

Review of: "Probabilistic Assessment of the Heavy Metal Pollution in Debrecen's Topsoil"

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Potential competing interests: No potential competing interests to declare.

Summary

The paper examined the effects of heavy metal contamination on the environment and human health in the Debrecen region. With the aid of stochastic simulation tools, it investigated the spatial distribution of heavy metals in soil samples. After analysing 300 soil samples, the study determined that the main harmful contaminants that are over threshold levels are Cd, Mo, and Cu. To evaluate contamination levels and potential dangers, statistical studies such as the pollutant accumulation index (PGI), heavy metal enrichment index (HMEI), ecological risk index (ERI), and heavy metal pollution load index (HMPLI) were used.

Strengths:

Comprehensive Analysis: To evaluate heavy metal pollution thoroughly, the study used a strong approach that combines laboratory analysis, field sampling, and cutting-edge statistical tools.

Spatial Understanding: The article skilfully captured the geographical distribution patterns of heavy metals, offering important insights into pollution hotspots, using stochastic simulation and geostatistical analysis.

Risk Assessment: A thorough grasp of the consequences for environmental health is provided by the application of a variety of pollution indices to evaluate contamination levels and ecological dangers related to heavy metal pollution.

Drawbacks:

Review Figure 1. Instead of the study area's location and sample protocols, there is merely a red arrow.

Limited Discussion on Remediation: Although the article evaluated ecological concerns and indicated hotspots for contamination, it fell short of providing a thorough analysis of prospective remediation techniques to reduce the amount of heavy metal pollution in the Debrecen region.

Discussion on Uncertainties: Although the paper admitted that there are uncertainties in pollution assessments, there isn't much talk on how these uncertainties affect the validity of the results and possible mitigation techniques.

Suggestion for Improvement:

Incorporate Remediation Strategies: The study's practical relevance might be increased by including a section on possible

remediation methods or policy suggestions to address hotspots for contamination that have been found.

Address Uncertainty: Give a more thorough explanation of the consequences of the uncertainties related to pollution assessments, emphasizing how they affect the accuracy of the findings and possible ways to lower the level of uncertainty in subsequent research.

Overall Assessment: Using a strict approach and sophisticated statistical analysis, the paper offers insightful information about heavy metal pollution in the Debrecen area. There is scope for improvement in the discussion of prospective remediation solutions and the handling of uncertainties related to pollution assessments, even if it effectively identifies contaminated hotspots and evaluates ecological concerns. All things considered, the study makes a substantial contribution to our knowledge of the dangers heavy metal contamination in urban soils poses to human health.