Developing an evidence base for in situ contaminated sediment hazards in England

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Introduction: Royal HaskoningDHV have recently completed a detailed investigation of the risks posed by in situ contaminated sediments in England, on behalf of the UK Department for Environment, Food and Rural Affairs (Defra). This paper presents the main findings of the investigation.

Methods: The project used an extensive desk-based review of literature to produce a detailed conceptual model for potential contaminated sediment risks in the freshwater and marine environments. A comprehensive database of contaminated sediment quality was them compiled from available data sets and combined with information on potential sources of contamination, receptor sensitivity and physical characteristics to inform a GIS-based national risk assessment. This allowed the likelihood and consequence of contamination to be determined, and the scale of risk to be assessed.

Results: The results of the investigations demonstrate that in situ contaminated sediments have some potential to pose a risk to a wide range of receptors in areas across England. However, there is no definitive evidence that in situ contaminated sediments are currently resulting in widespread harm to the aquatic environment, or significant environmental impacts.

In situ contaminated sediments in England are influenced by a variety of factors which act in different combinations in different locations and environmental settings. The risks posed by sediment-associated contaminants are therefore likely to be site specific and localised in terms of geographical extent and environmental impact. The sources and impacts of some sources of contamination (e.g. historical metal mining) are well documented, with extensive evidence for their behaviour and likely environmental impacts. The risks associated with these sources are better understood and are more predictable than other sources that are less well documented in the literature (e.g. runoff from trading estates).

There is a significant gap in the understanding of the mechanisms by which many contaminants (either individually or in combination with other contaminants as part of a contaminant mixture) cause environmental impacts. There is also a wider lack of understanding and evidence regarding the causes of many of the observed impacts on aquatic environments.

The data available to assess the breadth and depth of the risk posed by in situ contaminated sediments in England are not currently sufficient to produce a comprehensively detailed risk assessment at the national scale. National data sets are frequently limited in their resolution and spatial coverage (and may be absent entirely in large parts of England), and are typically focussed on a specific range of contaminants. This means that coverage can be sporadic, and some contaminants may be poorly represented (if at all). Furthermore, differences in how these data have been collected, analysed and interpreted mean that results from different data sets may not be directly comparable. There are therefore considerable uncertainties associated with any assessment.

Discussion: The results of this investigation demonstrated that there are significant gaps that need to be filled in order to more fully assess the risks associated with in situ contaminated sediments in England. These include the development of specific environmental quality guidelines for standards for sediments, based, as far as possible, on evidence of harm to representative organisms. In addition, the development of a standardized process for assessing the chemical composition of contaminated sediments should also be developed so that different data sets can be more easily compared. Finally, the risks associated with climate change and the likelihood of increased remobilization should also be investigated further.

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