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.

General observation

The study on soil samples at Debrecen and its surroundings in the eastern part of Hungary by Fehér and Nagy addresses the problem of risk associated with heavy metal pollution in the area. They determine the concentrations of a large number of toxic metals such as As, Cd, Cr, Co, Cu, Mn, Mo, Ni, Pb, and Zn. Various pollution indices, namely, the pollutant accumulation index (PGI), heavy metal enrichment index (HMEI), ecological risk index (ERI), and heavy metal pollution load index (HMPLI), are estimated to evaluate the degree of contamination of heavy metals and trace elements. Multivariate statistical analyses of the data impart valuable insight to understand the spatial distribution of heavy metals within the topsoil of Debrecen and its surroundings and help in the identification of three main toxic pollutants, viz., Cd, Mo, and Cu in the area.

Specific comments

There are several points/issues/concerns that need to be addressed by the authors during the revision of the presently submitted manuscript. These are:

i. Page-1 ® Refer line# 10 of Abstract:

Cd, Cu, and Mo (compare mean values presented in Table-1).

i. Page-1 ® Line# 15-16 of Abstract:

Sentence is not clear to me. Clarity is needed.

i. Page-3 ® Fig. 1 is missing from the manuscript.
ii. Page-3 ® Analytical Procedures:

During the course of XRF analyses, how did you ensure quality data? A brief note on the preparation of calibration curves for heavy metals as well as how the QA/QC plan was adhered to needs to be incorporated in the revised version.

i. Page-4 ® Line# 7-8:

Add the maximum permissible concentration value of Mo.

i. Page-5 ® Line# 2:

Add a suitable reference after toxicity coefficient values for heavy metals.

i. Page-6 ® Table-1 column-2, 9 and 10:

Why is the number of analyzed samples variable for the elements? In the case of Pb, it is only 169, although a total of 300 samples were collected. Add a proper explanation in the footnote of Table-1. Include in column# 9 and 10 the values for Mn.

i. Page-7 ® Fig. 2:

Include a spatial distribution map for Mo, which is one of the major pollutants identified through your study. Insets at the top and bottom of each panel are not visible even after magnification. They need modification. Do the black points indicate sample locations? I would suggest to include only those points for which analyses are provided (refer to column 2 of Table 1). This should be mentioned in the figure caption.

i. Page-7 ® Fig. 3:

Spatial continuity of heavy metals, shown as Fig. 3, needs adequate elaboration in the text, specifying the significance of major and minor ellipsoids, use of **colors** and their basis (shown as inset of each panel), etc. Once again, the inset of each panel is indistinct. Add spatial continuity for Mo.

i. Page-8 ® Fig. 4:

The inset of each panel is indistinct. Add a panel for Mo. Regarding black points, refer to the above-mentioned point (as in Fig. 2).

i. Page-8 ® Line# 4:

Change Pd to Pb.

i. An earlier study conducted in 2009 (Environmental Protection Program of Debrecen) identified multiple sources of pollution that include the pharmaceutical (TEVA), fuel stations, airport, food companies, plastic industries, train service station (MÁV), and waste dumping sites, etc. Based on your study, you have categorically stated that agricultural activities and waste disposal are the major sources of pollution (line # 7-8 of page 13). Does it mean that based on the 2009 study, some mitigation measures were taken up by the concerned authorities? If so, a brief account needs to be incorporated in the discussion section of the text. Otherwise, adequate elaboration is needed as to why you think agricultural activities and waste disposal are the major sources of pollution and contribution from other sources is minimal.
ii. Your results and their analyses indicate that Cu, Cd, and Mo concentrations are in excess of the threshold values in the Debrecen area and need remediation. In this respect, I feel that in the later part of the discussion, a few sentences highlighting the most cost-effective and simple remediation strategy would not only be beneficial to the concerned officials but also help enhance the quality of the manuscript.