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

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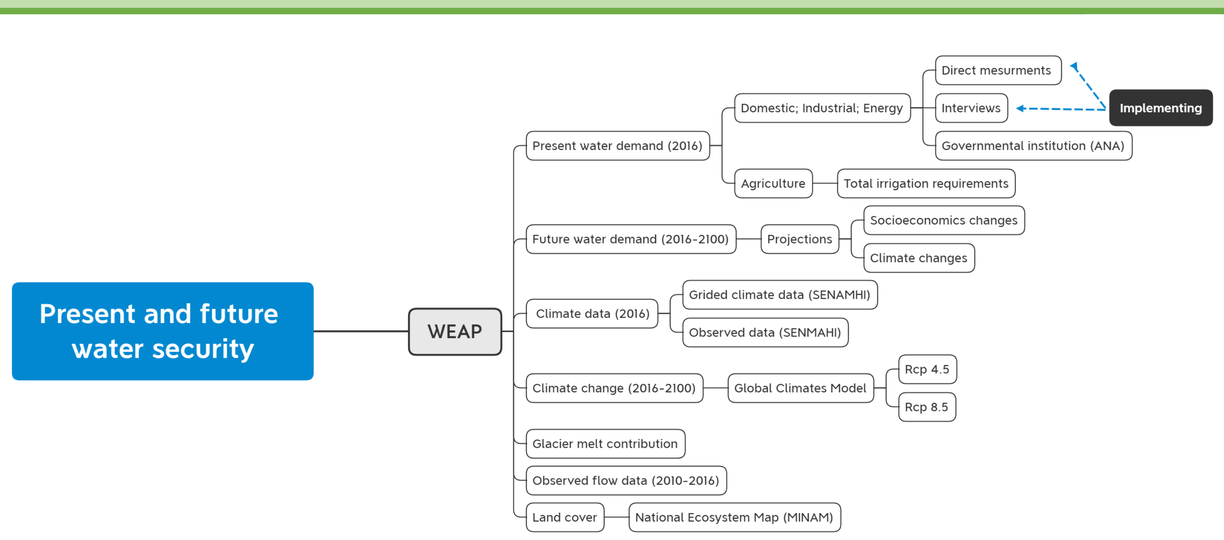
Introduction

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.

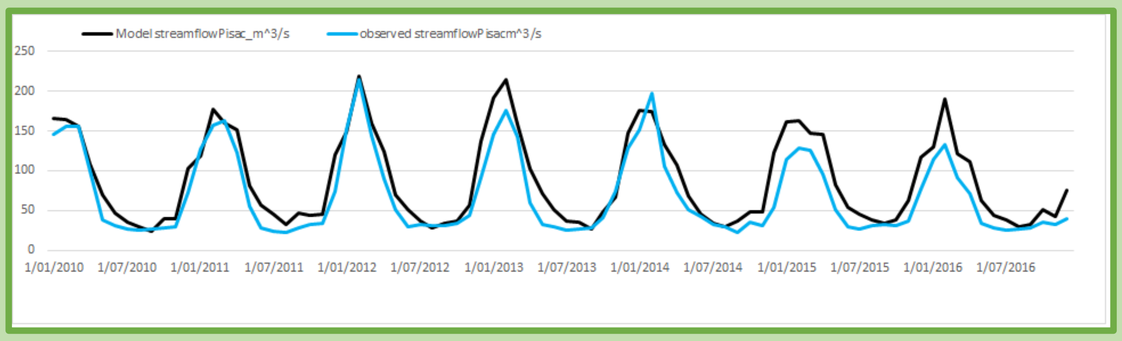
Methodology



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.

Preliminary results

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.



Model strem flow (black) vs observed stream Flow (blue)

