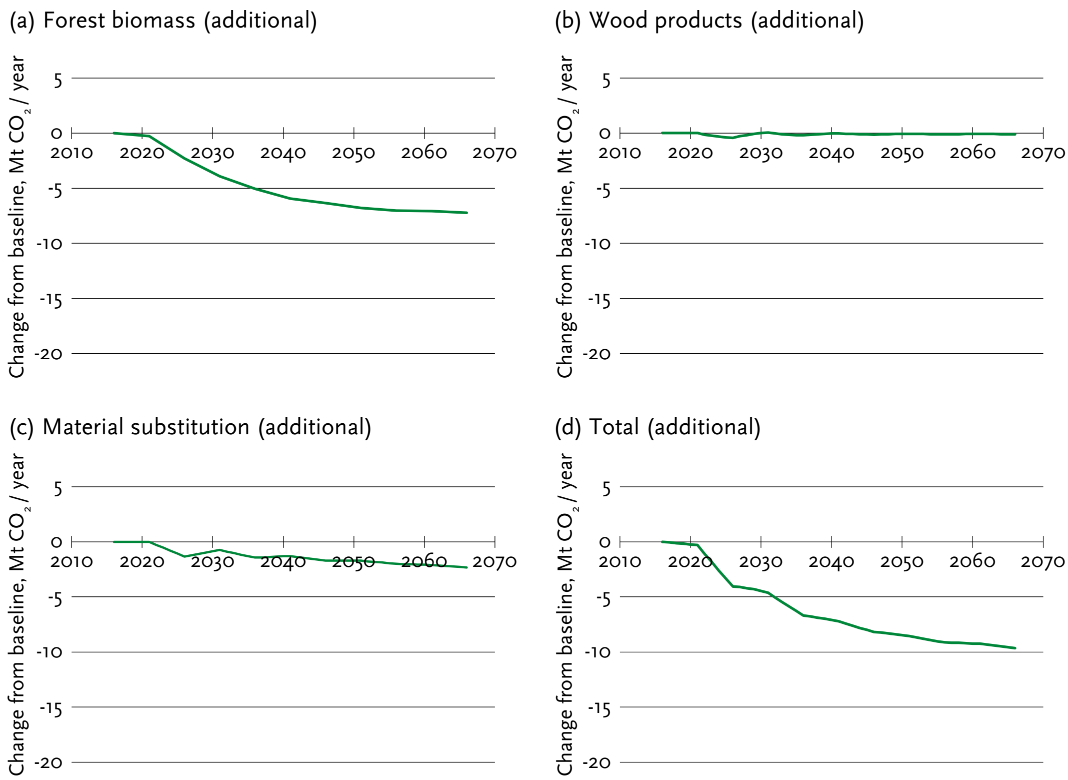


Figure 1. Estimated development of emissions (positive values) and removals (negative values) of CO_2 when Climate-Smart Forestry measures are considered, compared a continuation of current management practices. Results are shown for the case study for the Republic of Karelia for forest biomass (a), wood products (b), material substitution effects (c) and the total (d).

This brief is based on a report on Russian forests and climate change by Leskinen et al. (eds), which is available at https://doi.org/10.36333/wsctu11

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

This publication was produced with the financial support of the European Union's Partnership Instrument and the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) in the context of the International Climate Initiative (IKI). The contents of this publication are the sole responsibility of the European Forest Institute and do not necessarily reflect the views of the funders.