

Climate change and water resources: scenarios of low-flow conditions in the Upper Danube River Basin

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Abstract Within the project GLOWA-Danube (www.glowa-danube.de) an analysis was made of the impact of a possible climate change on the low-flow conditions in the mountainous Upper Danube basin ($A = 77\,000\text{ km}^2$). The physical and spatially distributed hydrological model PROMET is used for this purpose, together with a stochastic climate change scenario generator. To ensure its predictive capabilities, PROMET strictly preserves energy and matter and is not calibrated. PROMET reproduces the daily discharge for the time period 1970–2005 with a Nash-Sutcliffe coefficient of 0.84 at the flow gauge at Achleiten. Twelve statistically equivalent realisations of the IPCC-A1B climate scenario were used to investigate changes in low-flow during the period 2011–2060. The analysis of the simulated scenarios shows increasing droughts, a remarkable change in the low-flow regime of the Danube as well as severe changes in low-flow and its frequency of occurrence. Possible water management adaptation strategies are discussed.

Key words climate change; mountain hydrology; PROMET; low-flow