HYDROLOGICAL MODELLING UNDER CLIMATE CHANGE SCENARIOS FOR A WATER RESERVOIR IN LA PAZ, BOLIVIA

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ABSTRACT

The Milluni Grande reservoir depends mainly on precipitation, being vulnerable to drought periods, which may affect the water security among La Paz and El Alto cities. Therefore, the present study sought to determine the variation of water available in the reservoir under the set of climate change scenarios stablished on the fifth report of the Intergovernmental Panel on Climate Change (IPCC) for the period 2022-2090. The study area was limited to the Milluni microbasin, taking the Milluni Grande reservoir as the outlet point. The hidrological modelling was performed through the Water Evaluation and Planning System (WEAP) using the temperature and precipitation daily data ensemble generated with the Gridded Meteorological Ensemble Tool (GMET). Climate change scenarios were incorporated using the Model 1 of Norway Land System NorESM1-M, reducing its scale through the nearest neighbor non-parametric method (knn-bootstrap). The following tendencies were obtained for the study period and area: overall temperature rise, precipitation rise during the dry seasons and precipitation reduction during the wet seasons, which might cause drought situations. On the other hand, the Milluni Grande inlet flow tends to vary proportionally to the precipitation, while its volume tends to decrease. In addition, a deficit in the coverage of the requirements of demand sites might exist, reaching minimum values of 45% for the Achachicala distribution system and 27% for the Meseta system. All results are accentuated in the pessimistic scenario RCP 8.5.

Keywords: Climate Change, Hydrologic Modeling, Water Security, WEAP Tool.

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