

Seasonal Groundwater Quality Variation in Monaragala District of Sri Lanka

W.A.C. Udeshani¹ and S.K. Gunatilake²

¹*Faculty of Graduate Studies, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*

²*Department of Natural Resources, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*

Sri Lanka is divided into three climatic zones namely; 'dry', 'intermediate' and 'wet' based on the mean annual rainfall. *Monaragala* district in the *Uva* Province, lies within both dry and intermediate zones. Agriculture is the main livelihood of rural people in this area and paddy is the major crop. Paddy is cultivated in; "*Maha*" and "*Yala*" season which are associated with two monsoons *i.e.* "north-east monsoon" and "south-west monsoon", respectively. Inorganic fertilizer is commonly applied by farmers to overcome the nutrient deficiency in permanent agricultural lands. However, excessive fertilizer application can cause severe environmental and health problems. Since groundwater is the main source for drinking water in this area, this study attempted to assess the seasonal variation of physico-chemical properties of groundwater. Samples were collected from 44 sampling points representing dug and tube wells which are closely located to the agricultural fields. A total of 88 groundwater samples were collected in both seasons. The collected samples were analyzed for pH, Electrical Conductivity, Total Dissolved Solids, Total Alkalinity, Total Hardness, HCO_3^- , Cl^- , SO_4^{2-} , NO_3^- , PO_4^{3-} and F^- . A student's t-test was carried out to evaluate the seasonal effects on groundwater quality. The groundwater in both seasons is characterized by $\text{HCO}_3^- > \text{Cl}^- > \text{SO}_4^{2-} > \text{NO}_3^- > \text{F}^- > \text{PO}_4^{3-}$ facies. As per the statistical analysis, only pH, NO_3^- and PO_4^{3-} showed significant seasonal variation ($p < 0.05$). About 40.9% and 31.8% of groundwater samples are very hard, while 22.7% and 18% of are brackish in *Maha* and *Yala* seasons, respectively. Higher NO_3^- and PO_4^{3-} levels in *Maha* season (the main cultivation season) potentially show the effect of fertilization on the groundwater quality. However, the proceeding of this assessment for several consecutive seasons would be more effective to identify the seasonal variation and agricultural effects (inorganic fertilization) on groundwater quality.

Keywords: Agriculture, Fertilization, Groundwater, Seasonal variation

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