

DEVELOPMENT OF A RAINWATER QUALITY INDEX USING PRECIPITATION OF SELECTED LOCATIONS IN KANDY DISTRICT

K.N.K. Kankanamge¹ and N. Priyantha^{2*}

¹Department of Environmental and Industrial Sciences, University of Peradeniya, Peradeniya, Sri Lanka.

²Department of Chemistry, University of Peradeniya, Peradeniya, Sri Lanka.

*namal.priyantha@yahoo.com

With rising demand and an unreliable municipal supply, Kandy (Sri Lanka) is experiencing increasing water security challenges. In response, rainwater harvesting is gaining importance as a supplementary source of freshwater, particularly in areas where access to treated water is limited. Although the rainwater quality is influenced by urbanisation and industrialisation, not much attention has been paid in determining comprehensive rainwater quality indices despite their importance. Therefore, this study focuses on determining the physicochemical characteristics of rainwater collected from three strategically selected locations within the Kandy area, comprising two suburban areas and one urban area, which is highly contaminated by vehicular emissions and industrial activities in the surrounding areas, to formulate a rainwater quality index (RQI). Weekly samples were collected over a period of 30 weeks in 2024. The samples were analysed for key water quality parameters, namely, pH, electrical conductivity, total hardness, and three selected anions: NO₃⁻, SO₄²⁻ and Cl⁻, which are predominant anions present in the atmospheric precipitation around this area because of cultivation activities, vehicular emissions, water treatment plants, and dumping sites. The simple rank sum method, enabling the integration of multiple variables into a single, interpretable value, was used in this exercise. The RQI is given by,

$$RQI = \sum W_i Q_i$$

where W_i represents the relative weight of parameters, and Q_i is the quality rating of each of the parameters. The RQI is determined as $\sum W_i Q_i$ which has a range of 1 to 100, where 100 is the worst quality. The results revealed that the rainwater quality of the study sites ranged from 15.2 to 100.0. Seasonal variation was also observed, with a slight decline in water quality during the early monsoon period, because the dry season showed the higher air pollutant level across the sampling area. These findings underscore the spatial and temporal variability of rainwater quality in Kandy and demonstrate the usefulness of the RQI formulated as a practical tool for water quality assessment.

Keywords: Bulk deposition, Kandy, Rainwater quality index, Urbanisation