Use of the Ecosystem Service approach for integrated estuarine management

Wolfstein, Kirsten[1], **Jacobs, Sander**[2], **Meine, Manfred**[1]

[1]Hamburg Port Authority, Neuer Wandrahm 4, 20457 Hamburg, Germany
[2] Instituut voor Natuur- en Bosonderzoek, Kliniekstraat 25, 1070 Brussel, Belgium

Phone: +49-(0)-40428473053
E-mail: Kirsten.Wolfstein@hpa.hamburg.de

Introduction: Estuaries are amongst the most socio-economically and ecologically important environments. They are used in manifold ways, e.g. for tourism, shipping, industries, fisheries, etc. At the same time, most European estuaries are designated Natura 2000 sites. Hence estuarine management has to face many challenges as it has to ensure the protection of natural characteristics and the maintenance of economic uses.

Estuaries deliver a large amount of Ecosystem Services (ES) such as water for navigation, biodiversity, erosion and sedimentation regulation by water bodies. The Ecosystem Services Approach connects ecological, societal and economic aspects. It can be used to assess competing demands on all types of ES and can also integrate the diverse values for a variety of stakeholders interested in a particular ES. Therefore the approach can be used to support sustainable and practical decision-making in estuarine management.

The EU INTERREG IV B project TIDE (Tidal River Development) has addressed the necessary ingredients for a sustainable estuarine management strategy by using the four estuaries Elbe, Humber, Scheldt and Weser as test cases. This project has applied the concept of Ecosystem Services as a central element of an integrated management.

Methods: TIDE has brought together relevant interdisciplinary scientific expertise and partners of various institutions related to estuarine science and management in order to provide knowledge on estuarine functioning and the delivery of ES. A list derived from the TEEB project (The Economics of Ecosystems and Biodiversity) has been used by 4 Regional Working Groups to determine the demand of ES in the TIDE estuaries. Maps showing the supply of the ES have been created for the four estuaries by using average supply scores of each habitat type. Further the importance of estuarine habitats for the delivery of ES has been determined resulting in a qualitative supply score for every service by every habitat. The expected effect of a broad set of 38 selected management measures on ES supply was assessed.

Results: The survey led to a list of 20 ES which were considered to be the most important in the four estuaries. It could be shown that the ES demand in the four estuaries is very similar, due to the fact that they are very similar both under ecological and socio-economic aspects. Of the 10 services with the highest demand, 7 were regulating for hydro-geomorphologic aspects and 2 were directly linked with navigational or industrial use of water.

The analysis on the expected effect of management measures showed that increases of the ES habitat ("biodiversity") have the highest significant correlations. Since most measures considered were biodiversity-targeted and examples of good practice, high scores for supporting, regulating and cultural services are expected while the anticipated impact on provisioning services is limited. Main results of the analysis, e.g. similarities and differences between the four estuaries will be presented.

Discussion: All ES depend on certain common key drivers, such as discharge, morphology, pollution and nutrient loads. These affect ES directly or indirectly by impacting on quality and amount of certain habitats. Estuarine management therefore influences the supply of ES by for example implementing particular management measures. Decisions have to be taken on which habitats should be maintained/ restored in order to stimulate certain ES. For decision making processes it is recommended to determine and consider the most important ES necessary to pursue a pre-defined overall objective (vision) of the estuary including the demands of respective society/residents.

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