

# **Projection of Low Flow Conditions in Germany under Climate Change by Combining Three RCMs and a Regional Hydrological Model**

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## **Abstract**

The present study is aimed to: (a) project future low flow conditions in the five largest river basins in Germany, and (b) to account for the projections uncertainties. The eco-hydrological model SWIM was driven by different regional climate models (REMO, CCLM, and Wetreg) to simulate daily river discharges in each study basin. The 50-year low flow was estimated for the period 1961 to 2000, and its return period was assessed for two scenario periods, 2021-2060 and 2061-2100, using the generalized extreme value distribution. The 50-year low flow is likely to occur more frequently in western, southern, and parts of central Germany after 2061, as suggested by more than or equal to 80% of the model runs. The current low flow period (from August to September) may be extended until late autumn at the end of this century. The return period of 50-year deficit volume shows a similar temporal and spatial pattern of change as for the low flow, indicating slightly less severe conditions with lower confidence. When compared with flood projections for the same area using the same models, the severer low flows projected in this study appear more pronounced, consistent, and have lower uncertainty.

**Keywords:** low flow, RCMs, SWIM, Germany, climate scenarios, uncertainty.