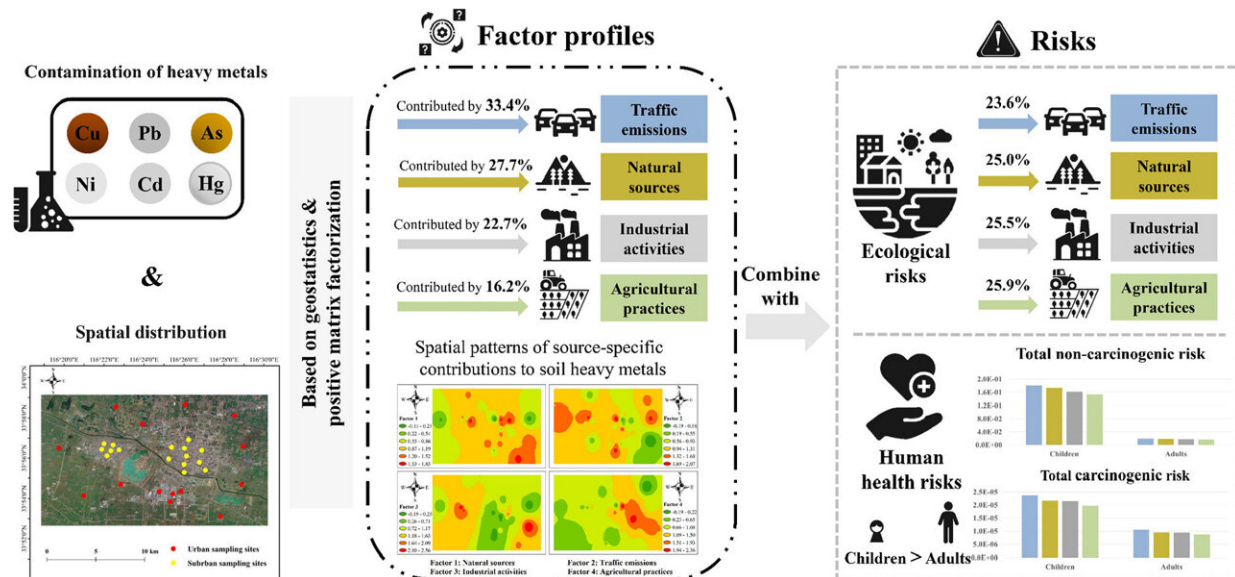


# Study provides methods for obtaining source apportionment of soil heavy metals

May 13 2022, by Zhang Nannan



Graphical abstract. Credit: *Science of The Total Environment* (2022). DOI: 10.1016/j.scitotenv.2022.155694

Previous studies have indicated that soil heavy metals (HMs) contaminating the surrounding of mining areas mainly emanates from industrial emissions. However, research on the quantification of specific risks from various sources is still lacking.

In a study published in *Science of The Total Environment*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) of the

Chinese Academy of Sciences have investigated the soil HMs contamination and [pollution sources](#) in a typical coal industrial city. They quantified the ecological and human health risks of soil HMs from different sources by using a comprehensive approach combining risk assessments with positive matrix factorization (PMF) model.

The study was performed in the core areas of the Yongcheng, a coal-mining city in eastern Henan Province. Thirty [soil samples](#) were collected and analyzed for six HMs (Cu, Ni, Pb, Cd, As, and Hg).

The researchers found that the average concentrations of HMs exceeded the corresponding background values, and the study area was moderately contaminated by soil HMs, especially from the accumulation of Cd and Hg. HMs pollution was higher for soils in [urban area](#) than soils suburban area.

The specific contributions of four sources, including [natural source](#), traffic emissions, [agricultural practices](#) and industrial activities, were apportioned as 27.7%, 33.4%, 16.2% and 22.7%, respectively.

Moreover, the source profiles of potential ecological risks vary in urban and suburban areas. Industrial activities are leading contributions in the urban areas, while agricultural practices contribute mainly to suburban areas.

The non-carcinogenic and carcinogenic risks of children were higher than those of adults, while the contributions of human health risk from different sources were very similar between the two groups. Sources from traffic emissions and natural origin mainly contributed to the non-carcinogenic and carcinogenic risks in the study area, due to the high non-carcinogenicity and carcinogenicity of As and Ni.

"Our findings suggest that the combination of risk assessment models

and PMF can be an effective method in obtaining accurate source apportionment of soil HMs," said Song Liang of XTBG.

**More information:** Xian-Meng Shi et al, Contamination and source-specific risk analysis of soil heavy metals in a typical coal industrial city, central China, *Science of The Total Environment* (2022). [DOI: 10.1016/j.scitotenv.2022.155694](https://doi.org/10.1016/j.scitotenv.2022.155694)

Provided by Chinese Academy of Sciences

Citation: Study provides methods for obtaining source apportionment of soil heavy metals (2022, May 13) retrieved 20 April 2024 from <https://phys.org/news/2022-05-methods-source-apportionment-soil-heavy.html>

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