

SMARTSEDIMENT project: ready-to-use and tested spatially explicit GIS tool to estimate effects of sediment management on ecosystem services

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Introduction: The SMARTSEDIMENT project (EU Interreg) investigates the ability of innovative sediment management strategies to contribute to sustainable management of the Scheldt delta (Belgium, Netherlands) for maintaining biodiversity and protecting ecosystem services (ES). As part of this project, we developed a spatially explicit tool (Q-GIS) which managers can use to investigate and demonstrate the effects of different sediment management strategies on the delivery of ES.

Methods: At the start, the most relevant ES for the context of estuaries and sediment management were selected [1]: food provision (fish, shellfish and crustaceans), water and space for navigation, provision of raw materials (sand), water quality regulation, climate regulation (carbon storage), regulation of flood risk, recreation. Additionally, effects on habitat diversity and biodiversity are also considered. To make use of the state-of-the-art knowledge on estuary functioning, a conceptual model was developed. This model allowed to get insight into the different effect chains from the sediment management strategies on the selected ES. Following the conceptual understanding of management effects, calculation rules were developed, based on best available knowledge and data, to quantify effects of sediment management strategies on the selected ES. Next, the calculation rules were implemented in a Q-GIS plug-in (open access). This is based on the ECOPLAN-SE tool that was developed for scenario analysis in Flanders (terrestrial ecosystems) [3]. After finishing the demo tool, the tool was validated by analyzing current sediment management practices and comparing the outcome with monitoring results. In the last step, scenarios for new innovative sediment management strategies were analyzed with the tool to investigate its potential impact on ES.

Results: We developed a ready-to-use and tested GIS tool to assess the impact of a diversity of sediment management strategies in estuaries on 7 ES. State-of-the-art knowledge and data on ecosystem processes and the relationships with the 7 ES is used to develop

the impact calculation rules. The GIS tool allows managers and decision-makers to assess impacts on the management site and on the whole system. The tool also allows for the assessment of temporal effects by comparing different time steps after the management project (after 1 year, 2 years, 5 years) compared with the reference situation before the project.

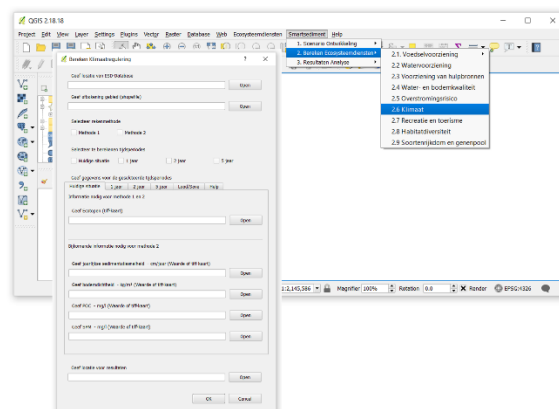


Figure 1: Screenshot of the plugin interface in Q-GIS.

Discussion: The tool is developed and tested for 8 sediment management strategies in the Scheldt Delta (Netherlands, Belgium). The underlying methods are transferable to other estuaries and deltas.

References: [1] Boerema et al. (2018) UA ECOBE report 018-R222; [2] Boerema et al. (2018) UA ECOBE report 018-R223; [3] Vrebos et al. (2017) UA ECOBE report 017-R202.