OPT²FOR

Spatial and dynamic optimisation of forest management

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Summary —

Context —
Forest management (from regeneration to harvesting) involves time horizons exceeding several decades and multiple interactions with the environment. These interactions affect the biophysics and biogeochemistry of forests, as well as the quantity and quality of harvested products. Climate change is a dynamic and complex phenomenon. Its impacts may be perceived differently by forest owners over time, leading them to adjust their strategies or re-evaluate management alternatives at time steps.

Objectives —
The main objective is to develop a methodology for evaluation and spatial and dynamic optimisation of forest management under environmental, climatic and socio-economic constraints.

Approaches —
First, we define scenarios of territorial evolution of the socio-economic context that reflects different expectations towards forest and wood. For each scenario, we then simulate the demand for different types of wood products to be harvested and the spatial distribution of forest management to meet this demand, via the French Forest Sector Model FFSM at the regional scale. Each silvicultural itinerary and the dynamic evolution of the associated economic and environmental indicators are simulated via the GO+-CNP-CAT-Forest-Gales model chain under different climate scenarios (reference, RCP 4.5 and RCP 8.5) from 2020 to 2100.
Spatial and dynamic optimisation, carried out for each combination of socio-economic and climatic scenarios, makes it possible to propose a spatial distribution of silvicultural itineraries that maximises all economic and environmental indicators. This optimisation takes into account the regional demand for wood products; forest owners' aversion to economic losses when a wood price risk is introduced; and the temporal evolution of forest owners' decisions.

Expected results and impacts —
We are developing an innovative methodology for spatial and dynamic multi-criteria analysis of adaptive management choices for production forests under different scenarios. It will allow us to characterise these choices, in environmental and economic terms, while considering the behaviour of forest owners in the face of losses.