

Temperate Oceanic Region

Potential impacts of climate change on forest goods and services

Climate characteristics

The region is characterized by high rainfall and high winter temperatures. The difference between the mean temperature of the warmest and coldest month is less than 21°C. There is no seasonal variation in rainfall pattern; annual rainfall remains under 2,000 mm per year in the lowlands, and goes up to 3,000 mm in the north of the region.

Key climate change trends

Annual mean temperature increases will be approximately 3 °C. Summers are likely to be drier and hotter. Extreme events (storms and floods) are projected to become more frequent, due to warmer temperatures and higher volumes and intensities of rainfall, in particular in winter.

Sensitivity to climate change

Higher air temperature will have a positive impact in northern and western parts (i.e. less water limited) and a negative impact on southern and eastern parts (i.e. water limited).

Changes in temperature and precipitation will lead to changes in **species distribution**. In western and central Europe, temperature increase may lead to the

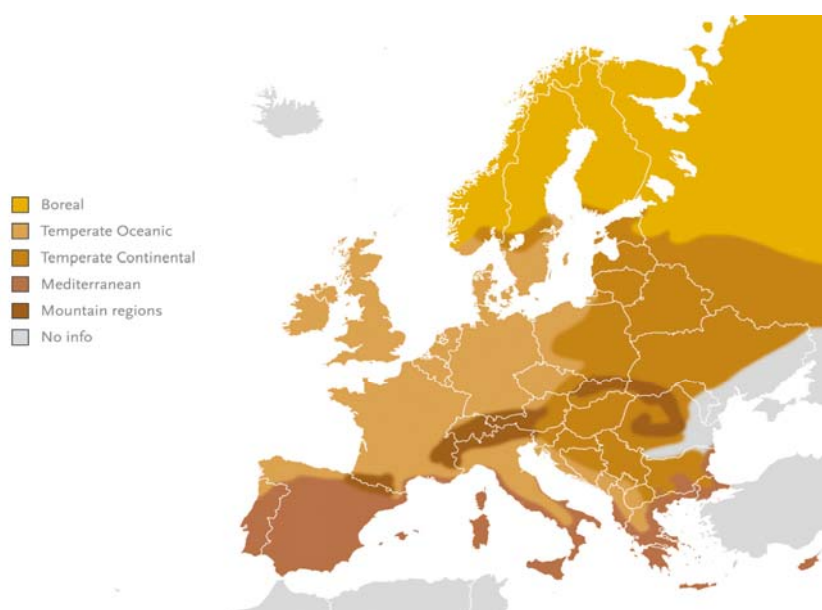


The Gwydr forest in Wales, UK. Conifer is the dominant type.

Photo: MOTIVE case study Wales, UK

replacement of natural conifers with more competitive broadleaved trees.

Precipitation (rainfall) is expected to increase in winter but summers are likely to be drier. Positive growth could occur in temperate forests if increasing precipitation balances the increased demand for water due to a rise in temperature. Negative impacts can be expected where climate warming changes the water balance, leading to increased drought stress.



Projected climate change impacts vary in different bioclimatic regions.

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Abiotic risks (non-living factors which affect ecosystems, like wind patterns, precipitation, temperature). Disturbance regimes such as storms and windthrow (trees uprooted or being broken by the wind) may gain in importance under climate change.

Biotic disturbances (changes in living organisms). Prolonged and warmer vegetation periods will enhance the development of several species of bark beetles, allowing for the establishment of additional generations and multiplying population densities. An expansion in the range of moth species may affect the recreational value of pine and oak forests in the region.

Temperature increase associated with drought will be a main factor predisposing forests to diverse fungal diseases. In the future, the expansion and northward shift of highly thermophilic (heat-loving), Mediterranean pathogen species such as fungus is to be expected. Drought is also a main trigger of infections by root diseases in conifers, and plays a significant role in the oak decline.

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Wood production. Most of the region is projected to benefit from increased growth rates under average climate conditions, so wood production will also increase. Negative impacts may occur in the southern and eastern parts of the region where water is a more limiting factor.

Biodiversity. Natural species composition could shift from coniferous towards broadleaved species. Management effects will strongly influence the transition by either maintaining economically important species (e.g. Norway spruce) or by supporting the regeneration of new target species.



Beech invading pine forest, South-East Veluwe, Netherlands. Photo: MOTIVE case study, S-E Veluwe.

Adaptation options

- Keep forests in good condition, so they can better recover from biotic or abiotic damage.
- Maintain the biodiversity of forests; it will improve the ability of forests to adapt to changes in climate.
- Adapt management to an increased disturbance risk.
- Select well-adapted tree species or new plants that are genetically similar to those that might have grown in the area previously, and favour them at the tending and thinning stages.

The project MOdels for AdapTIVE forest management (MOTIVE) is a large-scale integrated project (project number 226544) in the 7th Framework Programme of the EU that develops tools to support decision-making in forestry in response to climate and land use change. It encompasses 20 partners from 14 European countries. It has an overall budget of almost 9 million euros, from which 7 million will be paid as EU contribution. The project is coordinated by the Forest Research Institute of Baden-Württemberg with duration of 4 years.