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GROUNDWATER RESOURCES DEVELOPMENT IN HARD ROCK TERRAIN IN DRY ZONE OF SRI LANKA - AN APPROACH USING GEOCHEMICAL AND ISOTOPE SIGNATURES

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Groundwater contamination is a serious problem in the dry zone of Sri Lanka, which is reason for many health problems. Padaviya-Ruwanpura and Mihinthale-Naatiyagama villages locate in Anuradhapura district are also suffering from this groundwater quality problems. EC, alkalinity, and hardness are the main physical properties exceeding the WHO standard in both villages. According to resistivity survey data, probable groundwater bearing zones exists below 25 m, near the bedrock in Naatiyagama area. Influence of bedrock composition to groundwater quality in Naatiyagama village represent by collected groundwater samples. The number of samples tested in Ruwanpura and Naatiyagama are respectively 15 and 36. Ruwanpura zone rich in groundwater of Ca-HCO₃ type which closes to fresh water conditions and Na + K - HCO₃ type groundwater predominant in the Naatiyagama area with patches of Ca-HCO₃ type. High Na + K concentration in Naatiyagama groundwater may result of weathering of plagioclase and potash feldspar present in pegmatitic granitoid gneiss. Fluoride concentration of both villages are beyond the WHO standard limits of 0.6 mg/L for tropical countries, and fluoride concentrations of Ruwanpura and Naatiyagama are 1.14 mg/L and 0.86 mg/L respectively. Weakly bound fluoride ions present in biotite and hornblende mineral structures. Biotite and hornblende rich rocks may cause high fluoride concentrations of Ruwanpura. Concentrations of cations and anions are fairly high in Naatiyagama village. Three small tanks and depression geomorphology on syncline axis may be the reason for high ion accumulation within the groundwater bodies. Obtained $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotope data of indicate the high evaporation conditions in Naatiyagama. $\delta^{18}\text{O}/\delta^2\text{H}$ ratio of groundwater samples varies between 0.139 and 0.180. Further study of isotopic patterns shows Naatiyagama water table directly recharged by rainwater during the Northeast monsoon and Inter monsoon periods. Current situation of groundwater quality reveal, Naatiyagama village needs an intensive solution for their drinking water problems.

Keywords: Dry zone, Groundwater, Isotope, Resistivity