HYDROGEOLOGICAL MODELING IN THE CENTRAL VALLEY OF COCHABAMBA-BOLIVIA

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ABSTRACT

In the metropolitan region of Cochabamba, an accelerated growth of the urban footprint has been observed, towards the aquifer recharge areas leading to an increase in the groundwater stress, with groundwater consumption being approximately 65% of total water consumption. Then, there is a need for a hydrogeological study in a sector of alluvial fans with extensive and productive aquifers, in the Central Valley of Cochabamba. In this sense a monitoring network was established to measure phreatic levels in drinking water supply and irrigation wells in the Municipalities of Tiquipaya and Colcapirhua, where 26 measurements were made in a period of 6 months between April and September 2021. A simplified hydrogeological model was set up in steady-state condition, to understand the behavior of the aquifers in the area, using Visual MODFLOW Flex, considering four layers: two of sand, gravel or blocks and two of silt and clays, each with their respective conductivities. Subsequently, Calibration of parameters was performed resulting in a Correlation of 0.94, an RMS (Root Mean Square) of 17 m and a Normalized RMS of 16%. In the Validation, a Correlation of 0.63 and a Normalized RMS of 78% were obtained. The trend of the main groundwater flow direction is from north to south. Significant decreases in water levels were observed during the monitoring period, particularly in wells OG-5 and OG-7. In wells OG-18 and OG-10, located in the northwest with deep levels and in the central area with shallow ones, respectively, the water table has risen by 3 to 5 meters since 2019, evidencing a recharge corresponding to alluvial fans, mainly from the Chijlawiri river. Therefore, it is crucial to carry out periodic monitoring of phreatic levels, as well as to characterize the quality of groundwater in the area.

Keywords: Groundwater, Cochabamba, Central Valley, Hydrogeological Model.