

17th International Conference on

Environmental Toxicology and Ecological Risk Assessment

36th International Conference on

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Environmental Chemistry & Water Resource Management

September 24-25, 2018 | Chicago, USA

Assessment of thallium and trace metal contaminations in river sediments and stream water of Lanmuchang tl-mineralized area, Southwest Guizhou

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This study was carried out to evaluate the concentration, spatial distribution and sources of thallium and trace metals in river sediments of Lanmuchang study area. Samples were collected from different locations of the river and analyzed for major physicochemical properties and metals. Thallium high concentration has also been observed in river sediments, ranging from 0.72 to 72.34 mg/kg. In stream water, thallium concentration ranges from 0.00483 to 75.658 ppb, with marked high contents in downstream sections which likely originated from an unidentified groundwater discharge. Our result exposed that trace metals except for Pb, Cd, Co, Li, had the concentration higher than the maximum safe limits for sediment likewise in stream water some trace metals except Cr, Pb, Cd, Cu, Li and Zn, had the higher concentration than the maximum permissible safe limit of WHO. Trace metals pollution levels were examined in sediment samples using different assessable indices, such as enrichment factor (EF), geoaccumulation index (Igeo) and pollution load index (PLI), based on regional background reference values. Pearson correlation showed that there was significant positive association among Tl-As ($r=0.725$, $p<0.05$) in river sediment sample. Results revealed that weathering of Tl mineralization; water-rock interaction and hydrogeological conditions were major sources of river sediments contamination in the study area. The improved analytical method presented in this study offers an economical, simple, fast, sensitive method for separation of Tl species at trace environmental concentrations.

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