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Future tendencies of climate indicators important for adaptation and mitigation strategies in forestry

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Climate change is expected to have severe impacts in the forestry sector, especially in low-elevation regions in Southeast Europe, where forests are vulnerable and sensitive to the increasing probability and severity of climatic extremes, especially to droughts. For providing information about the most important regional and local risks and mitigation options for the Carpathian basin, a GIS-supported Decision Support System is under development.

This study focuses on the future tendencies of climate indicators that determine the distribution, growth, health status and production of forests as well as the potential pests and diseases. For the analyses the climate database of the Decision Support System has been applied, which contains daily time series for precipitation and temperature means and extremes as well as derived climate indices for 1961-2100. For the future time period, simulation results of 12 regional climate models are included (www.ensembles-eu.org) based on the A1B emission scenario.

The main results can be summarized as follows:
· The projected change of the climate indices (e.g. total number of hot days, frost days, dry days, consecutive dry periods) and forestry indices (e.g. Ellenberg climate quotient, Forestry aridity index; Tolerance index for beech) indicates the warming and drying of the growing season towards the end of the 21st century. These can have severe consequences on the ecosystem services of forests.
· The climatic suitable area of the native tree species is projected to move northwards and upwards in the mountains, respectively. For beech (Fagus sylvatica L.) this shift would mean the drastic shrink of the distribution area in the analyzed region.
· The characteristic climate conditions that are expected in the Carpathian basin in the second half of the century, are now located southeastern from the case study region. In this way, the potential future provenance regions can be determined.

Results provide input for the climate impact analyses and build an important basis of the future adaptation strategies in forestry, agriculture and water management.

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