EGU22-10506
https://doi.org/10.5194/egusphere-egu22-10506
EGU General Assembly 2022


# Local solutions for global water security

**Wouter Buytaert**
Imperial College London, Civil and Environmental Engineering, London, United Kingdom of Great Britain – England, Scotland, Wales (w.buytaert@imperial.ac.uk)

Globally, the terrestrial water cycle is changing rapidly, because of human interventions in catchment hydrological processes, and changing meteorological boundary conditions. Many of these changes have a negative impact on the water security of people living within and nearby those catchments. Plenty of scientific evidence points to increasing intensities and frequencies of floods and droughts and degrading water resources in many parts of the world. While increasing water security is globally high on the policy agenda, there are clearly no easy solutions to this problem. Catchments are complex, idiosyncratic systems from which society draws many different resources and services, and many of these activities affect the local hydrological processes and the human benefits and risks that emanate from those.

Achieving global water security is therefore only possible with solutions that are tailored to these specific local characteristics and realities. Analysing cases from the Andes, the Himalayas, and Africa, in this lecture I set out to identify crucial ingredients for successful catchment interventions, as well as some of the main scientific challenges that remain. I start from the conceptualization of a catchment as a complex adaptive system, governed by a unique combination of natural, social, and cultural processes.

A first step then involves characterizing and quantifying these processes, which requires data collection and measuring. Although high-quality data are severely lacking in most of the world, many new opportunities are emerging. These range from remote sensing and pervasive in-situ sensor networks to novel data collection arrangements such as participatory monitoring and citizen science. In a next step, potential catchment interventions must be identified and evaluated. Also here, the toolbox of the catchment managers is growing continuously, with new concepts such as green infrastructure and nature-based solutions gaining traction. However, evaluating different potential interventions requires careful scenario analysis. Computational models, as well as uncertainty and risk assessment, are crucial tools to do so, but it also involves a thorough analysis of the (potentially complex and interacting) benefits and disbenefits that each intervention exerts on various population groups. Lastly, long term monitoring and evaluation of catchment interventions remains a formidable challenge, even though it is a crucial element to ensure that interventions effectively generate the anticipated benefits, to mitigate unexpected side-

effects, and to adjust and adapt to constantly changing boundary conditions and catchment dynamics.