EGU2020-5306, updated on 26 Oct 2020
https://doi.org/10.5194/egusphere-egu2020-5306
EGU General Assembly 2020

Present and future water security under socioeconomic and climate changes in the Vilcanota-Urubamba basin

Andres Goyburo[1], Pedro Rau[2], Waldo Lavado[3], Fabian Drenkhan[4], and Wouter Buytaert[5]
[1]Centro de Investigación y Tecnología del Agua, Universidad de Ingeniería y Tecnología UTEC, Lima, Perú (anesgoyburo@gmail.com)
[2]Centro de Investigación y Tecnología del Agua, Universidad de Ingeniería y Tecnología UTEC, Lima, Perú (prau@utec.edu.pe)
[3]Servicio Nacional de Meteorología e Hidrología,Lima , Perú (wlavado@senamhi.gob.pe)
[4]Department of Civil and Environmental Engineering, Imperial College London, London, United Kingdom (f.drenkhan@imperial.ac.uk)
[5]Department of Civil and Environmental Engineering, Imperial College London, London, United Kingdom (w.buytaert@imperial.ac.uk)

This research assesses present (2009-2016) and future (until 2100) levels of water security taking into consideration socioeconomic and climate change scenarios using the WEAP (Water Evaluation and Planning) tool for semidistributed hydrological modeling. The study area covers the Vilcanota-Urubamba basin in the southern Peruvian Andes and presents a complex water demand context as a glacier-fed system.

Current total water demand is estimated in 5.12E+9 m3/year and includes agriculture (6674.17 m3/year), domestic (7.79E+07m3/year), industrial (1.01E+06 m3/year) and energy (5.03e+9 m3/year) consumption. For assessing the current water supply, observed flow data is used to simulate and validate the model (also accounting for glacier melt contribution). The analysis of unmet water demand for the period 2016–2100 was computed using the soil moisture scheme of the WEAP model, which simulates the hydrological cycle and generates future scenarios for water demand. Different scenarios were generated for external driving factors (population growth and increasing agriculture area) and the impact of climate change to evaluate their effect on the current water supply system.

These results will allow for the first time to evaluate the impact of changes in glacier melt contributions on water security taking into account also changes in water demand.

This study also further explores the importance of incorporating science and policy within a broader study of water security. As a result, it is expected to deliver high spatial resolution water demand maps and adaptation strategies for stakeholders. This research is part of the RAHU project as a new multidisciplinary collaboration between UK and Peruvian scientists.