

Different rivers, common problems – Linking chemical and ecological status in polluted sediments of three different European river basins

Sebastian Höss¹, Lieven Bervoets², Raf Elst³, Sonja Faetsch⁴, Hanne Hetjens², Will Mayes⁵, Jeannette Rotchell⁵, Els Ryken³, Johannes Teuchies², Walter Traunspurger⁶, Paul Walker⁷, Susanne Heise⁴

¹ Ecosa, Giselastr. 6, 82319 Starnberg, Germany; ² University of Antwerpen, Belgium Phone: +49-(0)- 8151.5509172
³ Flanders Environment Agency, Belgium; ⁴ Hamburg University of Applied Sciences, Germany; ⁵ University of Hull, UK; ⁶ Bielefeld University, Germany; ⁷ Socotec, UK E-mail: hoess@ecossa.de

Conference theme number(s): Sediment quality assessment (1)

Introduction: Contaminated sediments are still a major obstacle to achieve good chemical and ecological status in aquatic ecosystems, with the consequence that less than half of the EU's water bodies are in good status. Due to contaminant effects on sediment dwelling organisms, sediment-associated contamination contributes to disruption of the whole aquatic ecosystem because of benthic-pelagic food web coupling, which is a natural component of nutrient cycles influencing benthic and pelagic food webs and by that the ecological status. Weight-of-evidence (WoE) approaches, such as the sediment quality triade, using various lines of evidence (LoE) based on chemical, toxicological and ecological information, can help to reliably determine sediment quality and to identify cause-effect relationships and thus allow a more effect-directed decision making in water management. However, there is a lack of specific pollution-sensitive metrics, and many macroinvertebrates in data of the EU water framework directive are not exclusively endobenthic and are to a large extent exposed rather to contamination in the water phase. These shortcomings may lead to misinterpretations of cause-effect relationships and, in the worst case, to inappropriate water management actions. Sediment-based LoEs (sediment quality guidelines; sediment toxicity tests; endobenthic bioindicators) might be more appropriate to reliably determine sediment quality and predict the risk of contaminated sediments for the aquatic ecosystem. The EU Interreg project "Sullied Sediments" aimed to provide the tools for sediment assessment to enable better risk assessment and reduce economic costs.

Methods: contaminated sediments were sampled at three different river basins in Germany (Elbe), UK (Humber) and Belgium (Scheldt) over a period of 21 months (9 sites; 6 sampling campaigns) for analyzing physico-chemical properties, potentially toxic chemicals, ecotoxicity and the endobenthic invertebrate fauna. As LoEs, the toxic potential based on sediment quality guidelines (LoE1), the ecotoxicity based on a toxicity test battery (bacteria, algae, nematodes) (LoE2), and chemical stress-sensitive biotic indices based on endobenthic macro-

invertebrates (Biotic Sediment Index; BSI) and meio-invertebrates (NemaSPEAR[%]-index) (LoE3) were applied.

Objective: The aim of this study was to evaluate the sediment quality triad as a tool for a more reliable and, thus, better decision making for water managers. On this poster, we will show and discuss the different combinations of the LoEs, conclude on the sediment quality status at the 9 sites and address potential causes. We will point out additional information that may be needed for assessing the environmental risk from the respective sites.