

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

Rene Rietra¹

¹ Wageningen University & Research

Potential competing interests: No potential competing interests to declare.

The manuscript is about a cheap sampling project around a large city in Hungary. The manuscript states that knowledge about the variation in pollutants is important to know. However, if statistical aspects are relevant, it is strange that the manuscript misses any explanation about the sampling strategy. Sampling strategies have much effect on the results (see de Gruijter et al., 2006). Normally, researchers make a grid and sample all locations, or researchers take a map of the area as the basis and decide that they want a specific number of soil samples from each type of soil use. In this manuscript, nothing has been explained about this strategy. Without such a strategy, you cannot extrapolate the knowledge. I think this manuscript should not be published.

Minor comments:

Introduction, 1st paragraph:

"major concern for the environment". I think this can be debated. I guess it is more a concern for human health.

Hungary, region: It is a country.

In many parts of the world, heavy metal pollution started ages ago. Lead in water pipes, roofs, cadmium and lead in paint, etc. So why relate economic growth of the last 50 years to pollution?

Introduction, 2nd paragraph:

The huge experience with these subjects is not clear from this paragraph, and also not why the current experience still has many relevant uncertainties. Some good books have been written about these subjects, and these offer a relation between theory and experience.

Gruijter, J. J., Bierkens, M. F., Brus, D. J., & Kotters, M. (2006). *Sampling for natural resource monitoring*. Springer-Verlag Berlin Heidelberg.

Swartjes, F. A. (Ed.). (2011). *Dealing with contaminated sites: from theory towards practical application* Springer Science & Business Media.

Why is uncertainty important? Please give relevant aspects: Do we remediate too much soil, or do we leave too many people at risk?

2.2

How was the sampling strategy? For a manuscript about statistics, it is absolutely strange to see no explanation about the sampling strategy.

Is it a mixed soil sample? What is the size of the sampling area? Did you sample according to a well-known method (ISO method)? Then please mention this. Or mention why you deviated from a well-known method. I guess you have a standard in Hungary?

How did you sample locations if they have houses or roads on the site? Or did you only sample gardens, etc.? Please give more info. Did you describe each location and categorize them: garden, non-urban, urban, agriculture, possible source of pollution? Did you sample enough sites with possible pollution, or did you have too many polluted sites? Did you plan the sampling on the basis of soil use?

2.3 Please mention that XRF is not identical to well-known methods, and that preparation and drying of the soil sample have much influence. The detection of cadmium with XRF is not very good.

2.4 Why only ecological risks? Risks to crops begin at much lower levels: exceedance of crop quality (Cd, Pb) according to EU norms for food can already appear at rather low levels of soil pollution.

3.1 You compare the data with limit values in Hungary, but you did not use a proper method for sampling and analysis. You have to mention such aspects. Why mention a norm for water ($\mu\text{g/L}$)? You absolutely cannot compare soil data with water quality.

3.2 "The form of Ca^{2+} in soluble forms which are easily leached away, thus exhibiting toxicity to the water system". Toxicity of calcium? That is wrong. I guess you mean pollution that is strongly related to calcium, and not calcium itself.

3.3 As mentioned, it is strange if you