



Social dimensions of vulnerability to glacier-hydrology hazards in Peru and Nepal

Graham McDowell (1), Mark Carey (2), Christian Huggel (3), and Jeffrey S. Kargel (4)

(1) McGill University, Canada, (2) University of Oregon, USA, (3) University of Zurich, Switzerland, (4) University of Arizona, USA

Snow and ice hazards affect populations worldwide, and prevention and adaptation plans must devote more attention to the human dimensions of these hazards. Historically, most research on glacier hazards has emphasized glacial lake outburst floods (GLOFs) and rock-ice landslides. This work often focuses on technical approaches or scientific knowledge about these high-magnitude and low-frequency hazards. This study examines a different type of cryospheric hazard, one that is low-magnitude and high-frequency, especially under future climate change projections: the increasingly recognized hydrologic hazards related to runoff variability in downstream communities below shrinking glaciers. By focusing on actual water users in glacier-fed watersheds, the research helps illuminate key vulnerabilities to hydrological change. It demonstrates that people are indeed vulnerable to decreased runoff, but that these vulnerabilities must be analyzed in the context of global change, including socio-economic and political variables, and not just through technical or scientific approaches. The study examines water use for export-oriented agriculture in Peru's billion-dollar Chavimochic Project, which depends on a single canal from the Santa River that could be damaged by a GLOF or avalanche. Or the canal could experience declining water supplies in the future if water use increases, particularly due to international agricultural demands, while water supplies from glacial ice decreases. The study also provides insights from Khumbu, Nepal, where changing hydrological conditions are leading to reduced water access for household uses, declining crop yields, reduced water access for meeting the high water demands of tourists, and reduced hydro-electricity generation capabilities. Although these effects are widespread, there are clear patterns of socially determined vulnerability among the population, with low livelihood diversity an important indicator of increased susceptibility to harm. While focusing on hydrologic variability and vulnerability, this poster's societal orientation has far-reaching implications for the analysis of all cryospheric hazards where vulnerability and resilience are affected by a range of human and environmental forces.