

Ecological risk assessment and source apportionment of heavy metals in sediment from two large reservoirs in Tibet, China

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Shiquan Reservoir is the only large reservoir on the main stream of the Singe Tsangpo River in Tibet. Zam Reservoir is the first and largest reservoir built for several years on the main stream of the Yarlung Tsangpo River in Tibet. However, no date exists to assess the concentration and contamination status of heavy metals in these two reservoirs. To investigate the effects of dam construction on heavy metals accumulation, transport and potential environmental risks in the plateau river system, samples of sediment cores from Shiquan Reservoir and Zam Reservoir were collected in wet season (August 2017), dry season (January 2018) and normal season (May 2018) respectively. Heavy metals including Cr, Co, Ni, Cu, Zn, As, Cd and Pb were analysed. Results of sediment quality guidelines indicated that Cr, Ni, As and Cu in sediments of the two reservoirs posed considerable ecological risks. The metals chemical fraction analysis demonstrated that Cd, Pb in Shiquan Reservoir and Cd, Pb, Cu and Co in Zam Reservoir were dominated by non-residual fractions with high mobility and bioavailability. Cu was the most important factor affecting the environmental quality of the Zam Reservoir. Comprehensively considering the pollution of the eight metals, Shiquan Reservoir reached the “high-medium priority site” level, and Zam Reservoir reached the “medium-low priority site” level. Moreover, based on the principal component analysis (PCA), we deduced that As in Shiquan Reservoir mainly originated from hot spring sources, and Cr in Zam Reservoir was affected by chromite deposit. Other metals in the two reservoirs mainly originated from natural geological sources.

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