

## Submitted Abstract

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## Abstract

The Pyrenees, as well as other mountainous areas, are the main source of fresh water for the lowland regions but also include high water-consuming areas. The context of global change leads to spatiotemporal changes in water availability posing a challenge in both mountains and adjacent lowlands.

This case study analyzes the future water resources in the Principality of Andorra, where the confluence of climate change and a socioeconomic model based on intensive water use could threaten the future sustainability of the system. The main analysis is carried out using the WEAP (Water Evaluation and Planning System) tool, implementing a model that explores the future evolution of water resources. We propose an integrated approach combining hydrological and water resources management modeling to better understand the future impacts of the combined physical and socioeconomic changes on the water resource. Water availability and demand are analyzed in extreme future scenarios (i.e., combining extreme climate drought periods and high socioeconomic growth) up to 2050 to anticipate future spatiotemporal water tensions between the main activity sectors in the country.

The results identify winter and spring as the most vulnerable seasons where the convergence of low water availability and high demand may lead to problems on the water supply of some key sectors of activity such as ski resorts or the hydropower sector. The simulated scenarios estimate a severe decrease of the rivers' streamflow affecting ecosystem functions. Frequency and duration of drought periods will probably determine the long-term ecological impacts on the Pyrenean rivers and its ecological functions. In this context of global change, there is a need of more research focusing on this topic to anticipate tensions between competing users and design water management strategies to ensure water supply along with preserve rivers ecosystems.