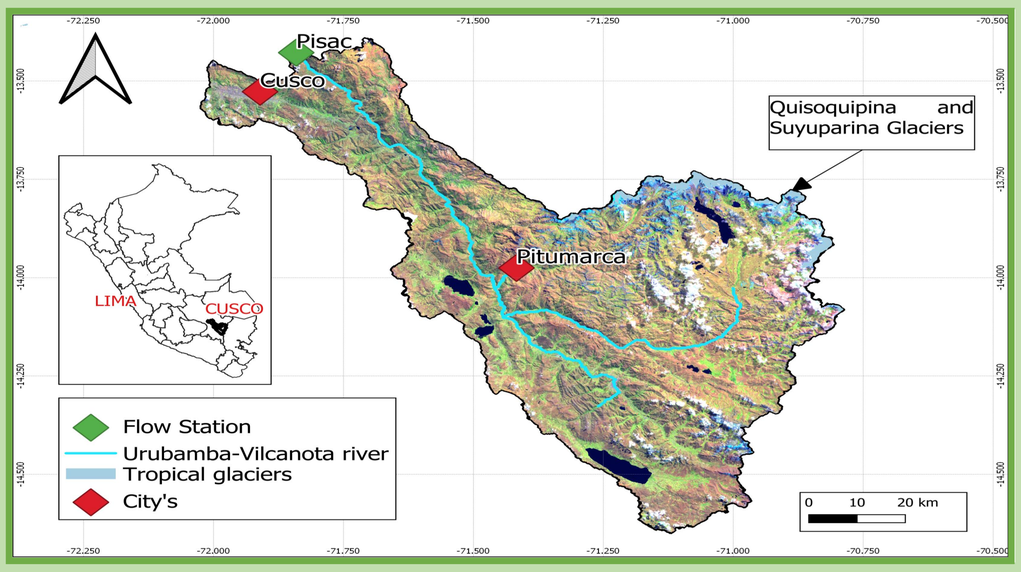
Expected results

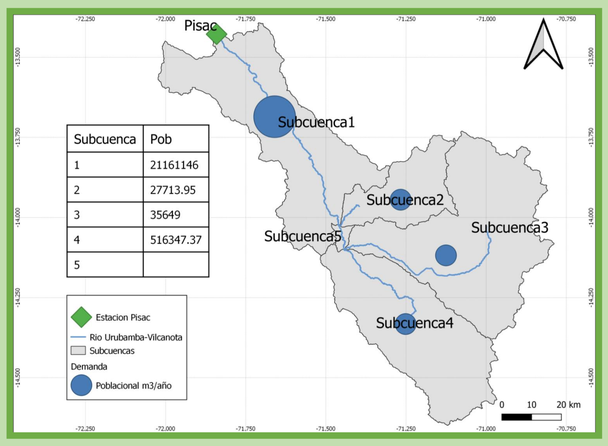
The expected results will allow for the first time to evaluate the impact of changes in glacier melt contributions on water security taking into account also changes in water demand. Furthermore, we will be able to make distention between basins whit glacier and snow melt contributions and without it in terms of 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.

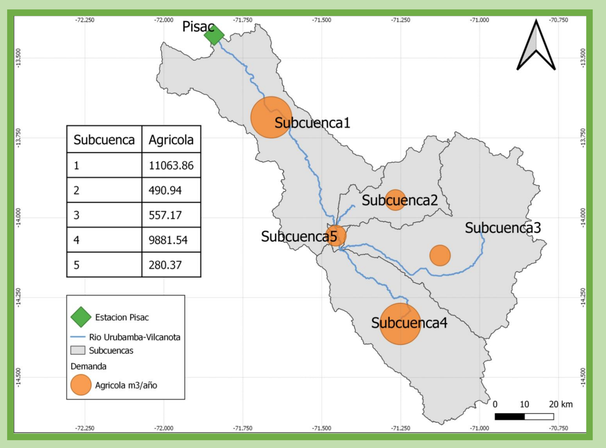
Study area

The Vilcanota urubamba basin is located in southern Peru in the Cusco region. A region with many glaciers and multiple uses of water

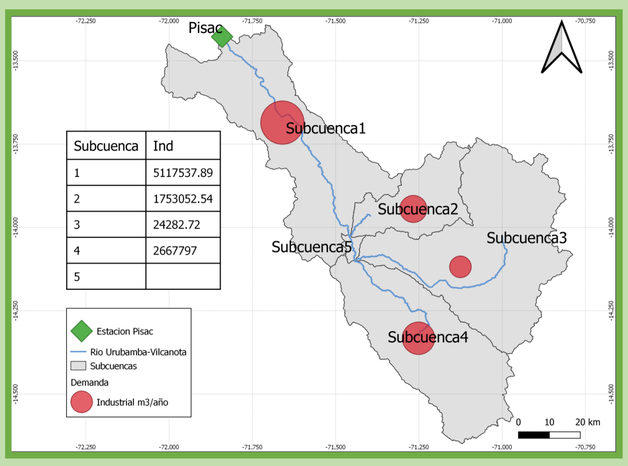




Domestic water demand in VUB basin



Agriculture water demand in VUB basin



Industrial water demand in VUB basin

Semidistributed hydrological model of VUB basin

Performed activities

1° Field trip, visiting Quisoquipina glacier

Flow measurement using ADCP Rio Grande in Pisac station

First workshop on Water Use awareness in Pinaya, Sibinacocha