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### **Spatial and temporal variations of ground water quality in Kalpitiya peninsula**

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Intensive agricultural practices in Kalpitiya have caused excessive usage of fertilizers. The sandy regosol soil and the over irrigation due to the presence of semi-arid climatic conditions in the area have led to nutrient leaching conditions in Kalpitiya. Since 1990s, the groundwater aquifers in Kalpitiya remain contaminated with higher levels of nitrate due to intensive agricultural practices and the current status of groundwater pollution remains poorly studied. Therefore, this study was conducted to evaluate the current status of groundwater pollution in Kalpitiya, with special emphasis on spatial and seasonal variations. Groundwater samples of 50 wells (potable and agricultural) located in five sentinel sites, namely Nawakkadu, Narakkalli, Thalavila, Kandakuli and Kalpitiya town were collected at monthly intervals from November 2018 to March 2020. In addition, the existing land use practices surrounding the respective wells were also recorded. Selected water quality parameters, namely pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), salinity, nitrate and phosphate concentrations were analyzed using standard methods. The General Linear Model (GLM) followed by Tukey's pairwise comparison was used for statistical analysis. Significant spatial variations ( $p < 0.05$ ) were observed among the study areas for all the water quality parameters, except for pH and phosphate concentration. The highest conductivity ( $1.96 \pm 0.13$  mS/cm), nitrate ( $59.27 \pm 5.38$  mg/L), salinity ( $0.95 \pm 0.05\%$ ) and TDS ( $870.88 \pm 50.78$  mg/L) levels were recorded from groundwater samples collected from Nawakkadu. Meanwhile, Thalavila area denoted the lowest values. The highest pH and phosphate levels and the lowest conductivity, nitrate, salinity and TDS levels in groundwater were detected during the second inter monsoon period, followed by the North-East monsoon. The impact of seasonal variations in rainfall on ground water quality remained significant ( $p < 0.05$ ) at 95% level of confidence. EC, nitrate, phosphate and TDS levels in groundwater samples of Nawakkadu, Narakkalli, and Kalpitiya town areas remained above the permissible levels for potable water quality given by the Central Environmental Authority (CEA). Therefore, adequate treatment of groundwater is recommended prior to use for drinking purposes.

**Keywords:** Groundwater pollution, Nitrate, Kalpitiya, Agriculture

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