

INVESTIGATING THE INFLUENCE OF CLIMATIC PARAMETERS ON RIVER MAHAWELI WATER QUALITY ASSOCIATED WITH LEACHATE CHEMISTRY

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Increased solid waste generation due to rapid urbanization and industrialization is a major problem around the world. Landfilling or open dumping is the most common disposal method of municipal solid waste (MSW) in developing countries. However, majority of these landfills are not properly managed, resulting in contamination of nearby groundwater and surface water bodies by the landfill leachate run-off. In Kandy, the canyon method is commonly used for MSW disposal. In this method, a suitable canyon (depression) has been filled with dumped waste, without taking any measures to prevent or minimize hazards arising from dumped waste. According to the available literature, chemistry of the leachate generated from a landfill is seriously influenced by the climatic parameters. Therefore, the study was conducted to understand the relationship between the climatic parameters and the leachate chemistry and the association of these two factors with the river water quality to ensure the safety of drinking water consumers. Landfill leachate, river water and groundwater samples were collected weekly from the leachate drain of the Gohagoda landfill, four locations along Mahaweli River (two upstream and two downstream points from where leachate drain to the river) and from two wells within the landfill, respectively, for a period of two months. The samples were preserved, stored and analyzed according to the Standard Methods. Daily temperature and rainfall data were also collected from the Horticultural Crop Research and Development Institute, Gannoruwa, and the statistical analysis were performed with MINITAB version 17.0. The study found that the concentrations of components (pH, Biological Oxygen Demand, Chemical Oxygen Demand, Ammonia Nitrogen, Phosphate) in the Gohagoda landfill primary leachate were higher than the recommended standards of tolerance limits for discharge of effluent for inland surface waters by the Central Environmental Authority and most parameters were similar to the values reported in the past studies. According to the results, Total Organic Carbon (TOC) concentration showed significant differences (0.001) at 5 % probability level ($P < 0.05$) in upstream and downstream river water samples leading to conclude that leachate has a negative impact on the river water quality. Apart from TOC, the Pearson Correlation Analysis and the ANOVA on other parameters (pH, Electrical Conductivity, Dissolved Oxygen, Total Dissolved Solids, Phosphate, Nitrate-Nitrogen, Ammonia-Nitrogen, Total Nitrogen, Biological Oxygen Demand, Total Carbon, Total Organic Carbon, Inorganic Carbon, Cadmium) did not show any significant impact of Gohagoda leachate on Mahaweli River water. This is attributed to the dilution effect and few of the leachate parameters were affected from the temperature and rainfall. Therefore, further studies are necessary to investigate the influence of other climatic parameters such as wind pattern and solar radiation on leachate and river water quality.