

Heavy metal pollution risk of cultivated land from industrial production in China: Spatial pattern and its enlightenment

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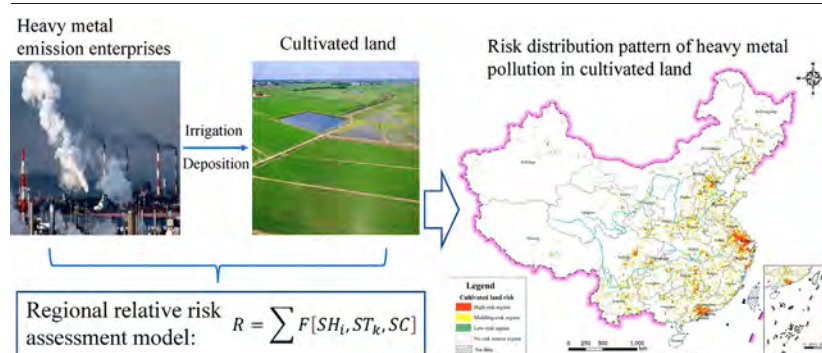
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HIGHLIGHTS

- An innovative methodology for relative regional risk assessment was developed.
- 18.77% of China's cultivated land is at risk of pollution by HMEEs.
- The regional risk increased gradually from the northwest to the southeast of China.
- Environmental policies have curbed the momentum of heavy metal pollution in cultivated land.

GRAPHICAL ABSTRACT



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ABSTRACT

Industrial production is the main source of heavy metals for cultivated land in China as it has been the world's factory. However, owing to there being insufficient data and appropriate methods, it is difficult to rank the risk level and identify spatial patterns of heavy metal pollution in cultivated land. This study developed an innovative methodology for relative regional risk assessment based on the risk theory of source-pathway-receptor, and the heavy metal pollution risks of cultivated land were appraised on a national scale. The results showed that: (i) the cultivated land with high, medium, and low risk of heavy metal pollution accounted for 4.23%, 10.01%, and 4.53% in China; (ii) the heavy metal pollution risk level of cultivated land increased gradually from the northwest to the southeast of China, and the risk in the north was more serious than that in the south; (iii) the aggregated distribution areas of high-risk regions in China were the Yangtze River Delta, the Pearl River Delta, the Tianjin coastal area, the Sichuan-Chongqing economic zone, central-southern Hunan, central Hebei, and the Yellow River coast of Henan; and (iv) China's prevention and control policies effectively curbed heavy metal pollution in cultivated land, the pollution risks have declined significantly. It is suggested that different protection and control strategies should be upgraded and implemented according to different risk modes.

1. Introduction

Since the adoption of economic reform and open-door policy in China, a lot of cultivated land is not only occupied but also facing serious pollution risk due to its rapid industrialization and urbanization (Chen, 2007; Seto et al., 2000; Zhou et al., 2020). It is generally accepted that industrial production is the main source of heavy metals in cultivated land in China, and

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