Levels and chemical forms of heavy metals in soils from red river delta, Vietnam

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Abstract: Levels and chemical forms of heavy metals in forest, paddy, and upland field soils from the Red River Delta, Vietnam were examined. Forest soils contained high Cr and Cu levels that were higher in subsurface than in surface layers. Levels of Cu, Pb, and Zn that exceeded the limits allowed for Vietnamese agricultural soils were found in the surface layer of a paddy field near the wastewater channel of a copper casting village. High amounts of Zn accumulated in the surface soil of paddy fields close to a fertilizer factory and an industrial zone. In these cases, larger proportions of Cu, Pb, and Zn were found in the exchangeable and acid-soluble fractions compared to the low-metal soils. We conclude that no serious, large-scale heavy metal pollution exists in the Red River Delta. However, there are point pollutions caused by industrial activities and natural sources. ?? 2009 Springer Science+Business Media B.V.

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