
An economic comparison of adaptation strategies towards a drought-induced risk of forest decline

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Abstract

Drought is a stress affecting forest growth and resulting in financial losses for forest owners and amenity losses for society. Due to climate change, such natural event will be more frequent and intense in the future. In this context, the objective of the paper is to compare, from an economical perspective, different forest adaptation strategies towards drought-induced risk of decline. For that purpose, we focus on a case study of a forest of beech in Burgundy (France) and, we studied several adaptation options: density reduction, reduction of the rotation length and substitution by Douglas-fir. We also considered two levels of risks (intermediate and low soil water capacity), two climatic scenarii from IPCC (RCP 4.5 and RCP 8.5) and two types of loss (financial and in terms of carbon sequestration). We combine a forest growth simulator (CASTANEA) with a traditional forest economics approach (Fautsmann's LEV and Hartman's LEV). The results showed that adaptation provided the best economic return in most of the scenario considered. Combining strategies appears as a relevant way to adapt forest towards a drought-induced risk of forest decline. The interest to consider two disciplinary fields was also demonstrated with beneficial scenarii in an ecological perspective that were not in an economic one and reversely. The results are discussed taking into account the financial balance and the carbon balance.

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