

## Estimation of recharge in karst aquifers in the region of Lagoa Santa (MG) for the period 1972-2019 based on pluviometric data from the Raul Soares station

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The studied area is located 35 km north of Belo Horizonte and covers about 505 km<sup>2</sup>, covering the region of APA (Environmental Protection Area) of Lagoa Santa Karst and surroundings. On site, there are mainly pelito-carbonate rocks of the Sete Lagoas and Serra de Santa Helena formations, belonging to the Bambuí Group. Free karstic aquifers, locally confined, predominate in the region. The pluviometric recharge is influenced by pluviometry, geology, geomorphology, pedology and vegetation. Previous studies indicate recharge equivalent to 12% of the total annual precipitation in the hydrological year 2016/2017 for the area considered. In the present work, the aquifer recharges from the karst system were calculated for the hydrological years between October 1972 and September 2019 considering recharge equal to 12% of annual precipitation for all years. For this, pluviometric data from the Raul Soares station were used, which has the greatest influence in the region (about 50% using the Thiessen Method). The failures in filling of these pluviometric data were completed using the Regional Weighting Method, which uses pluviometric values from neighboring stations to estimate the precipitation in the station in question. The pluviometric data for the Raul Soares station and neighboring stations were made available by ANA-Hidroweb (Raul Soares, Pedro Leopoldo and Vespasiano stations) and INMET (Sete Lagoas station). The consistency of the pluviometric data from the Raul Soares station was analyzed using the double mass method, obtaining a complete historical series of 47 years with 86% consistency considering 90% of the data. Then, the recharge was calculated (12% of the annual precipitation at Raul Soares station) for each hydrological year considered. Extreme values (5%) were disregarded. The average recharge obtained for the analyzed period was equivalent to 142.3 mm. In the 70s, 80s, 90s and 2000s, the average recharge remained practically constant, being 146.0 mm, 146.6 mm, 147.4 mm and 145.2 mm, respectively. However, in the hydrological years of the last decade, there was a decrease in the calculated aquifer recharges, with an average value equal to 126.1 mm. The recharges calculated for the hydrological years of the last decade show the smallest variation (51.8 mm), with a minimum recharge of 97 mm and a maximum equivalent to 148.8 mm. From the results obtained, it is concluded that the recharge values obtained in the analyzed period, 12% of the pluviometry, indicate excellent conditions of infiltration in the region. The methods used to determine the aquifer recharge using pluviometric data from the Raul Soares station resulted in quantitative data consistent with the local karst hydrogeological system. Also, the recharge values obtained showed a change in the behavior of this hydrogeological system in the last 10 years.

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