

Seasonal changes of groundwater quality in agricultural areas: A case study in Monaragala District, Sri Lanka

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Sri Lanka is an agricultural country and rice is the staple food of the inhabitants. There are two cultivation seasons namely; Maha and Yala which are synonymous with two monsoons. Maha Season falls during the North-east monsoon from September to March and Yala season is effective during the period from May to August. Exploitation of groundwater has increased greatly, particularly for agricultural purposes in Sri Lanka due to little access to rainfall and variable flow of surface water. Therefore the quality of groundwater has to be concerned due to intensive agricultural practices. Monaragala District which is fallen to a dry zone withdraws water from both dug and tube wells for cultivation. Several health diseases are recorded due to the consumption of poor drinking water in this area. Therefore this study was undertaken to evaluate groundwater quality due to cultivation. A total of 176 ground water samples were collected from tubes (50) and dug wells (126) covering one year. 50% of the groundwater water samples were alkaline and within the safe limit of pH. Anions in groundwater samples were ordered as $\text{HCO}_3^- > \text{Cl}^- > \text{SO}_4^{2-} > \text{NO}_3^- > \text{F}^- > \text{PO}_4^{3-}$ while cations were in $\text{Na} > \text{Ca} > \text{Mg} > \text{K}$. Dominant anion was HCO_3^- and Na and Ca were the dominant cations. Except anions, there was a significant difference of all major cation distribution ($P < 0.05$) during two seasons. For instance, significant values are $P = 0.025$, $P = 0.000$, $P = 0.036$ and $P = 0.002$ for Na, Mg, K and Ca. The electrical Conductivity and Sulphate of all samples were safe levels of WHO recommended guidelines. Moreover, 7.21% and 5.06% of groundwater samples exceeded the permissible level of hardness while 8.24% and 7.59% of groundwater samples were exceed the permissible level for TDS in Yala and Maha seasons respectively. One sample exceeded the Nitrate and Chloride permissible levels in the Maha season. Fluoride concentrations were higher in Maha season as 26.58% and 35.05% in the Yala season. This study revealed that agricultural practices and fertilization for different crops in Yala and Maha seasons have a potential effect on the groundwater quality in the Monaragala region.

