Impact of high water discharges of the Elbe River on toxicity in the estuary

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Introduction: Climate change (CC) is expected to have a variety of influences on the quality of urban and coastal waters. Temperature increase and shift of salinity boundaries could change degradability and bioavailabilty of pollutants. In Northern Europe, the load of contaminants from land to sea could increase due to increased rainfalls and surface-run off, as well as due to resuspension of legacies of the past by high floodings of the river.

2 projects have started in Hamburg in 2009, that deal with these aspects on a national (KLIMZUG) and on an international (DiPol) scale focussing on the North Sea area. Presented here will be the studies on the German case site, the tidal part of the Elbe River. Contamination is carried to the estuary coming from (former) industrial areas in the Middle and Higher Elbe. Potentially also local industrial, urban and agricultural sources can add to the amount of contaminated sediment.

Methods: Suspended sediment samplers have been deployed in ecologically important wadden areas, in harbour basins that contain contaminated sediments but are open to the river, in urban canals and at the mouth of the river. The trapped material is analysed with a biotest battery and for chemical contaminants.

Results and Discussion: First results indicate a strong seasonal variation of toxicity in wadden area sediments in the estuary. Strong influence of the Elbe river during events of high water discharge seems to increase toxicity significantly: While the canals that cross the River Island "Wilhelmsburg" do not show high toxicity, the wadden areas in the tidal Elbe show a response which could be attributed to historical contaminants remobilized by flood events.

Results are integrated into a regional risk model for the area. A first example is shown for an easy-to use and adaptable version which should help stakeholders in prioritizing future measures.