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ECOLOGICAL RISK CAUSED IN SOIL BY HEAVY METALS IN THE WATER-LEVEL-FLUCTUATING ZONE OF A YANGTZE RIVER TRIBUTARY

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Abstract

This paper discussed the potential ecological risk, homologous relativity and spatial distribution of heavy metals in the water-level-fluctuating zone (WLFZ) of the Xiao River, a tributary of the Yangtze River. The Cd, Cu, Pb and Zn contents in the WLFZ soil were analyzed via atomic absorption spectroscopy. The potential ecological hazards of the heavy metals were also evaluated using the classical Lars Hakanson potential ecological risk index method. The average Cd, Cu, Pb and Zn contents were 0.94, 28.92, 60.46 and 74.49 mg/kg, respectively. The Cd and Pb contents in soil exceeded the reference values of Sichuan by approximately 11.90- and 1.96-fold, respectively. A highly significant correlation was found between Cd and Cu ($r = 0.656$), Cd and Pb ($r = 0.503$) and Zn and Cu ($r = 0.503$), indicating that their sources were probably the same. In terms of spatial distribution, similar results were found. Cd and Cu contents were very high in Shuangjiang, Cd and Pb contents were very high in Fengle and Zn and Cu contents were very high in Gaoyang. The hotspots of Cd, Cu, Pb and Zn were mainly distributed in Shuangjiang, Shuangjiang, Fengle and Gaoyang (near populated areas or the estuarine area), respectively. The major pollutant was Cd, which reached a very strong ecological hazard level. The potential ecological risk individual coefficients of the four heavy metals were ranked as follows: Cd (357.07) > Pb (9.78) > Cu (4.65) > Zn (0.86). Overall, the WLFZ of the Xiao River attained a strong pollution level.

Key words: health risk, heavy metal, spatial distribution, Yangtze River

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