

## **Analysis of the variation of flow cycles of Das Velhas River in the karst region of Lagoa Santa - MG**

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**ABSTRACT:** The area to be studied, located about 35 km north of Belo Horizonte, has approximately 505 km<sup>2</sup>, comprising the municipalities of Lagoa Santa, Pedro Leopoldo, Matozinhos, Vespasiano, Funilândia, Confins and Prudente de Morais, covers the Environmental Preservation Area of Lagoa Santa. The region is characterized by carbonate rocks of the Bambuí Group, represented by the covered karst of Lagoa Santa, the region being drained into Das Velhas River, the base flow of the area. This project intends to analyze the flow dynamics of the Das Velhas River, to evaluate possible climatic or anthropic interferences in the region. The methods used consist of the analysis rainfall (1943049) and fluviometric (4134000) data from Lagoa Santa station, provided by the National Water Resources Information System, in the hydrological years from 1980/81 to 2019/20. From the treatment of these historical data, an average rainfall (1187 mm/year) and average flow (74 m<sup>3</sup>/s, ranging from 42 to 137 m<sup>3</sup>/s) from Das Velhas River were obtained. The fluviometric history recorded the existence of three 11-year cycles. The cycles are defined by the ascension period, marked by the first five years to an inflection point, in which the flow reduction period begins for the next six years. During these periods of rising in flow there are some reductions, as well as some rises in the period of reduction. The first cycle (1984/85-1995/96) has an average flow of 83 m<sup>3</sup>/s, peak of 107 m<sup>3</sup>/s in 1993/94 and average rainfall of 1192 mm/year. The second (1996/97-2007/08) has an average flow of 73 m<sup>3</sup>/s, peak of 96 m<sup>3</sup>/s in 2002/03 and average rainfall of 1283 mm/year. The third cycle (predicted period: 2008/09-2019/20), has average flow was 64 m<sup>3</sup>/s, peak of 117 m<sup>3</sup>/s in 2011/12 and average rainfall of 1104 mm/year, this value being 7% lower than the historical average of the region. Grant data (Minas Gerais Water Management Institute - Igam) for surface abstraction in Das Velhas River, indicate a capture value of 1.2 m<sup>3</sup>/s, showing a low value when compared to its historical average flow 74 m<sup>3</sup>/s. From the data presented, it is observed that despite the flow of the river behaving in hydrological cycles of 11 years, the average flow has been decreasing about 13% with each cycle that differs from the rainfall values that remained approximately constant. Therefore, the decrease in flow observed in the river can be correlated not with the abstraction of surface water, but with a probable lowering of the aquifer level caused by overexploitation of tube wells causing the reduction of the underground supply to the base river.

**KEYWORDS:** EPA Karst Lagoa Santa; Fluviometry; Rainfall.