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Forests and climate change

The Paris Agreement, the 2030 Sustainable Development Goals, the EU's 2030 Climate and Energy Framework, the updated EU's Bioeconomy Strategy and EU Long-term Strategy for Reducing Greenhouse Gas Emissions by 2050 have confirmed the important role of the EU forests and forest-based sector in tackling climate change.

First and foremost, forestry should be considered as the sector that can offer a great potential in mitigating climate change and support the transition towards the bioeconomy. Currently, the forests sequester approximately 10 % of the EU's greenhouse gas emissions annually and by substituting the fossil-based raw materials and energy the overall mitigation effect is even higher. Wood based bioenergy reduced EU greenhouse gas emissions by around 332 mio. t CO2eq in 2017 (source Bioenergy Europe). Furthermore, by increasing the amount of carbon in the long-term wooden products e.g. in construction and promoting circular approaches, overall climate benefit of the sector to the society would be fostered.

It should be noted that young and healthy forest resources effectively remove CO2 from the atmosphere. Climate change with an increase of droughts and heavy storms already affects forest ecosystems in many parts of the EU and has a pivotal impact on practising forestry. It is for sure that the current trend with rapidly changing climatic conditions (droughts, increasing temperatures) increases the damages caused by e.g. insects and pests, including invasive alien species, forest fires, and erosion and weakens the resilience against those threats. Thus, it is important to understand the climate change impacts on forests in order to be able to develop necessary adaptation strategies and measure and to make most of the mitigation potential.

Forest owners and their cooperatives are sustainably managing European forests in a way that they can fulfil both now and in the future, their ecological, economic and social functions, at local, national and global levels while contributing to fight against climate change. The definition and criteria of Sustainable Forest Management (SFM)[1] is embedded into national forest and nature legislations and voluntary market-based tools to showcase sustainability of forestry practices.

Specificities of forests[2]

Forests are the green lungs of Europe, transforming CO2 into oxygen, maintaining biodiversity, filtering water and buffering emissions from industry whilst producing timber, biomass and cork. Forests also bear non-wood products such as fruits, nuts and mushrooms, are home to game and provide other renewable resources. Furthermore, they offer a place of leisure and recreation for European citizens but also ensure clean water and air alongside other ecosystem services. All these functions and services are mutually compatible and must be seen as a whole.

1 Forest Europe SFM Criteria and indicators

2 Eurostat 2018

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There are 182 million hectares of forest land in the EU-28. The area of forest and other wooded land showed an increase of 5.2% (8.9 million ha) between 1990 and 2015 as a result of afforestation on former agricultural land and natural forest regeneration.

The forest stock of EU-28 has also been growing constantly over the past 50 years. The total volume of standing timber is around 26 billion m3. Every year, the increase in forest resources in Europe outstrips the uses found for them as on average 70% of the annual increment is harvested.

Forests are recognised as one of Europe's most important renewable resources providing multiple benefits to the society and the economy. Additionally, European forests, ranging from the Mediterranean to the Boreal, from the Atlantic to the Alpine zones, represent in their enormous biotic differences the main depository of biological diversity.

About 60% of forests in the EU-28 are privately owned, mainly by families, and 40% are publicly owned, e.g. by the state, municipalities, religious communities and other entities with large regional variations.

The role of forest in mitigating climate change

The Paris Agreement stipulates in article 4.1 the goal of "a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century" (climate neutrality), that cannot be reached without sustainably managed forests and their ability to absorb CO2 from the atmosphere. Forests and their sustainable management therefore have a fundamental role to play in mitigating climate change.

Sustainable and active forest management is key for continued carbon sequestration

Sustainable and active forest management with regular harvesting improves carbon mitigation as forests are constantly developing new and additional carbon sequestration capacity. The amount of carbon dioxide that a forest can capture depends largely on tree growth and silviculture affects this growth. Therefore, SFM provides a great opportunity and also responsibility to influence and increase the sequestration of carbon dioxide.

Premature trees that dominate managed forests have a very high capacity to absorb CO2 due to their exponential growth and thus allow larger amounts of biomass to be harvested. The larger the carbon store is in the forest products from final fellings, the more positive the effect of forestry on climate change.

The Ministerial Conference on the Protection of Forests in Europe (MCFPE) has established criteria and indicators for sustainable forestry. The EU should continue to support this process as a key reference point for the sustainable use of forest resources within the framework of sustainable development, nevertheless respecting the subsidiarity principle. Continuous, sustainable management and use of European forests has an important role in preventing the delocalization of timber production to third countries.

