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## **Climate Services for eXtremes: Bi-directional knowledge transfer for developing adaptation strategies in agriculture and forestry on the example of the 2018-2020 summer drought in Germany.**

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The main goal of Climate Services for eXtremes (which is an integral part of the ClimXtreme framework) is to advance our understanding of the intensity as well as the spatio-temporal distribution of extreme weather and climate events, but tailored to the needs of stakeholders in the agricultural and forestry sector. The project is designed to optimise the communication between scientists and decision makers and thus to maximise the mutual benefit with regard to climate adaptation. The scientists involved learn from the interview partners what climate information is actually required on the ground to facilitate the development of adaptation strategies, whereas the sector experts gain insights into the capabilities and limits of state-of-the-art climate information.

In order to increase the efficiency of the knowledge transfer between scientists and stakeholders, we introduce a process-chain based approach: (i) the sector-specific identification of the characteristics of extreme weather conditions in close cooperation with partners from forestry and agriculture, (ii) the analysis of past and future weather and climate extremes with various statistical techniques, (iii) the investigation of the effects of these extremes by means of forest and agricultural case studies, and (iv) the development of possible needs-based adaptation strategies to future climatic conditions and extreme events based on this information.

The extended summer drought in Germany during the warm seasons 2018 to 2020 is the perfect testbed for the approach, given the wide-ranging consequences this multi-year event had especially on the forestry sector. The event will be analysed from a probabilistic point of view, i.e. what is the return time and what were the causal factors from an atmospheric dynamic and teleconnection point of view. There is also potential to investigate the role of climate change in terms of altered risks. With this information, we can offer initial guidance for the project partners as to what they have to prepare for. But crucially, the interview feedback will help guide our ultimate research strategy. It will be a function of spatial scale, indices of interest as well as scope and complexity of the data and services our partners require. The new insights will serve as a basis to investigate such extreme drought events under potential future climate conditions.

