

Research Article

## Contamination of road side soil with heavy metals in urban area of Madurai city

## **D. SARALA THAMBAVANI AND M. VIDYA VATHANA**

## Article Chronicle : *Received* : 01.09.2012; *Accepted* : 30.12.2012

Key Words : Principal component analysis, Geo accumulation index, Enrichment index, Heavy metals

Author for correspondence :

M. VIDYA VATHANA Department of Chemistry, Sacs M.A.V.M.M Engineering College, MADURAI (T.N.) INDIA Email: vidhyanagaraj\_1973 @yahoo.com

See end of the article for **Coopted authors'** 

**SUMMARY :** The purpose of this article is to apply two methods, which are Principal Component Analysis and Geo accumulation Index to assess the heavy metals (Fe, Mn, Zn and Cu) contamination levels in the urban area of Madurai. The concentration of heavy metals were determined at six different sampling sites Site 1 (Kalavasal), Site 2 (Palaganatham), Site 3 (Periyar), Site 4 (Simmakal), Site 5 (Goripalayam) and Site 6 (Mattuthavani) at two different depths, 0-20 cm and 20-40 cm by using Atomic Absorption Spectroscopy (AAS). The mean accumulation level of heavy metal contents were found to be below the critical heavy metal values. The enrichment index was determined for six sampling sites at different depths. The enrichment index for sampling site 2 (Palaganatham) was found to be greater than 2 indicating the soil was enriched with heavy metals. From multivariate statistical technique at depth 0-20 cm two factors were chosen for interpretation accounts for 77 per cent of total variance in the data set and 70 per cent of variance account at depth 20-40 cm. The assessment of geo accumulation index showed that Mn and Cu were highly accumulated at all the sampling sites. Principal component analysis results revealed that sampling site 2 (Palaganatham) and 4 (Simmakal) had high pollution levels of heavy metals. Principal component analysis and geo accumulation index are the important tools to find out heavy metal pollution in soil.

HOW TO CITE THIS ARTICLE : Thambavani, D. Sarala and Vathana, M. Vidya (2012). Contamination of road side soil with heavy metals in urban area of Madurai city. *Asian J. Environ. Sci.*, **7** (2): 226-234.

oil pollution is one of the main concerns of today's world. The sources of soil pollution in urban areas are different but as non-point source pollution, roads are known as the second largest source of creating pollutions in environment (Fakayode et al., 2003). Emissions from roads and vehicles cause many problems to human health and environment. Roadside soils and dust being contaminated by metals were evaluated by many researchers and they measured vehicular heavy metals in roadside soils with different methods. In many researches, the researchers commonly sampled from roadside soils, dusts or plants and after analyzing samples and comparing to the background levels and standards, they came to result if these observations were anthropogenic or not. Besides that some of them tried to find the relations of concentrations with distance from roads and

traffic volumes (Ndiokwere, 1984; Hewitt and Candy, 1990; Garcia and Millan, 1998; Thambavani and Vathana, 2012). In recent year, environmental problems such as air and soil pollution have become increasingly important issue in everyday of life. The widespread contamination with heavy metals in the last decades has raised public and scientific interest due to their dangerous effects on human health (Gilbert, 1984). Heavy metals having great ecological significance are arsenic, zinc, manganese, chromium, lead, cobalt and molybdenum. These elements, unlike most pollutants, are not biodegradable and they undergo ecological cycle (Nurnberg, 1984). Some metals such as iron, zinc, copper, cobalt and manganese are essential to life but can be toxic in high doses. The total trace metal content provides an important information about the pollution level