

6. Impacts of land-use activities on trace metals distributions in urban soils: scenario from a developing country

MOSHOOD Tijani n. and OTHUKE Evue-Uzuazobona

University of Ibadan- Nigeria

Abstract:

Concentrations of trace metals in surface soils and sediments are strongly influenced by natural geogenic activities (such as weathering-pedological processes) and to large extent by anthropogenic activities. Most of the anthropogenic activities do results in the introduction of potentially toxic metals into the surface soils and sediments, especially in most developing nations where adequate environmental protection measures (laws) are lacking. Hence, this study is aimed at assessing the environmental impacts of diverse urban land-use activities on geochemical concentration profiles and partitioning of trace metals in the urban surface soils of Ibadan metropolis, SW-Nigeria.

A total of 25 samples were collected from different land-use areas within Ibadan metropolis. The samples represent soil categories based on different anthropogenic activities such as urban residential, rural residential, mines/quarries, dumpsites, auto-mechanic workshops, farmlands, virgin lands, schools, poultry/animal yards as well as shooting range area. Subsequent, to the initial sample preparation including sieve analyses, both clay and silt fractions were subjected geochemical analyses of metals (Cu, Pb, Zn, Cd, Co, Cr, Ni, As and V) using aqua-regia based ICP-MS method.

The results revealed variations in metals concentration profiles in the different soils categories consequent to the different anthropogenic or land-use activities. For example, average concentrations of Cu vary from 34.1 ppm in virgin arable soils to over 200ppm in mechanic yards and waste dumpsite soils, while that of Pb vary from 30.5 ppm in virgin arable soils to over 1000 ppm in mechanic yard soils. Likewise average concentrations of Zn range between 56.5ppm in arable farm soils to 629 ppm and 1,010 ppm in mechanic yard and waste dumpsite soils respectively. However, Cd has concentrations below the detection limit in most of the soil categories except for mechanic yards and waste dumpsites with average values of 2.5ppm and 5.3ppm respectively.

Further evaluation using normalized enrichment factors (EF), anthropogenic contamination factor (CF), degree of contamination (Cdeg) and the index of geo-accumulation (Igeo) revealed that only Cu, Pb, Zn, Cd and Cr exhibited minimal to significant contamination levels in the different land-use areas. Most especially samples from waste-dump sites and mechanic workshops revealed CF of 10.4 to 35.0 with respect to Cu, Pb, Zn, Cd and Cr compared to 0.5 to 5.9 in relatively uncontaminated farmland soils. This is consistent with largely positive value of Igeo (2.8 to 4.7) of these metals in waste-dump sites and mechanic workshops compared to -1.6 to 1.7 in farmland soils. The study also highlighted the significance of diverse urban land-use and anthropogenic activities as sources of trace metals contaminations in soils and sediments of urban areas in a typical developing country. Thus, need for adequate and appropriate regulation and monitoring of human activities that are likely to induce metal enrichments in soils and sediments.

Keywords: Land-use, urban soils, trace metal, anthropogenic activities, contamination

Topic: B. Impacts of urbanization on soil resources

Sub-topic: B4. Chemical aspects of urban soil changes

Presentation type: Oral

Information of corresponding author

Full Name: Tijani N. Moshood

Organization: University of Ibadan- Nigeria

Mailing address: Department of Geology, University of Ibadan, 20005 Ibadan â€™ Nigeria

Tel: +234-8039173275

E-mail: tmoshood@yahoo.com