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Preliminary investigation into groundwater suitability for domestic use in the Matoks catchment, Limpopo Province, South Africa

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Statement of the Problem: The Matoks area, comprising Mphakane, Dikgading, Sekonye, Springs, Mamotshana, Makgato and Sekalegolo villages, under the jurisdiction of the Molemole Local Municipality have been collectively described as a water scarce community. To address current and future water demands of these communities, there is a dire need to evaluate the groundwater resource potentials in the area.

Methodology & Theoretical Orientation: In this study, groundwater physico-chemical parameters (pH, conductivity, TDS, alkalinity and hardness) and chemical constituents (HCO₃, NO₃, NH₄, Cl, F, Mg, Ca, Na, and K) from 11 boreholes drilled within crystalline aquifers in the area were analysed. Hill-Piper and the simplified Durov diagrams were used to appraise chemical characteristics of groundwater.

Findings: Results for the physico-chemical parameters ranged as follows; pH (6.8-8.81), conductivity (67.8-413.2 mS/cm), TDS (439.4-2685.8 mg/L), alkalinity (176-410 mg/L as HCO₃), and total hardness (81.15-630.84 mg/L as CaCO₃), with concentration of major ions in the order; CO₃>NO₃>Cl>F>NH₄ and Ca>Na>Mg> K. Groundwater was classified into four hydrogeochemical facies: Ca²⁺- Mg²⁺- HCO₃⁻ (Type I); Na⁺- K⁺ - Ca²⁺- HCO₃⁻ (Type II); Na⁺- K⁺- Cl⁻ - SO₄²⁻ (Type III) and Ca²⁺ - Mg²⁺-Cl⁻- SO₄²⁻ (Type IV). About 36.4% of the samples trend towards Type III (saline) whereas 63.6% tend towards Type II (alkaline).

Conclusion & Significance: The results suggests significant mixing of the water types, primarily through ion exchange reactions. Based on World Health Organization and the South African standards, water quality from 7 of the 11 boreholes was classified as good, 3 poor and one unacceptable for domestic use. Several recommendations are advanced to mitigate adverse health risk as well as improve water quality.

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