Climate resilient and productive forests and disaster management is required

More frequent climate anomalies in the future such as fierce extratropical cyclones can devastate vast areas of forest in a short time-span and lead to sharp spikes in available timber on the marketplace which would lead to dramatic price drops for wood. A "solidarity fund for forest owners" to reimburse the damages of climate change should be established at European level. New cross-European insurance products for insurance/reinsurance of risks within forestry could also be developed. This would accommodate the future needs of forest owner's and encourage them to invest in sustainable production forestry under future uncertain climatic conditions.

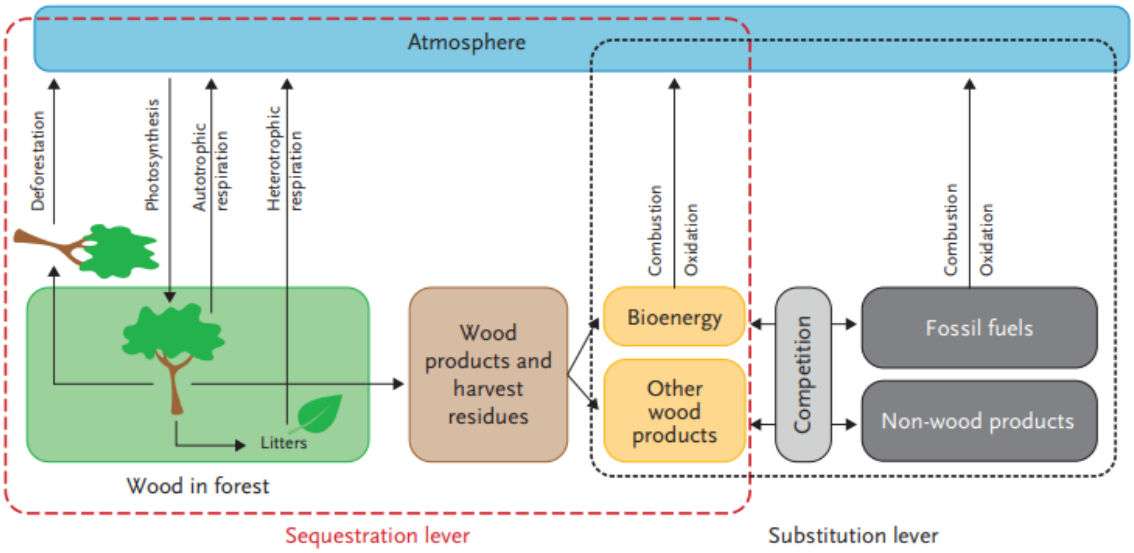
Afforestation - increase the carbon sink without compromising food security

The carbon sink can be increased through afforestation, without having a negative impact on productive agricultural area and thus not compromising food security, in line with the Paris Agreement. The forest area could be expanded to natural reserves, abandoned marginal land areas and other land areas not suited for agriculture and settlement, e.g. areas prone to flooding during heavy rainfall and thaw events. In addition to creating carbon storage, afforestation of these areas could locally prevent soil erosion and associated eutrophication and adverse sedimentation of nearby aquatic ecosystems. The increased forest area available would be beneficial for sustainable biomass production as well.

Wood substitutes GHG-intensive materials and wood products build up carbon stocks

Wood is a renewable natural resource and promoting its uses as building-materials or fuels to substitute CO2-emission–intensive materials, is the most effective way of locking up carbon dioxide in trees and wood-based products, avoid CO2 emissions and substitute materials based on non-renewable resources.

The following graphic gives a good illustration of the important role of forest in sequestering carbon in biomass and wood products and the substitution effect of wood products and bioenergy.



Source: EFI- A new role for forests and forest sector in the EU post-2020 climate targets

Based on the elements presented above, forest can help to mitigate climate change by fulfilling two crucial functions:

Sequestration and storage of atmospheric CO2 in the forest, in wood products and in soil through:

- Active and sustainable forest management with regular harvesting that can improve the carbon mitigation capacity of forests by ensuring they constantly develop new and additional carbon sequestration capabilities.
- Increasing new forests on abandoned or marginal agricultural lands trough a sustainable afforestation and reforestation.

Carbon substitution through:

- Harvested wood products, which can replace energy-intensive, high- carbon industrial materials such as concrete or steal
- Wood biomass, which replaces non-renewable fossil fuels when used to produce energy and heat.
- Insulation materials made from wood that are both efficient and environmentally friendly

The effect of avoided fossil emissions (substitution effect) is much higher than the carbon storage in forests.

