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Assessment of land use, climate variability and climate change in water resources from Andean basins: the example of Quito

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The strong socio-economic growth of Quito has led to significant projects of inter-basin transfers, intensifying high-altitude resources mobilization in environmentally sensitive areas and with accelerated melting of glaciers. In order to study various future scenarios, we propose modelling of the climate / glacier / hydrology / water resources management continuum, applied to Andean basins. Using the tool Water Evaluation and Planning (WEAP21), we developed: (1) semi-distributed hydro-climate modelling with monthly data using regional homogenization (vector method); (2) glacier modelling of water production and inter-annual evolution; (3) modelling in hydrological units depending on land cover; and (4) water management modelling distinguishing water rights, allocation and use. We present results of monthly hydrological calibrations (1963-2006), studying, in particular, the equifinality of various parameter settings. We show flexibility, robustness and limits of the proposed modelling, contributing to identification of uncertainties for evaluation of future scenarios. Finally, the model is used to analyze the influence of land use changes, climate variability and climate change over water availability for the city of Quito.