

Multiple Stress Factors affecting Sediments in the Estuaries of Elbe and Odra

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Introduction: Estuaries are among the most productive ecosystems and simultaneously among the most threatened because of damage to their ecological functions by conflicting human activities [1]. Drastic changes in estuaries are caused by increasing industrial pressure (shipping and construction), human population growth, tourism, pollutant and nutrient inputs, and climate change [2]. In addition, the destruction of riparian wetlands and benthic habitats (e.g. through dredging of navigation channels) impact communities and feeding relationships up to fish and seabirds. Maintaining viable and healthy estuaries therefore requires a detailed understanding of essential system characteristics and linkages, as well as novel measures to conserve these valuable and important coastal systems [3].

Project description: The goal of the Blue_Estuaries project (BluEs) is to gain a comprehensive understanding of the major stressors and critical biological processes in the Odra and Elbe estuaries in terms of their potential responses to climate change and human activities. These stress factors include, among others, chemical pollution, eutrophication, and dredging. In both estuaries, for example, navigation channels will be deepened during the study period (2020-2023), which may lead to remobilization of contaminants during resuspension of sediments.

The BluEs project will combine existing data bases with latest research approaches in order to assess the effects of pollution, an excess supply of nutrients, temperature and hydrological changes in the Odra and Elbe estuaries in their interaction, and their impact on the ecosystem. The project consortium consists of scientists working in the fields of environmental toxicology, biogeochemistry, fish biology, anthropology, protected area management, and ecosystem modelling, as well as relevant stakeholders from authorities and associations.

The focal point of our work within BluEs will be to investigate the role of sediment bound contaminants in the Elbe and Odra estuaries. For this purpose, sediment and water samples will be collected and their ecotoxicological effects on organisms of different trophic levels (e.g. bacteria, microalgae, daphnia, and nematodes) will be investigated. As an indication of the health status of the local biological communities, an analysis of the meiobenthos composition will be carried out (Nema-SpeAR-Index). Concentrations of pollutants will be determined, and the Toxic Unit concept will be used to determine how much of the

ecotoxicological effect can be attributed to the measured pollutants. A specific issue will also be the importance of pollutant adsorption on the surface of pelagic microalgae and the resulting horizontal transport within the estuary, as well as the vertical transport within the food chains by an increased contribution to bioaccumulation and possibly biomagnification.

In the course of the project, a quantitative model of complex cause-effect relationships will be developed for each of the two estuaries, compiling data from all work packages which, next to the sediment issues, comprise analysis of the pelagic food web structure in the light of multiple stressors and the benthic-pelagic coupling. Using the iModeler software to set up this model, those stress factors can be identified, that can be actively influenced and which could thus be managed to have the greatest sustainable effect on the ecological system. On this poster the project will be introduced and first results will be presented.

References: [1] Vasconcelos et al. (2007) *Science of the Total Environment* **374**: 199–215; [2] Lotze et al. (2006) *Science* **312**:1806-1809; [3] Kennish (2002) *Environmental Conservation* **29**:78-107.