GROUNDWATER MODELING IN THE COCHABAMBA VALLEY USING MODFLOW

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ABSTRACT

In the Cochabamba metropolitan area, 65% of water for human consumption comes from groundwater extracted from the west side of the Central Valley. There has been an intense exploitation in the area with growth of operating wells. The objective of this study is to update and extend well monitoring, and improve understanding of groundwater flow through a hydrogeological model. The study area is an attractive region for groundwater exploitation due to the presence of an alluvial fan to the north that encourages the recharge of the aquifer. The MODFLOW computer package has been used for the modeling, using hydrogeology data of precipitation, temperature, evapotranspiration, stratigraphic profiles, and piezometric levels. As for latter, measurement campaigns were carried out at identified wells within the study area. The study area is made up of unconfined aquifers with high piezometric levels. The results of the calculated heads against the observed ones in the calibration process, gave a correlation coefficient of 0.76 and a root mean square (RMS) of 6.2 m. The model was simulated at steady state, showing a balance without evidence of exploitation, with an input of 77 m^3 to the system. The main flow direction is from north to south with evident changes in direction due to the presence of rivers. The average level of the water table is 4.9 m below the surface in the southern zone and 130 m below the surface in the northern zone. The water balance generated by the model presents an input to the system of river infiltration and recharge. The output of the system is mainly due to evapotranspiration.

Key words: Groundwater, Hydrogeological model, Groundwater flow, Cochabamba, MODFLOW.

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