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A study of heavy metal contamination in road side soil

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Summary

Contamination of heavy metals in the environment is of major concern because of their toxicity and threat to human life and the environment. Metal interaction in soil vary considerably with the nature of soil types. Concentrations of Pb, Cu, Cr, Zn, Ni and Cd were determined to assess the impact of traffic and industrial activities. Soil samples at two polluted sites and a control site were collected at a depth of 0-2cm. A comparison of elemental levels between polluted and control sites exhibited exceptionally higher concentrations at the former sites. The Pb levels in polluted sites varied from 33.23-41.50 µg/cm^3. Similarly mean concentrations of Cu, Cr, Zn, Ni and Cd were significantly higher in industrial and traffic area compared to residential area. Correlation coefficients between heavy metals were positively significant for all the heavy metals. A comparison of heavy metal content strongly implicate the automobile as the source of contamination. Heavy metal contamination such as Pb in road side soil is continuous and takes place on a relatively long term basis since many metals are not so mobile. The levels of Pb, Cu, Cr, Zn, Ni and Cd in the road side soil of traffic areas are much higher than the industrial and residential road side soil. Therefore, it is apparent that the continued loading will ultimately place human health and other environmental targets at risk. The results have been presented using heavy metal index.

Key words : Concentrations, Polluted sites, Control site, Heavy metal index, Contamination, Environmental target, Correlation coefficient

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Introduction

Soil is a precious natural resource, but its quality is deteriorated due to several anthropogenic activities. Fortunately, only rarely does soil become polluted to the extent that it can no longer support plant growth. More often, pollutants such as heavy metals are found in soil below a level toxic to plants and yet have accumulated to higher levels that may be a biohazard. Investigations have demonstrated elevated levels of heavy metals in soils adjacent to busy roadways.

The degree of heavy metal pollution, which serves as an index, is directly related to the quality of exhaust gases emanating from the combustion of leaded gasoline, wear and tear of automobile components. Leas is a primary pollutant produced by the combustion of leaded petrol (Page and Gange,1970), while higher levels of Zn, Cd, and Ni (Lagerwerff and Specht, 1970) and Cu and Cr were also reported (Beavington, 1973; Keyser *et al.*, 1978).

Recently, environmental concerns are growing and sustainable use of natural resources and risk and impact assessments are becoming increasingly important to avoid any human health impacts. A common approach to determine the origin of contamination is to identify the spatial relationships among environmental variables.

Many recent studies were concerned with the identification of the sources of contamination either in soil, groundwater, rivers, streams, lakes, seas, or oceans (Maillard and Santos, 2008), while other studies were focuses on assessing the impact of industrial and agricultural uses on soil and groundwater quality (Milovanovic, 2007).

When heavy metals are retained in the soil by repeated and uncontrolled additions, they interfere with these key biochemical processes which alter ecological balance. They