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ABSTRACT

Luvuvhu Sub-catchment is one of the major water resources in Limpopo. Groundwater is vastly utilized for irrigation purposes. The hydrogeochemistry of the groundwater is the key tool to identify its suitability for various uses. This study aims to assess the suitability of groundwater for drinking and irrigational purposes by determining the hydrogeochemistry in the upper part of Luvuvhu sub-catchment, Limpopo, South Africa. A total of 39 groundwater samples and 2 surface water samples were collected from boreholes and Luvuvhu River in August 2015, respectively. Physical and chemical parameters namely, pH, electrical conductivity (EC), total dissolved solids (TDS), calcium (Ca2+), magnesium (Mg2+), sodium (Na+), potassium (K+), bicarbonate (HCO_3-), sulphate (SO42-) and chloride (Cl-) were measured. EC and TDS values of all the groundwater samples imply that groundwater is suitable for drinking purposes. The groundwater samples are found to be acidic to alkaline ranging from soft to hard in nature. The order of the abundance of the major cation and anion was Ca2+ >Mg2+ >Na+ >K+ and Cl- >HCO_3- >NO_3-. The dominant water type as reflected by piper diagram is Ca2+-Mg2+-Cl-, Ca2+-HCO_3- indicating silicate weathering and reverse ion exchange processes and Na+-Cl- water types indicating halite dissolution and ion exchange processes. The analysis results of major ions and their spatial variation showed that dominance of rock-water interaction is the major process controlling groundwater chemistry in the review area.
Keywords: Luvuvhu River, Limpopo, rock-water interaction, silicate weathering