



Projecting hydropower production under future climates: a review of modelling challenges and open questions

Bettina Schaefli (1,2)

(1) Ecole Polytechnique Fédérale de Lausanne (EPFL), School of Architecture, Civil and Environmental Engineering (ENAC), Laboratory of Ecohydrology (ECHO), Lausanne, Switzerland (bettina.schaefli@epfl.ch), (2) Ecole Polytechnique Fédérale de Lausanne (EPFL), School of Architecture, Civil and Environmental Engineering (ENAC), Hydraulic Constructions Laboratory (LCH), Lausanne, Switzerland

Hydropower is a pillar for renewable electricity production in almost all world regions. The planning horizon of major hydropower infrastructure projects stretches over several decades and consideration of evolving climatic conditions plays an ever increasing role. This review of model-based climate change impact assessments provides a synthesis of the wealth of underlying modelling assumptions, highlights the importance of local factors and attempts to identify the most urgent open questions. Based on existing case studies, it critically discusses whether current hydro-climatic modelling frameworks are likely to provide narrow enough water scenario ranges to be included into economic analyses for end-to-end climate change impact assessments including electricity market models. This will be completed with an overview of not or indirectly climate-related boundary conditions, such as economic growth, legal constraints, national subsidy frameworks or growing competition for water, which might locally largely outweigh any climate change impacts.