Novel scenarios for sustainable waterway sediments management deduced from a decision-support tool

Bruno Lemière[1], Pascale Michel[1], Claire Alary[2], Laurence Haouche[3], Hervé Bréquel[4], Rodolphe Gaucher[5], Jérôme Jacob[1], Nathalie Gineys[4], Agnès Laboudigue[2]

[1]BRGM, 3 av. Claude Guillemin, 45060 Orléans, France
[2]Ecole des Mines, bd de Lahure, Douai, France
[3]ISSeP, Colfontaine, Belgium [4]CTP, Tournai, Belgium [5]INERIS, Verneuil, France

Phone: +33-(0)-238-643504
E-mail: b.lemiere@brgm.fr

Introduction: Sediments accumulating in waterways affect navigation, and are a concern for flooding hazards and their pollutant contents. Waterways dredging releases millions of m3 of sediments. A large part is contaminated or polluted enough to be considered as hazardous waste. Temporary or final storage on land is no longer a sustainable option.

Methods: The GeDSeT decision support tool (DST) aims to provide sediment management options with quantitative data, in order to evaluate scenarios taking into account cost and sustainability and consequently to highlight good practice. Several indicators take into account all the consequences (effects) of the chosen options for the evaluation of different management scenarios ("what-if" tools, [1]). As it is aimed at assessing all consequences of a chosen option (environmental, economic…), the tool is based on multicriteria analysis [2].

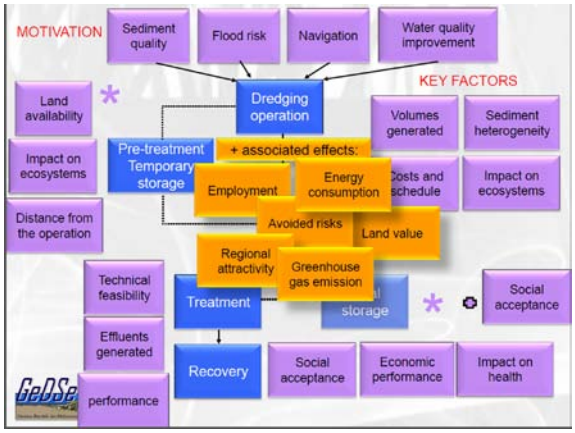

Fig. 1: Data and indicators for the GeDSeT tool.

Results: Scenarios were developed using databases and focused research results [2] through discussions with operators, communities and industries.
Scenario 1: *selective dredging* is a 2-phase scheme in which pollution hotspots are removed before bulk dredging, to improve reusability of sediment.
Scenario 2: *on-site treatment* implies processing sediment on a ship-borne plant. Dehydration benefits include easier handling of output material, and reduction of dredged volume to be managed. Water can be returned to the waterway after treatment.
Scenario 3: *selective treatment* refers to directing sediment loads to a treatment procedure adapted to their pollutant contents (inorganic and/or organic). Treatment may be aimed at reducing contamination under critical levels for sediment reuse, or at concentrating the pollutants for safe disposal.
Scenario 4: *alternative use of sediment*
Selectively dredged or treated sediments may be directed to reuse according to contamination level and regulatory constraints. Potential uses comprise:
- bulk (landfill cover, civil works, backfill),
- composite (mix with demolition aggregate),
- alternative mineral resource (cement production).

Benefits include the reduction of primary minerals extraction and of sediment storage, hence increase of possible waterways dredging operations.
Scenario 5: *alternative use of disposal sites*. Sediment deposits are fertile but unfit for food crops. Energy crops (wood pellets, seeds) would reduce undesirable land use and take profit of fertility without any competition for land with food crops.

Discussion: All these scenarios are aimed at increasing the reuse of sediments, and reducing their disposal as waste. Scenarios 1 and 3 require field analysis methods, currently in development.

The benefits (environmental, land use, employment and economic activity) of such scenarios are not properly accounted for if dredging projects are evaluated at the waterway scale..
The benefits of sediments reuse, at constant budget, are to reduce land pressure and to improve waterways maintenance, offering therefore more possibilities to sustainable fluvial transport. They are identified by enlarging system boundaries [1]

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