2021-12

# Land use patterns influence the distribution of potentially toxic elements in soils of the Usangu Basin, Tanzania

Mng'ong'o, Marco

Elsevier Ltd.

https://doi.org/10.1016/j.chemosphere.2021.131410

# Land use patterns influence the distribution of potentially toxic elements in soils of the Usangu Basin, Tanzania

Marco Mng'ong'o, Sean Comber, Linus K. Munishi, Patrick A. Ndakidemi, William Blake, Thomas H. Hutchinson

To download the complete text, click that link.
DOI: https://doi.org/10.1016/j.chemosphere.2021.131410

## Abstract

Spatial distribution of Potentially Toxic Elements (PTEs) in agricultural soils in Usangu Basin (Mbeya Region)-Tanzania were conducted. The study included three land-use types (paddy farming, maize farming, and conserved community forest areas). About 198 soil samples were collected from November to December 2019 across contrasting land management schemes (Group I dominated by agricultural areas versus Group II dominated by residential and agricultural areas). Total (aqua regia extracts) and bioavailable (Mehlich 3 extracts) PTEs concentrations were analyzed. For Group I and II areas, total and bioavailable concentrations (mg/kg dry weight, mean values) of some PTEs were: chromium 1662 ± 5.2 μg/kg for Group I and 1307 ± 3.9 μg/kg for Group II (Total), 55.1 ± 37.1 μg/kg for Group I and 19.2 ± 21.6 μg/kg for Group II (bioavailable); and lead 5272 ± 1650 μg/kg for Group I and 6656 ± 1994 μg/kg for Group II (Total), 1870 ± 800 μg/kg for Group I and 1730 ± 530 μg/kg for Group II (bioavailable). Soil total PTEs such as cadmium and lead were generally lower in Group I areas than in Group II areas. The reverse scenario was observed for copper. Farming areas had high PTEs concentration than non-farming areas because of anthropogenic activities. Overall, soil total concentrations of Fe (99.5%), As (87%), Se (66%), and Hg (12%) were above Tanzanian Maximum Allowable Limits. This study provides essential baseline information to support environmental risk assessment of PTEs in Tanzanian agro-ecosystem.

## Keywords

Agriculture; Toxic elements; Risk management; Hazard assessment; Paddy farming; Irrigation