Science for Solutions decade: HELPING
Hydrology Engaging Local People IN one Global world
IAHS Scientific Decade 2023-2032

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Details of the Working Group – Hydrologic Design: Solutions and Communication

Describe the work and how your suggested working group will contribute to the goal(s):
Hydrologic design is one of the key tasks of hydrologists and most important for most stakeholders, authorities, and practitioners. Usually, the estimation of design characteristics like the design flood is based on statistical methods. This comes with a few drawbacks: limited data availability and thus high uncertainty and variability of the estimation, the lack of physical process-knowledge and the difficulty in communicating the methods and results in a way understandable and applicable by practitioners and community. This working group will develop novel methods to improve the estimation of uncertainty and variability in hydrological design and to be able to extrapolate the results to data-scarce regions, ungauged catchments or beyond the observation range. The usage of available information from local sources will be improved, such that different sources of information are combined. This will allow for a simplified communication of hydrological design and the corresponding uncertainty to stakeholders, local people, and authorities, increase the dissemination of the methodology and hence strengthen the connection between science and practice.

Describe the methods you will use to achieve the goal(s): A main goal of this working group is the coupling of statistical models with physically based conceptual models. This allows for a combination of deterministic and stochastic hydrology and to obtain as much information as possible. Current examples are stochastic watershed models, physics-informed machine learning models or type-based statistics. Moreover, we will combine different sources of information, including observations, simulations, and local knowledge, e.g., on historical floods. The gained knowledge will be used to evaluate the impacts of changes in the hydrology of a catchment, e.g., by renaturalization, and to improve the ensemble forecasting of extreme flood events.

Describe the (a) short-term, (b) the long-term and (c) the ultimate results you hope to achieve:
(a) combination of different sources of information as basis for statistical modelling, (b) utilization of this information in hydrologic design by combining deterministic and statistical modelling and improved estimation of uncertainty and variability, (c) initialisation of a continuous exchange between scientists and local practitioners to keep hydrologic design updated; providing user-friendly frameworks, tools, digital platforms for assuring an effective knowledge transfer.

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