

## **CONTAMINATION ASSESSMENT ON HEAVY METALS AND POLYCYCLIC AROMATIC HYDROCARBON IN ATMOSPHERIC DEPOSITION OF KANDY, SRI LANKA**

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### **Abstract**

Kandy is a City located at a valley in the hill country, Sri Lanka which has a highly polluted atmosphere due to increased traffic activities of incoming population. Therefore, the monitoring of atmospheric quality is an important need in order to assess the contamination and risk. Atmospheric deposition acts as a transport media for different atmospheric pollutants such as heavy metals (HMs) and polycyclic aromatic hydrocarbons (PAHs). The presence of HMs and PAHs in atmospheric deposition were investigated in Kandy. Deposition samples were analyzed for Fe, Al and the HMs namely; Cr, Mn, Ni, Cu, Zn, Cd and Pb. The USEPA priority 16 PAHs were considered. Contamination assessment was done in the means of HMs. Atmospheric deposition samples were collected weekly over ten weeks. The samplers were made as a bottle and funnel connected system and fixed at a height of 1.5 m above ground to minimize contamination from re-suspended particles. The particle size distribution of atmospheric deposition indicates that there is an adverse effect to the ecosystem health as the most of the particles are in the range of lower than 150  $\mu$ m. The HMs namely, Cr, Mn, Ni, Cu, Zn, Cd and Pb, were attributed to being primarily originating from anthropogenic sources, mainly from traffic activities as confirmed by the PCA analysis undertaken. Al and Fe were found in high concentrations due to the presence of natural sources, but may also be re-suspended by vehicular traffic. Relatively high concentrations of toxic metals such as Cr ( $6 \times 10^{-4}$  – 0.5 mg/m<sup>2</sup>/day) and Pb ( $1 \times 10^{-6}$  – 1.13 mg/m<sup>2</sup>/day) were also found. High Zn loads (9.53 mg/m<sup>2</sup>/day) can be attributed to vehicular emissions and Zn coated roofing materials. The metal concentrations showed significant differences between different sampling sites (P=0.05). Only five PAHs namely; Phenanthrene, Anthracene, Fluoranthene, Pyrene, Naphthalene, were found in deposition loads. Consequently, the traffic exerts high influence on HM and PAH loadings. Contamination factor and geo-accumulation index showed that currently, Cu

and Mn are at uncontaminated level and other metals are in the range of uncontaminated to contaminated levels, but with the potential to exacerbate in the long-term. The study outcomes provide fundamental knowledge to regulatory authorities to determine appropriate mitigation measures in relation to HM and PAH pollution in city environments in the developing world, where to-date only very limited research has been undertaken.

**Keywords:** Heavy Metals, Atmospheric Deposition, Sri Lanka, Contamination Assessment

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