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Citizen science in hydrology: a sustainable development perspective

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Beyond the most basic measurements of manual rain and staff gauging, hydrology is not an evident discipline for the application of citizen science. High-resolution measurements require elaborate equipment, installation, and maintenance that is typically beyond the scope of non-scientists. Additionally, hydrological analysis has traditionally relied upon long time series of consistent accuracy and precision. Nevertheless, new opportunities for public participation in hydrological research are emerging, driven by increasingly affordable, robust, and more user-friendly technology, and ICT applications in particular.

Using recent field-based experiences gained in locations as diverse as Peru, Nepal, Kyrgyzstan and Ethiopia, in this paper we build a framework for leveraging the opportunities provided by citizen science in order to create actionable knowledge on the water cycle and to support sustainable development.

We build our framework on empirical evidence and observations that community-based monitoring of water resources and water-related risks, can have a transformative impact on local water management, making it more inclusive, polycentric, and evidence-based. However, the results and effectiveness depends strongly on the natural and socio-economic boundary conditions and require specific conditions to be fulfilled. A major requirement for success is the use of a highly tailored and bottom-up approach to implementation, which is ideally rooted in a locally-based actor that acts as "catalyst" between the scientific community and local realities.

We illustrate this framework with specific ICT-based tools and methods for data collection, processing and communication that were developed as part of a 4-year research project (Mountain-EVO).