

ASSESSMENT OF HEAVY METAL POLLUTION IN SEDIMENTS, DUST AND SURFACE SOILS IN THE COLOMBO METROPOLITAN REGION

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Accelerated urbanization in complex and diverse metropolitan environments has masked the contribution of natural features on heavy metal pollution. Therefore, this study focuses on to assess the heavy metal contamination in the Colombo metropolitan region in order to identify the natural and anthropogenic control on the elements. Road dust, road deposited sediments, surface soil, canal sediments, canal water and plant leaf samples from the Colombo metropolitan region were collected and selected heavy metal and major element concentrations were measured. Mean element concentrations of road deposited sediments are high in industrialized areas (Cu-108, Zn-210, Pb-31 mg/kg) indicating the input of elements from industrial sources. However, observed concentrations (Cu-174, Zn-476 and Pb-71 mg/kg) of road dust indicate that they are more polluted than road deposited sediments which shows the dominance of motor vehicles in contamination. Further, heavy metal concentrations of surface soils are also characteristically high in the city (Cu-112, Zn-390, Pb-89 mg/kg) compared to those of suburbs. Similarly, high mean concentrations of heavy metal (Cu-149, Zn-360 and Pb-91 mg/kg) were also measured from sediments of canals which received domestic waste. Similarly, all analyzed higher plants are also rich in heavy metals (Cu-15, Zn-53, Pb-27 mg/kg). Compared to other samples, canal water is low in heavy metals (Cu-0.02, Zn-0.03, Pb-0.02 ppm). Spatial distribution of all these elements shows similar trends with higher accumulation close to the city center and depletion towards the residential areas. This indicates that anthropogenic aspects such as land use variations (industrial, commercial, residential and high traffic areas), high usage of old vehicles and high-rise buildings control the distribution of pollutants. Apart from these undulated geomorphology, high rainfall and humidity, close proximity to the ocean, velocity and direction of wind and underlying geology play a key role in deciding the sources and distribution of elements in the urban area. Present study revealed that even though the sources of environmental pollutants are mostly anthropogenic, prevailing natural conditions inherited to the area can also influence for the accumulation of pollutants. Further, cultivating suitable metal accumulating plants, regular cleaning of roads and edges, construction of artificial wet lands and controlling sea water intrusion in canals are suggested as preventive measures for the heavy metal pollution in the area.