# Submitted Abstract

ID IMC22-FSAbstr- 508

| | |
|---|---|
| **First Author**<br>First Name<br>Last Name | <br>Christina Elisabeth<br>Dollinger |
| **Submitting Author**<br>First Name<br>Last Name | <br>Christina Elisabeth<br>Dollinger |
| **Correspondence** | christina.dollinger@tum.de |
| **Co-Authors**<br>**>> E-Mails will be not listed** | Seidl, Rupert; Rammer, Werner |
| **Organisations** | Technical University Munich, Germany |
| **Country** | Germany |
| **Region** | Western Europe |
| **Title** | Evaluating The Long-Term Success Of Forest Restoration Strategies In The Northern Alps Under Climate Change. |
| **Keywords** | Forest Dynamics, Ecosystem Analysis, Disturbance Ecology, Climate Change Impact, Landscape Modelling |
| **Type** | List Of Focus Session |
| **Focus Session ID** | 52 |

## Abstract

The forests of the European Alps are expected to face major changes in the next decades due to the interplay of accelerated climate change and intensifying disturbance regimes. Particularly vulnerable are regions where past timber-oriented forest management has led to even-aged Norway Spruce (Picea abies) dominated forests. Areas where biodiversity conservation is of high priority, such as Berchtesgaden National Park (BGNP) in the German Alps, thus promote natural succession towards more natural forest conditions. In pursuit of this goal the park is running a restoration management program in the park's management zone (~5000 ha, 25 % of the total park area).

We here analyse the long-term effects of different restoration strategies on forest composition and structure. Specifically, we contrasted two strategies which both focus on planting the currently underrepresented species Silver Fir (Abies alba) and European Beech (Fagus sylvatica). The more intensive "proactive" strategy introduces fir and beech in patches affected by natural disturbance and in canopy gaps artificially created by management, while the "reactive" strategy only replanted in gaps that occur naturally. To test the overall effectiveness of active management, a third "No Management"-strategy was considered. The strategies were implemented within the forest landscape model iLand and simulated over a period of 80 years (2020 – 2100) under past and future climate conditions (historical climate, RCP 2.6, RCP 4.5 and RCP 8.5). The model was evaluated with regard to its ability to reproduce tree regeneration densities observed in the field.

The forests of the management zone of BGNP developed from even-aged, strongly Spruce-dominated (73.2 % of all trees) forests to more mixed and structurally diverse forests under all evaluated management strategies, with the prevalence of Spruce decreasing by between 34 and 43 %. The "proactive" strategy was most successful in restoring species composition, while the "reactive" and "No Management"-strategies were best at increasing structural diversity. It remains unclear whether future forests will be resilient to the emerging environmental conditions, but younger and more diverse forests might have a better chance of adapting to change. In this study these indicators of resilience increased over time, regardless of human intervention.