Exploring the remediation of contaminated sediments

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Introduction: In line with the European Water Framework Directive, Flemish authorities have addressed major issues with respect to the impact of pollution from urban waste water and industry on surface and groundwater at the level of river basins. Historic contaminated stream sediments and those currently deposited are also known to negatively impact the water quality, and often spread gradually downstream causing damage to vulnerable ecosystems. Although the role of contaminated stream sediments has been acknowledged by authorities, an integrated approach to remediate and manage sediments is lacking. Such an integrated approach by means of a dedicated software tool is the topic of the current paper and has been put to practice in a collaborative project between VITO, the Flemish Institute for Technological Research, and OVAM, the public waste agency of Flanders. The project aims were twofold; 1) to identify potentially critical sites that allow decision makers to prioritize in efforts on further investigation, remediation and management of, and 2) to perform a cost-benefit analysis to inform the Flemish government about the societal costs and benefits of remediation in general and for specific areas as part of an integrated approach for sediment and water management.

Methods: In Flanders, sediment quality data are collected by different local and regional authorities for different purposes. To support the decision making process on further examination, remediation and/or management of sediments, a web-based spatial tool called 'Waterbodemverkenner' (eng. Sediment explorer) was developed, that collects data from these authorities and from publicly available sources. The tool considers data on the level of contamination (i.e. sediment quality) at measurement locations, spatial data mapping of the potential environmental risks (i.e. variables representing the quality of the aquatic ecosystem and riparian zones) and the potential for sustainable remediation (e.g. variables representing the chance for re-contamination) when contamination occurs. A weighted score is determined based on the relevant technical and environmental variables per stream in Flanders to derive the remediation priority of streams. Currently, a cost-benefit analysis is performed to compare costs for research and remediation with benefits for water quality, navigability and reduced remediation costs downstream if complete or partial remediation of the identified contaminated sites is achieved.

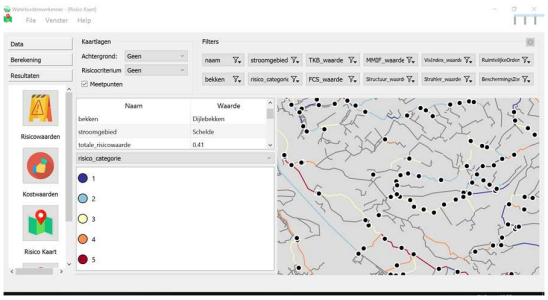

Fig. 1: Waterbodemverkenner tool developed to share data and harmonize assessment of contaminated sediments.

Results/lessons learned: About 40% of measured sites show signs of physico-chemical contamination with significant ecological risks but also often high chances on sustainable remediation if appropriate measures are taken. The degree and extent in which technical and environmental variables contribute to the prioritization differs between basins, and therefore potentially warrant different management approaches. Besides environmental prioritization, the expected results from the cost-benefit analysis should allow a prioritization at the basin scale. Local and regional authorities can consult, analyze and get insight in the prioritization and cost-benefit results through the web-based tool 'Waterbodemverkenner'. It has proven to be a very useful instrument to not only involve different stakeholders in the decision making process but also help streamlining operational activities between different authorities..