The impact of climate change on the distribution of tree species is likely to have economic implications for the timber industry. A new study has estimated that climate-induced shifts in range could reduce the value of European forest land for the timber industry by between 14 and 50% by 2100. At the higher end of this estimate, this could equate to a potential loss of several hundred billions of euros.

European forests are an important source of ecosystem services and timber production is one of the services that are more viable to evaluate financially. Expected variations in temperature and precipitation under climate change are likely to influence the range of most tree species. For example, species that grow in cold and/or moist environments, such as the Norway spruce, will be replaced by more drought-adapted species, such as oaks. The spruce and other similar trees are economically valuable, since they are fast-growing and provide large amounts of timber. This means their loss has financial implications, such as income losses to forest owners, reductions in raw materials for the wood products industry and less carbon sequestration.

The study, conducted under the EU MOTIVE project, investigated the economic impact of projected climate change on European forests (excluding Russia) under three Intergovernmental Panel for Climate Change (IPCC) scenarios: extreme (A1F1), moderate (A1B) and mild (B2). It modelled the presence or absence of 32 tree species in changing temperatures and precipitation.

Results suggest that, by 2100, the area occupied by the spruce species group would decrease by 43 to 60%, depending on the climate change scenario. In comparison, the total area of land occupied by the oak is expected to double under all three scenarios.

By applying a large scale forest projection model – the European Forest Information Scenario model (EFISCEN) - the study estimated the timber production for seven groups of tree species. It then transformed this into the value of forest land using land expectation values per hectare of land (LEV), which are based on costs and prices for timber. This estimated that under the moderate climate change scenario (A1B) there would be a loss of more than €190 billion by 2100, caused by the changes in distribution and amount of tree species. For more extreme scenarios, economic losses were greater.

The study has several important sources of uncertainty that could both under- and overestimate the economic losses. Firstly, other impacts, such as increasing storm, drought, fire and insect risks, have not been accounted for which could cause further adverse effects. The model is likely to have underestimated the adaptive capacity of tree species and there are also complex socio-economic drivers that have not been incorporated, such as further variations in the market values of tree species and forest owners opting for more resilient non-European species, such as the Douglas fir.

Nevertheless, the research provides an indication of the potential economic losses to the European timber industry due to climate change and the need for measures that could counteract these losses. In addition to timber production, there are several other ecosystem services that are likely to be affected, such as carbon sequestration, water regulation and prevention of soil erosion. These are not considered in this study but they provide important economic benefits as well as mitigate climate change. The impact on these services should also drive the need.