Ground water quality in the vicinity of Municipal solid waste landfills in the Colombo Metropolitan region

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A critical problem faced in the Colombo Metropolitan Region (CMR) is the lack of adequate capacity for final disposal of solid waste. Inevitable consequences of solid waste disposal in landfills are gas and leachate generation. The migration of gas and leachate away from the landfill and their release into the surrounding environment especially to the ground water table present serious environmental problems. This study intends to investigate possible contaminants in ground water in the vicinity of landfill sites in the CMR. Forty-five Local Authorities (LAs) are included in the CMR. Out of these, ten LAs were selected for this research covering Colombo, Gampaha and Kalutara districts.

The heavy metal content (Pb, Cu, Cr, Zn, Ni, Cd), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrate and Phosphate levels of well water samples from selected open dumping sites were compared with each other and with the Inland water quality standards in Sri Lanka. Total nitrogen was determined by Kjeldhal method and phosphorous level was measured with Spectrometer. Heavy metals were determined by the Atomic

Absorption Spectroscopic method. Results were analyzed using Kruskal – Wallis test and Two-way ANOVA test. Analysis showed that in some wells located closest to the landfills the concentration of certain heavy metals far exceed the standards set by the CEA for inland water quality. The highest values obtained for the three heavy metals are for Pb 0.1mg/l, for Cu 0.02mg/l and for Cr 0.09mg/l. These concentrations are higher than the standards values set by Sri Lanka (For Pb-0.05mg/l, for Cu-0mg/l, for Cr-0.05mg/l). It was also found that there is no significant difference between heavy metal contents in wet period well water samples and dry period well water samples. The highest values obtained for phosphate content (0.9mg/l) is significantly differing with the standard value (0.7mg/l). The highest values obtained for nitrate content (9mg/l), BOD content (9.6mg/l) and COD (100mg/l) content are significantly differing with standard value. (NO_3^--5mg/l, BOD-3mg/l, COD-15mg/l).

It can be concluded from this study that groundwater in the vicinity of landfill sites is polluted with heavy metals. Therefore proper control on leachate discharges is essential.