Supplementary 4. Economic calculations.

To calculate the NPV of each thinning intensity, plot and simulation repetition, we assumed that the value of initial standing stock value corresponded to the initial investment, and the returns were given by thinning revenues in each period and the value of standing stock at the end of simulation period (Eq.1):

$$NPV_i^s = Stock_{ini}{}^s + \sum_{i \in SP} \sum_{j \in A} \sum_{t \in T} \frac{Th_{ijt}{}^s netprice_{ijt}{}^s}{(1+ir^s)^t} + \frac{Stock_{fin}{}^s}{(1+ir^s)^T} \quad \text{(Eq. 1)}$$

Where: NPV_i^s: NPV of plot i and simulation repetition s; $Stock_{ini}$: value of standing stock at the beginning of simulation period; $Th_{ijt}{}^s$: thinning volume of species i, assortment j in period t and simulation repetition s; $netprice_{ijt}{}^s$: net wood price of species i, assortment j in period t and simulation repetition s; ir^s: interest rate in simulation repetition s; $Stock_{fin}{}^s$: value of standing stock at the end of simulation period (T) in simulation repetition s.

We used net wood prices (of harvesting costs) applied in the research area (year base = 2016), and at each time step (10 year period) we generated a random deviate of the current net price for each species and assortment uniformly distributed in [-20%,+20%] of the current value. In this sense, wood price and harvesting costs were aggregated. Similarly, the interest rate was randomly sampled from an uniform distribution [0.5%,1%] in each scenario s (Augustynczik et al . 2018).

Storms impacted the price of damaged timber, assuming damaged trees would be sold as firewood or industrial wood. We did not account for storm impacts on the equilibrium market price, as the additional supply generated by disturbances in the study area alone was assumed to be not sufficient to affect the wood market (which may not hold for widespread and extreme storm events – nevertheless the 20% loss in wood price that occurred due to oversupply after the storm Lothar was normalized within the time step used in our simulation, e.g. see Gardinet et al. 2013).

References

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