

Contamination of wetlands through transport of pollutants generated from the municipal solid waste open dumpsite, Kandy,

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Landfill leachate is well reported as a contaminant source polluting surface and ground water. Since the predominant waste disposal method still in Sri Lanka is open dumping which leads to generate significant amount of leachate mostly to nearby water sources. Gohagoda open dump site is one such location at the world heritage city, Kandy, in Sri Lanka. This leachate directly flows to the Mahaweli River which is the main water source for entire province due to absence of proper lining system or any treatment mechanism before disposal. Hence, this study was focused on characterization of leachate generated from Gohagoda dumpsite, assess their spatial and temporal variations, identify subsurface canals and perched water bodies in the wetland system affected by the leachate flow.

Leachate samples were collected monthly for one year from different points of the leachate drainage channel and tested for quality parameters as pH, temperature, EC, TDS, TS, VS, TSS, VSS, BOD₅, COD, alkalinity, hardness, nitrates, phosphates, ammonium nitrogen, chloride and heavy metals (Fe, Mn, Zn, Cu, Pb, Ni and Cr). Moreover, 1D and 2D modes of resistivity data were collected from Vertical Electrical Sounding (VES) at the abandoned paddy field at the downstream of the dumpsite, towards the Mahaweli River.

Results demonstrated average values of pH 8.37, BOD₅ 380 mg/L and COD 1835 mg/L. Nitrate and phosphate seemed to range between 1-765 mg/L and 2-258 mg/L and high levels were observed towards wet season exceeding the allowable limits for wastewater discharge. Some heavy metals were reported in high concentrations such as Zn, Pb, Ni, Cu, Cd and Cr in average concentrations of 0.3710, 0.217, 0.207, 0.135, 0.092 and 0.061 mg/L respectively. Concentrations were decreasing with the distance from the landfill. Leachate characteristics indicated that the leachate is in the methanogenic phase. VES results revealed that the depth to the bedrock is about 3-5m and bedrock is plunging towards the river with a gentle slope. Further, few subsurface canals were found in the abandoned paddy field area and the leachate flow is mainly confined to the near surface. In addition, no perched water pockets were observed and that may be due to the continuous flow in the subsurface. The results strongly suggest that the leachate generated from Gohagoda dumpsite may pollute the soils and waters in the close by wetland systems and the drinking water sources. The geophysical findings can be effectively used to obtain an understanding of the subsurface flow and transport of the leachate from open landfills without landfill liners.

Keywords: Landfill leachate, subsurface canals, Chemical oxygen Demand