

Pollution characteristics and ecological health risk assessment of soil heavy metals in a coal mining subsidence area

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In order to study the pollution level, potential ecological harm and human health risk of heavy metals in the soil of coal mining subsidence area, soil samples from 42 sites in a mining area were collected, and seven heavy metals As, Hg, Cr, Ni, Cu, Cd and Pb in the soil were analyzed and detected. The distribution characteristics of heavy metals in the soil of mining area were analyzed by SPSS software. Single factor index method, Nemerow index method and Geoaccumulation index method were used to evaluate the soil heavy metal pollution level in the mining area. The potential ecological hazards and human health risks of heavy metals were evaluated by potential ecological risk index method and health risk assessment model.

Single factor index method and Nemerow index method evaluation showed that As, Cr, Ni and Pb in the study area were at no pollution level, while Hg and Cu were at light pollution level. The Geoaccumulation index method showed that the pollution of Cr, Ni, Pb and Cu was serious in the study area. The potential ecological risk index method showed that the overall potential ecological harm level was at a medium level, and Hg contributed the most to the ecological harm, reaching 94.21%. The human health risk assessment showed that the heavy metals in the soil of mining area had a non-carcinogenic risk to both adults and children, and the carcinogenic risk was only for children. Among them, Hg and Pb were the main elements leading to the non-carcinogenic risk in children, and their HI values in children were 1.39 and 2.60, respectively. The CR value of As reached 1.53E-04, which was the dominant element in children's carcinogenic risk.

This research was supported by Key Research and Development Projects in Anhui Province of China (NO. 202004i07020012)