

EGU24-6421, updated on 14 Aug 2024

<https://doi.org/10.5194/egusphere-egu24-6421>

EGU General Assembly 2024

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Novel Use of Integrated Water System Model for Decision-Making Processes at Different Scales

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The increasing population and new urban developments have posed challenges to urban water management, such as domestic water scarcity and deteriorated water quality. Meanwhile, the existing development planning frameworks fail to facilitate an effective approach to enhance an efficient and sustainable urban water design. They tend to isolate groups and evidence by relying on different independent models. The state-of-the-art Water Systems Integrated Modelling framework (WSIMOD), which simulates the terrestrial water cycle integrally including physical and human processes, has been developed to provide holistic and integrated evidence to help with decision-making processes. The WSIMOD model has been previously implemented at the river sub-catchment resolution, while a complete decision-making process usually involves different groups, such as city authorities, water companies and environmental regulators, with multiple objectives at multiple spatial resolutions. In the current work, we propose the novel use of the model for multi-resolution simulations (local, borough and river sub-catchment), and aim to help multi-stakeholders and decision-makers understand potential challenges to achieving multi-objectives in a coordinated way. We will also explore the effectiveness of measures to offset urban water issues induced by new developments in the current and future scenarios. Our work can provide insight into efficient and sustainable urban water management strategies for multi-stakeholder planning and future adaptation under uncertainty.