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Regeneration decisions in forestry under climate change related uncertainties and risks: Effects of three different aspects of uncertainty

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Abstract: Future climate development and its effects on forest ecosystems is not easily predicted or described in terms of standard probability concepts. Nevertheless, forest managers continuously make long-term decisions that will be subject to climate change impacts. The managers' assessment of possible developments and impacts and the related uncertainty will affect the combined decision of timing of final harvest and the choice of species for regeneration. We analyze harvest of a Norway spruce stand with the option to regenerate with Norway spruce or Oak. We use simulated variations in biophysical risks to generate a set of alternative outcomes investigating effects on decision making of three aspects of uncertainty; (i) the perceived time horizon when there will be certainty on outcome, (ii) the spread of impacts across the set of alternative outcomes and (iii) the subjective probability (belief) assigned to each outcome. Results show that the later a forest manager expect to obtain certainty about climate change or the more skewed the belief distribution, the more decisions will be based on ex ante assessments - suggesting that if forest managers believe that climate change uncertainty will prevail for a longer period of time, they may make sub-optimal decisions ex ante.

Keywords: Uncertainty, regeneration, stopping value, subjective probability, risks, climate change.