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STUDY ON SURFACE AND GROUNDWATER CONTAMINATION AT KODIKAMAM NORTH AREA OF THE JAFFNA DISTRICT, SRI LANKA

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Due to the lack of perennial rivers, surface and groundwater are under stress in almost all parts of the Jaffna peninsula. Kodikamam North is one of the GN divisions in the Jaffna Peninsula which has been facing water contamination issues due to the expansion of agricultural activities and urbanisation. The main objectives of this study were to refine, maintain, and preserve the surface water bodies and provide people with awareness of groundwater quality. Water samples were collected from forty-three wells covering dug wells, tube wells and dug-cum bore-tube wells during the dry season in January 2017. The distance from the surface water pond embankments to the adjacent wells was measured to determine any correlation of the groundwater quality with the water in the ponds. The chemical parameters; $(NO)^{3-}$, $(PO_4)^{3-}$, Cl^-, total Fe, and total hardness (TH) were determined in water samples and The Electrical Conductivity (EC) and pH measurements were taken in the field. The Water Quality Parameters (WQPs) obtained were compared with the WHO and SLS standards (SLS 614:2013), while the spatial distribution of the WQPs was evaluated using thematic maps compiled with the aid of Arc-GIS software and the Pearson's correlation between variables was analysed using SPSS to find the ultimate source of contamination. It was revealed that 100% of well water samples were within the maximum permissible limit for $(NO)^{3-}$ based on SLS, while 40%, 51%, 14%, and 40% of the collected samples exceeded levels for Cl^-, total hardness, $(PO)_4^{3-}$ and Fe, respectively. The Aruvan paddy area is the riskiest area concerning all the parameters except $(NO)^{3-}$. Sixteen percent of the investigated wells exceeded EC values and specific one well out of forty-three showed elevated pH level (8.8). Further, there exist strong, moderate, and weak correlations among different WQPs, and the combined effect of their inter-relatedness indicates the water quality of the study area. The one-way ANOVA test revealed a significant difference ($p = 0.05$) between the means of well types in EC ($p = 0.01$), chloride ($p = 0.007$), and nitrate ($p = 0.048$). It was also noted that deep tube wells have a higher levels of dissolved ion concentration than dug wells, which indicates the comparatively high salinity. Factors such as lateritic soils and limestone bedrock could be considered as sources for elevated levels of Fe^{2+} and Ca^{2+} ions in the groundwater. Agricultural activities influence on $(NO)^{3-}$/$(PO)_4^{3-}$ levels.

***Keywords**: Surface water, Groundwater quality, Deep tube wells*