

EGU23-10137, updated on 14 Apr 2024  
<https://doi.org/10.5194/egusphere-egu23-10137>  
EGU General Assembly 2023  
© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



## Toward a glacier retreat driven redistribution of water resources

Michel Baraer<sup>1</sup>, Bryan Mark<sup>2</sup>, and Jeff McKenzie<sup>3</sup>

<sup>1</sup>ÉTS, University of Quebec, HC3, Montreal, Canada (michel.baraer@etsmtl.ca)

<sup>2</sup>Ohio State University, Columbus, USA

<sup>3</sup>McGill University, Montreal, Canada

Assessments of glacier retreat impacts on water resources are often carried out using hydrological models calibrated using stream discharge time series. Because long-term discharge measurements are scarce in different regions of the world, models' outcomes are analyzed assuming implicitly that stream discharge evolution projections at the outlet of a watershed affect the entire drainage area following a uniform pattern. In the present study, building on the learnings from the peak water analysis we performed in 2012, we explore the heterogeneity in Rio Santa sub-watersheds responses to deglaciation. The future of water resources at each watershed is projected by applying the peak water model with the latest glacier area estimations. The resulting map of the projected water availability across the Rio Santa watershed is then overlaid with previous works and literature-based water quality and demand maps.

Results show that, while glaciers are losing their hydrological influence across the Cordillera Blanca, gaps open between water availability and demand for water at different levels of the watershed. Moreover, the dry season share of polluted sub-watersheds into the Rio Santa discharge increasing due to glacier retreat, water quality evolution will add up to the challenge of sharing an already scarce resource.

Our study suggests that deglaciation in the tropical Andes affects populations and economic activities in a complex, disparate and evolutive way. Therefore, anticipating glaciers retreat redistribution of the water resources requires integrating hydrological, chemical, biological, economic, and sociological water resources aspects in locally grounded studies.