Impact of polluted sediments on biodiversity

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Introduction:

Assessment and conservation of biodiversity has been one of the important topics in recent years. Trends and causes of species loss have been discussed at local, national and global scales. A bad ecological status and a reduced biodiversity of aquatic ecosystems can be caused by three main factors namely deterioration of the habitat quality, eutrophication or pollution. It is not clear yet whether it is possible to distinguish the relative impact of these three causes on a basin scale or at a site scale. However it would be useful if the monitoring data gathered within programs implemented in function of Water Framework Directive (WFD) could indicate the major disturbing causes. Therefore we analysed within the MODELKEY project all the available monitoring data of four river basins, Danube, Elbe, Llobregat and Scheldt and try to identify the major stressors responsible for a reduced biodiversity.

Results and discussion:

Analysis of the monitoring data of the four river basins indicated that the macroinvertebrate community is affected a lot by eutrophication, but contaminants can also be identified as major stressors as the relevant data are available. Most data of contaminants were available for the Scheldt river basin and it is clear that diversity over there is mostly impacted by contaminants present in the sediment (fig. 1). This is confirmed if we focus deeper on small scale gradients of pollution (fig. 2). The results of the MODELKEY project clearly prove the huge impact of contaminants in the sediment on the biodiversity and thus the ecological states of waterbodies.
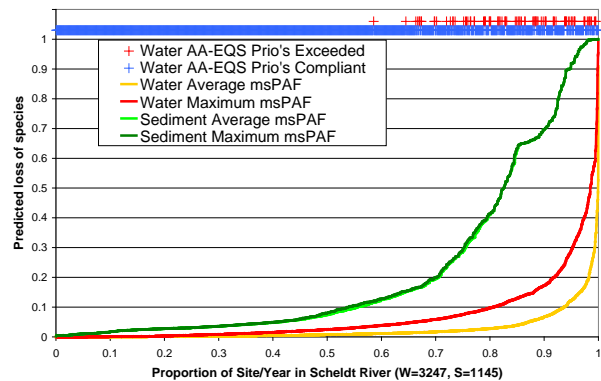

Figure 1 Average and maximum predicted loss of species plotted against the proportion of site/year. The green lines indicate the impact of contaminants present in the sediment, the red and yellow line the impact of contaminants in the water phase (after De Zwart et al, 2009.
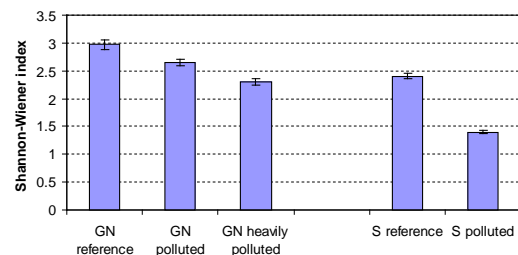

Fig. 2: Bootstrap estimates (2000 permutations) for the Shannon-Wiener index of diversity, calculated from data sampled in spring 2005. Vertical bars give the 95% confidence limits.