



# FOREVERS

## FOREsts Vulnerability to climate Evolution using Range Shifts of species

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**Context** — In the last years, important forest diebacks were observed over Europe for different species. Different studies demonstrated more mortality in areas where climate have warmed or dried up the most. However, forest managers lack tools allowing to determine species vulnerability according to local ecological conditions, to better adapt our forests to climate change effects.

**Objectives** — Species Distribution Models (SDM) actively developed over the past 30 years, allowing to map suitable ecological conditions for species according to local environmental characteristics for different periods of time. We want to evaluate the relevance of the SDM approach to determine species vulnerability to climate change, using a retrospective analysis and an important dataset with the location of forest diebacks in the Vosges mountains (France).

**Approaches** — We'll model the distribution of Silver Fir (*Abies alba*), and Norway spruce (*Picea abies*), which experience significant diebacks, using retrospective dataset for species occurrences and climate conditions. By simulating the consequences of the recent changes in temperatures and precipitation, we'll be able to identify areas with changes in probability of presence for the past 30 years. By relating areas with a decrease in probability of presence with the recent observed mortality patterns, we'll determine if SDM can be an efficient tool to map species vulnerability and if they can be used to anticipate the effects of future climatic changes.

**Expected results and impacts** — We expect an evaluation of SDM approach to determine Silver Fir and Norway spruce vulnerability to climate change, and for these two species a mapping of areas with different levels of vulnerability over the Vosges mountains. The interest and limits of this approach for forest managers will be discussed.