Contaminants of emerging concern reuse of sediment

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Introduction: In recent years, there has been a growing awareness of the presence of so-called "emerging contaminants" (contaminants of emerging concern or CECs) in the environment and the potential and/or actual risks these chemical components pose on humans and the environment. However, as their properties differ from known contaminants, the existing policy on the reuse of sediments contaminated with these emerging substances is insufficient. Consequently, the need for a sustainable policy on how to deal with sediments contaminated with these emerging substances is growing.

In this context, the European Interreg Sullied Sediments project aims to develop knowledge and tools to support watermanagers in their decision-making on the management of contaminated sediments. One of the key elements in this project is the investigation of possible effects of contaminants of emerging concern.

Therefore, the OVAM ("Public Waste Agency of Flanders" and one of the partners of the European Interreg Sullied Sediments project) intends to gain insight into the risks involved in re-use and relocation of contaminated sediments and find out how these risks can be avoided. For this purpose, Witteveen+Bos Belgium NV and Arcadis Belgium NV developed a decision system to supplement and update the code of good practice, which describes the methodology applied in Flanders, to support policymakers in their decisions regarding sediment management.

Methods: Through a targeted literature study we identified the key bottlenecks in the development of a decision system (unclear definition of emerging contaminants and the lack of data available for emerging contaminants), detected essential steps in the construction of the decision system (international comparison and determination of the end-point receptors after application of contaminated sediment on land), and learned the practicality of working with substance categories based on data availability to avoid excluding substances with only limited data available.

Next, an international survey was conducted to obtain an overview of existing international target values. This overview supports the bottleneck identified in the targeted literature search that there is only limited data available. Finally, to portray the main characteristics required to determine the reuse possibilities, we identified the key exposure and spreading pathways involved in the application of sediments on land.

Results and discussion: The basic principle of our decision system states: the combination of data availability and uncertainty/variability in the available data (input) determine the reuse possibilities of the contaminated sediment (output). Thus, the more data available for a specific emerging contaminant and the lower the uncertainty in these data, the more reuse possibilities exist for the contaminated sediment. The actual reuse scenario depends on the reuse possibilities defined in the decision system on the one hand, and the concentration of the emerging contaminant in the sediment on the other.

The decision system is structured as a tiered approach. The first step is a screening step, in order to make fast decisions regarding very clean and very contaminated sediments without running through the whole decision system in depth. In the second step, the categorization step, the emerging contaminants are assigned to a category ranging from category 1 (high data availability and limited uncertainty in the data resulting in the most reuse possibilities) to 4 (limited data availability and high uncertainty resulting in no reuse possibilities except after treatment).

Given that this categorization depends on data availability and that the knowledge on emerging contaminants is growing rapidly, it is important to note that this is an evolving system where emerging contaminants can switch categories over time when more data becomes available.

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