

HYDROGEOCHEMICAL CHARACTERIZATION AND GROUNDWATER QUALITY INDEX IN THE LOWER VALLEY OF COCHABAMBA, BOLIVIA**Ivette Echeverría, Omar Mamani, Oliver Saavedra****ABSTRACT**

This study conducted a hydrogeochemical characterization of groundwater in the Lower Valley of Cochabamba through physicochemical analysis, Piper diagram interpretation, estimation of the Water Quality Index (WQI), and evaluation of static water levels. The results show that most wells exhibit a coherent ionic balance. According to the WQI, water quality is generally rated as good or excellent; however, certain wells exceeded the maximum permissible values established by the Bolivian Standard NB-512 for drinking water, particularly in terms of turbidity, sodium, sulfates, and chlorides. Iron concentrations ranged from 0.34 to 6.58 mg/L and manganese from 0 to 0.50 mg/L, with all samples exceeding the regulatory limit for iron and some for manganese. From a hydrochemical perspective, 47% of the samples were classified as calcium and/or magnesium bicarbonate waters, typical of recharge zones with low geochemical evolution, while 35% corresponded to sodium bicarbonate waters, associated with cation exchange processes. Chloride and/or sulfate sodium-type facies were also identified in wells located in lower areas, reflecting more evolved geochemical conditions or anthropogenic influence. The analysis of static water levels revealed a predominant north-to-south groundwater flow direction, explaining the accumulation of salts and metals in terminal wells. Due to the elevated concentrations of iron and manganese, specific water treatment processes are recommended, along with complementary microbiological studies to assess potential sources of anthropogenic contamination. Overall, the findings highlight the need for integrated and sustainable groundwater resource management in the Lower Valley of Cochabamba.

Keywords: Groundwater quality, Hydrochemistry, Piper diagram, Water Quality Index

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