

## **Impacts of climatic change on water in the alpine part of the Rhone River catchment, Switzerland**

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The European Alps are one region of the world where climate-driven changes are already perceptible, as exemplified by the general retreat of mountain glaciers over past decades. Temperatures have risen by up to 2°C since 1900 particularly at high elevations, a rate that is roughly three times the global-average 20th century warming. Regional climate models suggest that by 2100, winters in Switzerland may warm by 3-5°C and summers by 6-7°C according to greenhouse-gas emissions scenarios, while precipitation is projected to increase in winter and sharply decrease in summer. The impacts of these levels of climatic change will affect both the natural environment and a number of economic activities. Alpine glaciers may lose between 50 and 90% of their current volume and the average snowline will rise by 150 m for each degree of warming. As a consequence, hydrological systems such as in the Rhone River catchment in Switzerland will respond in quantity and seasonality to changing precipitation patterns and to the timing of snow-melt in the Alps, with a greater risk of flooding during the spring and droughts in summer and fall. In addition, urbanization, industry, and other patterns of changing land-use (e.g., shifting forest cover and land dedicated to agriculture) are already today affecting surface hydrology and will be an increasingly exacerbating factor in the future. The direct and indirect impacts of a warming climate will affect key economic sectors such as tourism, hydropower, agriculture and the insurance industry that will be confronted to more frequent natural disasters. If water is to become rarer at certain critical times of the year for particular economic end-users, there is likely to be an increase in the potential for rivalry and conflict over water use that can only be alleviated through improved water governance. This presentation will thus provide an overview of the current state of knowledge on climatic change and its impacts on Alpine hydrology and sectors that are large users of water resources, taking the Swiss segment of the Rhone River catchment as a particular case-study region. In particular, emerging results from the major EU Framework Program 7 project "ACQWA" ([www.acqwa.ch](http://www.acqwa.ch)) initiated and coordinated by the author will be presented.