Spatial Distribution of Potentially Toxic Trace Elements of Agricultural Soils in the Lower Central Plain of Thailand after the 2011 Flood

Aksarapak Pongpom¹, Kampanad Bhaktikul¹*, Worachart Wisawapipat², and Piyakarn Teartisup¹

¹Faculty of Environment and Resource Studies, Mahidol University, Nakhon Pathom 73170, Thailand
²Department of Soil Science, Faculty of Agriculture, Kasetsart University, Bangkok 10900, Thailand

Abstract

A study has been carried out on 29 locations of paddy soils in the lower Central Plain in Phra Nakhon Si Ayutthaya and Pathum Thani provinces, Thailand, to identify geochemical distribution of major and potentially toxic trace elements and to determine their baseline concentrations in the soils. The geostatistical technique was also employed to generate spatial distribution maps of toxic elements in the area. Results of the study clearly indicated that total concentrations of toxic elements in both surface and subsurface soils did not exceed the soil quality standard limit for habitat and agriculture according to the Pollution Control Department (PCD) of Thailand. The concentrations of several heavy metals in many soils, located in the proximity of the main industrial estates in the areas were rather similar to those of other locations; except for Ay02 site which is located adjacent to a landfill, and had high concentrations of Cr, Cu, Ni, Pb and Zn. Factor analysis indicated that the chemical composition in the soils were rather diffused. Three distinct element affinity groups were recognized: the pH group, the clay group and the sand group. The spatial distribution maps of potentially toxic trace elements unraveled a large variation among elements and locations.

Key words: Multivariate analysis/ Factor analysis/ Kriging/ Soil pollution/ Micronutrients

*Corresponding author:
E-mail: kampanad.bha@mahidol.ac.th