



Did 250 years of forest management in Europe cool the climate?

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Over the past two centuries European forest has evolved from being an over-exploited source of timber to a sustainably managed provider of diverse ecosystem services. Although this transition is often perceived as exemplary in resources management, the loss of unmanaged forest, the progressive shift from traditional coppice forestry to the current production-oriented management and the massive conversion of broadleaved to coniferous species are typically overlooked when assessing the impact of land-use change on climate.

Here we present a study that addressed this gap by: (1) developing and reparameterizing the ORCHIDEE land surface model to simulate the biogeochemical and biophysical effects of forest management, (2) reconstructing the land-use history of Europe, accounting for changes in forest management and land cover. The model was coupled to the atmospheric model LMDz in a factorial simulation experiment to attribute climate change to global anthropogenic greenhouse gas emission and European land-use change since 1750 (i.e. afforestation, wood extraction and species conversion).

We find that, despite considerable afforestation, Europe's forests failed to realize a net removal of CO₂ from the atmosphere due to wood extraction. Moreover, biophysical changes due to the conversion of deciduous forest into coniferous forest have offset mitigation through the carbon cycle. Thus, two and a half centuries of forest management in Europe did not mitigate climate warming (Naudts et al., 2016).

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