# Switzerland's integrative research approach for forest adaptation to climate change

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**Résumé**

**Context**

Forest adaptation is a major challenge for temperate countries. In Switzerland, the first major surface damage directly attributable to climate change occurred in 2019, as a result of drought and heat waves in 2018. Fortunately, an extensive research program "Forests and Climate Change" had just resulted in the publication of a reference book (Pluess & al 2016) that summarizes analysis of the situation and possibilities for adapting forests. This publication introduced the term adaptive forestry (Brang & al 2016) to describe a form of forestry that is both close to nature and adapted to the reality of climate change.

Forest management in Switzerland is based on the concept of close-to-nature forestry (Allgaier & al. 2017), which represents both a cultural tradition and a legal framework. In the context of forest adaptation, this concept represents an opportunity to exploit the natural adaptive potential of forests, but also a major challenge to support and facilitate adaptation, to manage priorities, and for forest owners and managers to invest the limited resources available in the best possible way.

**Transition, adaptation, implementation**

In the transitional phase Switzerland is currently experiencing, the urgency of the measures to be implemented comes up against the time needed to test the ability of different species, whether native or exotic, to withstand the current and future climate, and thus ensure the sustainability of forest ecosystem services. On the one hand, research must continue to focus on basic research to improve knowledge about climate change and suitability of different tree species. At the same time, there is an urgent need to provide practitioners with decision-making tools that will enable to act today with the least possible risk.

**Integrative research program**

Given that the effects of climate change on Swiss forests are already visible, research programs must deliver results that can be implemented quickly. The idea of a research program that integrates the two levels (basic and applied research) and the two axes (natural and artificial regeneration) emerged for this new program. The challenges are numerous and complex. Research on planted trees may seem simple, but its duration (several decades) is a major obstacle, and climate is only one of many parameters that could influence the results, most of which are difficult to control. Research into natural regeneration has the advantage

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of being on-site, but it requires a dose of pragmatism (impossibility to inventory and monitor every single shrub) and it's even more complex to control all factors influencing success and development of natural regeneration.

The presentation will review the particularities of Swiss forestry context, before focusing on factors that led to the development of this integrative research program, from the point of view of the Federal office for the environment FOEN. It will then review the various projects under the program and the type of results expected.

**Expected results**

This program should make it possible to complete the silvicultural decision-making bases enabling forests to be adapted without interrupting their services. The data collected will provide additional knowledge about tree species, both native and non-native, and their ability to adapt to the climate of the future. In addition, feedback from practical experience will be used to refine the tools used to make recommendations, whether these concern tree species or conversion techniques.

**References cited**

Allgaier Leuch B., Streit K., Brang P. (2017) Close-to-nature forestry under the sign of climate change. Practitioner's guide 59.1. Birmensdorf: Swiss Federal Research Institute WSL. 8 p.

Brang P, Küchli C, Schwitter R, Bugmann H, Ammann P (2016) Silvicultural strategies and climate change. In: Pluess AR, Augustin S, Brang P, editors. Forests and climate change. Elements for adaptation strategies. Bern; Stuttgart, Haupt. p. 341-365
Pluess A.R., Augustin S., Brang P. (eds). (2016). Forests and climate change. Elements for adaptation strategies. Bern; Stuttgart, Haupt . 454 p.

**Mots-Clés:** climate change, forest adaptation, adaptive forestry, integrative research, future tree species