

## **GEOCHEMICAL CHARACTERIZATION OF GROUNDWATER IN DIFFERENT CLIMATIC ZONES OF SRI LANKA**

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In Sri Lanka, groundwater is a source of drinking and industrial water requirements. Its quality degradation occurring due to various agricultural and related anthropogenic activities has received wider attention during the last few years. Common agricultural practices such as fertilizer and pesticide applications have made substantial impacts on groundwater quality. Therefore, understanding the geochemical evolution of groundwater is important for sustainable development of water resources in Sri Lanka.

A detailed investigation was carried-out to evaluate the geochemical processes regulating groundwater quality in the three main climatic zones of Sri Lanka known as the wet zone, intermediate zone and dry zone. Groundwater samples were collected from above climatic zones and analyzed for their major anion and cation contents. Groundwaters from the wet zone are more acidic (mean pH= 6.30) compared to the dry zone (pH= 7.32). Electrical conductivity (EC) values range from 32 to 1223, 52 to 4280, and 215 to 2240  $\mu\text{S}/\text{cm}$  in wet zone, intermediate zone and dry zone respectively. Alkalinity, chloride and hardness of waters from intermediate and dry zones are much higher compared to that of the wet zone. For the anions, the concentrations of  $\text{HCO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{F}^-$  and  $\text{PO}_4^{3-}$  fall between 7.2 and 943, 4.7 and 1270, 0.01 and 130, 0.1 and 5.5, 0.02 and 5.0, 0.05 and 1.2 mg/L with a mean of 36, 91.7, 14.4, 1.29, 0.79 and 0.27 mg/L, respectively. Among the cations, the concentrations of  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  ions ranged from 1.21 to 654, 0.34 to 7.1, 1.61 to 158, 0.01 to 757 mg/L with means of 59, 1.87, 27 and 117 mg/L, respectively. Concerned pollutants of N-nitrate (1.31 mg/L) and phosphates (0.45 mg/L) in the dry zone water is much higher compared to that of the wet and intermediate zones. The hydrogeochemical characteristics of groundwater comprise different types of facies as Na- $\text{HCO}_3$  type in the wet zone and Ca- or Mg- $\text{HCO}_3$  type and non-dominant cation type in the intermediate zone and dry zone. Interestingly, groundwater type of up-country in wet zone is  $\text{HCO}_3\text{-CO}_3$  and Ca-Mg while mid-country shows non dominant type. The results indicate that the groundwater, particularly in the dry zone, is susceptible to contamination probably originating from agricultural activities. Common agricultural practices have caused substantial changes in the groundwater quality indicating high values of N-nitrate and phosphates.

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