Forests and wood – the key to adapting to climate change

Climate change affects vegetation zones differently. Longer, dry, hot periods increase the risk of forest fires and severe calamities all over Europe. It is estimated that forest fires could release twice as much GHG emission every year as the overall European transport sector, fastening the climate change process. Such a downward circle must be avoided. In addition, longer growing seasons mean that the probability of climatic extremes such as storm damages in central and northern Europe is greater. The LULUCF sector is required to remain a net carbon sink, although the described weather events are outside of human influence and might spoil the ambition. It has to be also taken into account that emissions caused by the natural disturbances do not belong to the mandatory accounting obligations of Member States.

Due to climate change, forests are facing the challenge to adapt to changes and dynamics of average temperature as well as to extreme temperatures, change of water availability and rainfall pattern, increase weather extremes as well as soil acidification, loss of nutrients, the impact of increased ozone and new pests and disease.

SFM is the main way of improving forests' ability to adapt to climate change. EU forests are for the most part managed on an ongoing basis and are thus able to sustain high production levels and retain their vitality. The long-time horizons in forestry, with rotation periods of between 15 and 150 years, mean that large parts of today's forests have been planted under different climatic conditions and were not meant to explicitly resist the challenges of a changing climate. However, adaptation is a continuous process that has already been started by foresters and should be financially promoted by states, e.g., replanting of areas that have been hit by droughts and forest fires. Supporting further research and innovation as well as availability of plant protection products and locally adapted tree species is of paramount importance in order to create forest policies and further develop and SFM practices suitable to adapt to the new situation.

Awareness of the impacts of climate change as well as of the importance of active forest management in adaptation must be increased accordingly among forest owners, the public and decision makers.

In the meantime because of climate change the question appears, which tree species are able to grow under extreme conditions. In forest regeneration preference should be given to native tree species whilst at the same time attempting to study and introduce new species which have the ability to adapt and benefit from changing climate conditions and sequester carbon efficiently. In addition, mixed forests could be recommended where this is likely to have higher resistance to storm and insect damage. Research on alternative resistant tree varieties and the introduction of new or novel species to new areas should be supported among predicative modelling of damages caused by extreme and sudden weather changes.

Climate change is expected to increase further the number of natural catastrophes. In the case of forests this means more forest fires, storm damage and widespread insect damage increasing the need for forest management practices to adjust. Therefore, at this point in time, particular attention should be paid to restocking methods, including selection and combining use of tree species, fire prevention and insect control. For these measures the EU should ensure that adequate financial support is available in order to maintain forests important role for the climate.

Forest role in absorbing CO_2 is an important ecosystem service that plays an important role in the fight against climate change. An ecosystem based payment for forest owners could help in supporting them to continue developing sustainable forest management strategies. This payment should include at least the compensation of the loss of income and could be part of the future CAP measures.

ANNEX:

Proposals for tools that could be used for forestry to mitigate and adapt to climate change

You can find below some of the recommendations of the European Innovation Partnership on agriculture (EIPAgri) focus group on Forest practices and climate change (https://ec.europa.eu/eip/agriculture/en/content/focus-groups/new-forest-practices-and-tools-adaptation-and) regarding the solutions for good practices, strategies, research and innovation needs that we consider that could be taken into account:

- Explore methods to boost the use of broadleaf species by increasing their potential in forest regeneration
- Test methods to improve assisted regeneration or afforestation in drought prone areas
- Scaling up management and tackling climate change risks by an integrated landscape management and the implementation of early warning and innovative risk management strategies (eg. for pests or forest fires)
- Develop a user-friendly early warning system on local forest health issues which can assess the situation and raise the alarm when necessary
- Develop or gather resources and tools to foster local adaptation in forest management by enhancing awareness and peer to peer learning
- Local/regional guidelines for the implementation of innovative silvicultural practices to adapt the forests to the expected future conditions
- Explore ways to enhance landscape management by helping individuals to make decisions aligned with strategies to fight climate change
- Develop collective and effective plans to mitigate climate change effects (drought, forest fires), promote actions for ecosystem resilience and/or increase awareness of all actors
- Analysis of mitigation options along specific value chains (e.g. for pine) to improve carbon balance
- Improving forest management at stand level with special attention to small scale forests. Climate smart silviculture, genetic resources and decision support systems (DSS) and tools can highly contribute to this objective
- Enhancing knowledge exchange and awareness about climate change beyond the forest community by finding and using effective communication methods and bringing together views from science, policy and practice
- Study carbon dynamics related to the fire regime: forest species (fire prone vs resistant), land uses and practices (e.g. monocultures, agroforestry) and management options (e.g. wild vs prescribed fire)
- Characterisation of existing collective approaches effectively improving forest management in a context of climate change