Sediment quality guidelines in Belgium: approach and implementation

Johnny Teuchies[1], Kristine De Schamphelaere[1], Ward de Cooman[2], Goedele Vanacker[3], Philip Spadaro[4], Hanne Hetjens[1], Patrick Meire[1], Ronny Blust[1]

[1]University of Antwerp, SPHERE, Groenenborgerlaan 171, 2020 Antwerp, Belgium
[2]Flanders Environment Agency , Dokter De Moorstraat 24-26, 9300 Aalst, Belgium
[3]Flanders Public Waste Agency , Stationsstraat 110, 2800 Mechelen, Belgium
[4]The Intelligence Group, 1200 Westlake Ave North Suite 809, Seattle, USA

Phone: +32-(0)- 653533
E-mail:
johannes.teuchies@uantwerpen.be

Introduction: Comparable to many European industrialized and densely populated areas, Flanders (Belgium) is confronted with large amounts of (historically) contaminated sediments. For aquatic ecosystems in the EU, the Water Framework Directive focusses on water quality and corresponding water quality standards. Sediment quality and related guideline are not (yet) directly addressed within this framework. In Flanders different sediment quality guidelines with different objectives exist, e.g. (1) guidelines for reuse of contaminated sediments, (2) guidelines for dumping of dredged sediments or (3) reference levels of non-contaminated sediments.
Increasing demand for use of the historically industrialized waterfront throughout Flanders has motivated an interest in a more coordinated approach in which investigation of contaminated upland sites would involve a collateral evaluation of the likelihood of potential sediment contamination. A risk based approach to evaluate contaminated sites and decide on cleanup is under development at present.
Comparing total concentrations with sediment quality guidelines (SQG) is often the first step in sediment quality assessment [1]. Also in Flanders SQG will be used for a first screening and decision on further investigation. SQG can be derived on a variety of approaches [2].

Methods: To explore the possibilities on implementation of SQG in the risk assessment procedure for Flanders, different datasets are explored: (1) a list of existing national and international SQG used in legislation, (2) existing SQG in scientific literature, (3) a dataset of contaminant concentrations in sediments in Flanders to define baseline concentrations and to explore how realistic the defined benchmarks are and (4) a large triad dataset (data on chemistry, biology and toxicology) for sediments in Flanders to explore possibilities to set site specific SQG.

Results: Existing SQG cover a very wide range of approaches, goals and concentrations. It is very difficult to define one set or a subset of several values which can be used within the specific goal and aquatic systems in Flanders. Even though Flanders is relatively small, a large range of different types of aquatic systems including streams, estuaries, harbor docks, canals, coasts, ….) and a large range in contaminant concentrations exist. Data on concentrations, biology and toxicology are used to define site specific guidelines.

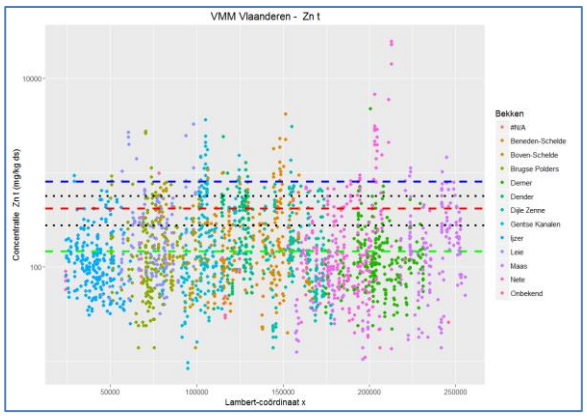

Fig. 1: Zink (mg/kg) concentrations in sediments in Flanders for different streams. Possible guidelines included as lines.

Discussion: In Flanders SQG are needed to define a threshold above which an elaborated risk assessment should be performed in order to decide if cleanup is needed (Fig. 1). Based on the available data, different sets of SQG are defined. Guidelines were compared in terms of applicability: (1) can guidelines predict negative effect on biota, (2) is it possible to include bioavailability, (3) can guidelines be site specific and (4) prevent that guidelines are too strict to be realistic.

References: [1] Simpson & Batley. (2016) CSIRO publishing. [2] Wenning et al. (2005) SETAC press.