

Feasibility of using Groundwater Geochemistry in Mineral Exploration; A Case Study from Udawalawe, Sri Lanka

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The geochemistry of heavy metals and trace elements in groundwater has been a promising tool for mineral exploration over the well-recognized and practiced geochemical methods such as isotopic techniques, key elements association, rare earth elements association, multi element relationship. This research focused on using heavy metals and trace elements around a known mineral deposit to explore the possibility of their potential in mineral exploration. A total of 31 groundwater and 12 soil samples were collected around Udawalawe serpentinite outcrop exposed at Ginigalpelessa and Indikolapelessa. A combined approach was used to assess the interaction between rock and minerals with groundwater and soil at Udawalawe. The pH and electrical conductivity of groundwater were measured in situ. Concentrations of Na, Mg, K, Fe, Mn, Cu, Cr, Cd, Rb, Sr in groundwater were measured using atomic absorption spectroscopy. The Present study showed Na, K, Mg, Cr, Cu, Cd, Sr and Fe are the highest elevated concentrations in groundwater close to the serpentinite outcrop. Soil samples were analyzed using X-ray diffraction for clay mineral identification. The soils close to the mineral deposit have clay minerals such as serpentine which have directly weathered from the outcrops. The enrichment of heavy metals and trace elements in the groundwater and soil clearly indicate the interaction between the serpentinite and local groundwater regime. This observation proves the feasibility of applying heavy metals and trace elements in groundwater as a tool for uncovering subsurface mineral deposits. In order to strengthen the observation and gain a recognition, it is recommended to precise the same procedure around known mineral deposits.

Keywords: Groundwater, Geochemistry, Mineral exploration, Heavy metals, Trace elements