



## **Impact of climate change scenarios on water resources management in the Italian Alps**

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Starting from simulations of three Global Circulation Models (NCAR-PCM, HADLEY, MPI-ECHAM), IPCC-based scenarios for the 2000-2099 period were selected. Because of the coarse resolution of the climate models' output, the statistics of the simulated rainy days and daily precipitation were adapted to the scale of two Alpine basins using the multiplicative cascade  $\beta$ -model, proposed to explain the statistics of fully developed turbulence. Two basins 1840 and 236 km<sup>2</sup> in size, respectively, and with different glacierised areas and storage capacity of reservoirs were selected. In the scenarios glacierised areas are decreased according to the Kuhn's concept of equilibrium-line adaptation to climate fluctuations, and the treeline altitude is increased, as observed since the end of the Little Ice Age. These results were used to force the WATFLOOD hydrological model in order to assess the expected changes of runoff regimes in the two watersheds. The PCM model, the one capable to better reproduce the observed rainfall regime in the investigated area, with the IPCC-A2 scenario was adopted for the meteorological forcing. Using detailed knowledge of characteristics of the hydropower plants in the two basins, the influence of climate change on hydropower production and water resources availability for irrigation and streamwater was assessed. A decrease of about 3% of runoff volume available for the 2050 scenario and of 12% for the 2090 scenario was estimated, on average, at the outlet of the two basins. Also the runoff regime changes are not negligible.