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Editorial

The impacts of climatic change on water resources: Foreword to the Special Issue



Observational data are essential for analyzing past and current environmental trends and for providing appropriate initial, boundary and validation conditions for numerical models used in the environmental sciences (climate, hydrology, cryosphere, biosphere, etc.), but very often access to such data needs to overcome a number of, from the sparseness of data to institutional barriers (confidentiality, cost, etc.). Such barriers impede in many instances the successful outcomes of research programs addressing themes such as climate change, water, or biodiversity protection.

In January 2011, a workshop was organized in Riederalp, Switzerland, sponsored by the “ACQWA” project (www.acqwa.ch), a large integrating project under the 7th R&D framework programme of the EU (FP7). Over 25 EU projects focusing on water resources and water management were represented. Institutional and financial obstacles to data access for use in modeling exercises were identified, and gaps in scientific knowledge that contribute to uncertainty were highlighted. The workshop served to identify a number of sectors where gaps in data represent barriers to successful research outcomes, and have suggested ways and means of alleviating some of these difficulties.

The present Special Issue of the *Journal of Hydrology* aims at bringing together some of these issues, by providing a research framework on various aspects of hydrology as impacted upon by climatic change. More specifically, the Special Issue adheres to the goals of the workshop and synthesizes the state-of-the-art in a broad spectrum of hydrologically-relevant fields based on recent outcomes of European FP6/7 and other international projects. The different papers identify and describe research gaps or missing information that may have been an obstacle to progress in the field in the past by including the upstream as well as the downstream issues of water quantity, quality, use and governance. The key topics included within this volume are addressed in an over-arching manner and the contributions point to ways and means of alleviating problems related to science and data gaps.

The wide range of themes discussed in the present volume of *Journal of Hydrology* clearly illustrate the critical issues and requirements associated with data that affect a broad spectrum of sub-disciplines in the hydrological sciences, as evidenced by the titles of the nine contributions to this Special Issue:

- European water policy and research on water-related topics: an overview.
- The future for global water assessment.
- Hydrogeomorphic response to extreme rainfall in headwater systems: flash floods and debris flows.
- Extreme hydrometeorological events and climate change predictions in Europe.
- Data and knowledge gaps in glacier, snow and related runoff research – a climate change adaptation perspective.
- Climate change adaptation and integrated water resource management in the water sector.
- The challenge of climate change in Spain: water resources, agriculture and land.
- Climate change impacts on groundwater and dependent ecosystems.
- Reviewing innovative earth observation solutions for filling science-policy gaps in hydrology.

All contributions highlight the need for a comprehensive approach to water use and management as well as to consider the manner in which current water policies, at the local, national, EU or other international levels or may be consistent with, other policies (e.g., energy, industry, agriculture) at various levels of governance.

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