

Summary Report

Climate Impacts on Global Mountain Water Security Session

Water Future Conference – Towards a Sustainable Water Future

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Conveners

John Pomeroy, Director, Global Water Futures, University of Saskatchewan, Saskatoon, Canada,
john.pomeroy@usask.ca

Chris DeBeer, Science Manager, Global Water Futures, University of Saskatchewan, Saskatoon, Canada,
chris.debeer@usask.ca

Session Summary

Mountain regions provide water resources that supply over half of the world's population. The issues of climate and cryospheric change, and the associated impacts to hydrological functioning and water resources within and downstream of mountain regions globally are therefore critically important. This session focused on a grand challenge for the global community: how to develop a global scientific approach to better understand, predict and manage alpine water resources in the face of dramatically increasing risks? Three core questions that are central to meeting this Grand Challenge are: (1) What control does climate change have on the security of mountain water? (2) What improvements to the global predictability of mountain water resources are possible through improved models? (3) How do changes in snow, glaciers, frozen ground and vegetation impact mountain water resource predictions? Speakers and panellists in this session addressed these issues and questions, and presented examples of research and predictive modelling applications from various mountain regions globally, focussing on impacts on the cryosphere and on hydrological systems.

First, Dr. John Pomeroy opened with a description of threats to mountain water, urgency of mountain water research needs, the potential to improve mountain water prediction, and a global plan to address mountain water futures around the world. Dr. Chris DeBeer followed with a presentation on the observed impacts of rapid climate change in the mountain snow, glaciers, streamflow, vegetation and the science needs to better understand, mitigate and adapt to these impacts. Next, Dhiraj Pradhananga gave an overview of the needs from science for water management both now and in the future in the Nepal Himalaya, and how cold regions hydrological modelling can be applied in the Langtang River Basin to address some of those needs. Dr. Ignacio Lopez Moreno described modelling the decoupling of mountain snow regimes from mountain hydrology around the world under future global warming using cold region hydrological modelling driven by atmospheric reanalysis products, and sensitivity of these nival-hydrological regimes to future change in various mountains of the world. Dr. Corinne Schuster-Wallace spoke about vulnerability of community health, impacts on women and water equity to changing mountain water supply and regime, and impact on community sustainability and equity. Finally, Robert Sandford discussed national and global policy and political implications of the destabilisation of mountain water supplies and what we need to build resilience in downstream communities.

A panel discussion followed the presentations. This included quick questions from the audience (5 min) and roundtable (2 min each) on how our findings relate to our key question: *How to develop a global scientific approach to better understand, predict and manage mountain water resources in the face of dramatically increasing risks?* In general, some of the key needs centered on (1) open sharing and accessibility of observations and data, (2) improvements and physically-based Earth system modelling and

climate model downscaling, and (3) better opportunities for education, training, knowledge mobilization, and the informing of policy by science. Policy and practice require input from local communities and those directly affected by climate and Earth system changes, and must incorporate local tradition, knowledge, and beliefs to succeed.