



Section C

301/C

Mapping of groundwater quality in Kaduwela area

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The present work was undertaken to study the ground water quality in Kaduwela East area at the beginning and end of the South-West monsoon season in 2017 to find interrelations using Pearson's correlation coefficient matrix. Ground water samples were collected from 30 wells covering 7 Grama Niladhari divisions and tested according to standard methods published by the American Public Health Association (APHA). The spatial distribution of water quality in the study area was investigated using thematic maps generated for water quality parameters with the use of ARC map 10.3.1 software. Based on SLS614:2013 standards, drinking water quality zones with potable and non-potable water were identified. A final groundwater quality map was created by overlaying all the thirteen thematic maps to understand the suitability of the overall ground water quality. According to the investigation, EC, hardness, iron, sulphate, chloride and phosphate concentrations were within the permissible standards for both the sampling sessions. The analysis of pH during two sampling sessions showed that 86.7% and 96.7% of the samples tested, respectively had pH values lower than the permissible limit. This acidic nature could be due to the geological formations as observed by similar studies in the region. Even though the Nitrate concentration in both phases falls within the permissible limit, nitrate concentration in many wells during the post-monsoon period had increased. This could be due to the leaching of the nitrate from the unprotected septic tanks observed in this neighborhood. The statistical correlation analysis showed that for both the sampling sessions, EC had a strong positive correlation with nitrate, phosphate, sulphate and chloride with correlation coefficient values of 0.73, 0.53, 0.82, and 0.79, and 0.60, 0.51, 0.80, and 0.70, respectively. *E. coli* was present in 47% of the wells tested in both seasons indicating a heavy pollution state with *E. coli* bacteria. This was an indication of recent fecal contamination. As explained in the methodology, thirteen thematic water quality maps were generated for all the parameters tested using GIS techniques and overlaid to analyze the overall groundwater quality of the Kaduwela East area. This mapping exercise divided the total study area into different zones according to the concentrations of water quality considering their permissible limits. The final analysis indicated that less than 10% of the study area had groundwater that can be categorized as potable. This can be considered as a serious threat to the ground water users in the Kaduwela East area and hence further detailed studies are proposed.

Keywords: GIS, Pearson's correlation coefficient, physio-chemical parameters, spatial analysis

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