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 – Water systems analysis for integrated planning and management

Describe the work and how your suggested working group will contribute to the goal(s): While our understanding of complexity of water systems has improved significantly due to enhancements in modelling and monitoring, we are still struggling to protect the water environment, mitigate and adapt to climate change and make development decisions that support long-term sustainability. The working group will analyse water systems and their interactions with human behaviour, decisions, infrastructure and land planning across a range of scales to understand socio-hydrological feedbacks (or phenomena) evidenced to create conditions for overexploitation of water resources, increased vulnerability to extreme events and ever-increasing environmental pollution.

Describe the methods you will use to achieve the goal(s): The working group will explore all forms of integrated modelling, from tools created within a single modelling platform, to those that have been designed through models' integration. We particularly want to explore water management and planning modelling approaches that link built and natural environments, infrastructure and human decisions and can assess the climate and development scenarios using flow and water quality indicators, as well as hybrid approaches to integrated modelling, combining physically based tools with machine learning and system dynamics approaches. We will also look into aspects of water management from the perspective of extremes (floods and droughts) and how we can utilise integrated models to move towards synergistic management of floods and droughts through adaptive planning.

Describe the (a) short-term, (b) the long-term and (c) the ultimate results you hope to achieve: (a) Create an integrated water systems modelling community and map current approaches to, and case studies of systems analysis for water planning and management. (b) Design a study that compares approaches in the context-specific applications for water planning and management and develop a framework that guides users through the selection of an integrated modelling approach applicable for their case study given the current baseline, planning purpose and data availability. This will also enable us to map gaps in knowledge and the need for future development of water systems analysis. (c) Establish water systems analysis as a core part of a hydrological science and position integrated modelling as a prerequisite for any water management and planning decisions that can create feedbacks between the land, water, and climate systems.

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