Beneficial use of sediments for our future: compared pathways for taking profit of them as resources for new challenges

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Introduction: Sediments are made available in massive quantities by dredging operations for the needs of the development of sustainable marine and waterways transport. This may end either as a huge flow of waste, or as a blessed resource for highly needed materials for climate adaptation works. Operators need a clear roadmap to beneficial use options, in a Circular Economy perspective. This roadmap has to include EU accepted alternatives for flood and coastal defence based on eco system based approaches. Since sediments are an 'end of pipe' resource this also includes ways to deal with contaminants.

Methods: Several European projects, mainly InterReg, funded RTD development to support beneficial use options for sediments as an alternative to waste disposal (GeDSeT, CEAMaS, USAR, VALSE, SURICATES). All contributed by investigating beneficial use (BU) pathways, benefits, options and potential traps. Real size pilot tests were developed in the later projects to demonstrate the validity of BU pathways. The authors took part in these projects and summarise their most promising findings. The key methods are geography (GIS based, [1]), economics and social modelling [2], engineering compliance, and environmental modelling.

Results: Climate adaptation operations must be on large volumes and at low cost, implying that potential reuse works are based on bulk sediments, with as little processing or storage as possible. These include coastline, harbour and river works, civil works and landscaping and agricultural uses [3]. Regardless of the type of application, the key features for the viability of a BU project lie in distance between source and target, timing of operations, suitability of specifications and public support. The main barriers are in the extra cost of BU vs. disposal, in dissuasive regulations and permitting, in social acceptance and in risks associated with contaminants.

Discussion: Project promoters are increasingly keen to develop beneficial uses and circular applications with sediments as an alternative to disposal. But these alternatives must be able to accommodate large volumes of sediments in a constrained timing, with varying levels of contamination, controlled by dredging and BU project agendas.

High value, small volume pathways are less useful here than large volume bulk applications. BU must entail low costs, as disposal is still a cheap option. To promote BU it helps to quantify the added value in social economic (job creation), in citizen awareness and participation, in greenhouse gas emission reduction and carbon sequestration, in ecosystem robustness and reduction of toxic stress, and on risk reduction due to the adaptation to climate change. The mentioned InterReg projects have developed tools to quantify these aspects and applied these on several pilot sites. The benefit from circular projects has to be sought from indirect benefits for the territory or public works, for which the availability of sediments can be seen as a trigger.
BU projects need therefore to be assessed within larger system boundaries than the original project. They need to involve many stakeholders in the initial design phase of the project, and most often the intervention of administrations and communities.

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