

# Introducing ecosystem services of sediments into maritime spatial planning with the focus on Polish experience

**Ilona Kamińska<sup>1</sup>, Jacek Zaucha<sup>2</sup>**

<sup>1</sup>Institute of Oceanography, University of Gdansk, Bazynskiego 1A St, Gdansk, Poland Phone: +48-58-523-6870

<sup>2</sup>Maritime Institute in Gdansk, Dlugi Targ 41/42 St, 80-830 Gdansk, Poland

E-mail: oceika@ug.edu.pl

**Introduction:** The paper seeks to answer the question concerning opportunities and implications of using the economic evaluation of regulating ecosystem services for the marine spatial planning using sediments as a testing ground.

Although 70.8% of the Earth constitutes the oceans, and most of the ocean floor is covered by sediments, there is still much to learn about ecosystem services provided by the marine benthic environment [1]. Sediments provide people with all categories of ecosystem services identified under The Millennium Ecosystem Assessment [2]. The pressure on the sea bottom exploitation is growing, whereas knowledge of less visible services of sediments is far from being complete at least among spatial planners. Regulating services are a part of such a knowledge gap. They require a more in-depth description and analysis in order to become a routine theme of the planning efforts.

One of the key benefits from sediments (positive external effects) is the removal mechanism for nitrogen from aquatic systems which mitigates eutrophication [3]. To better understand a magnitude of such type of benefits, the economic value of natural mitigation of a eutrophication service provided by sediments of the Gulf of Gdansk was estimated bas on replacement costs. On that practical basis the usefulness of such type of information for maritime spatial planning has been discussed.

**Methods:** The combination of two non-market goods valuation methods, i.e. the Replacement Cost Method and the Contingent Valuation Method was used to assess the economic value of mitigation of a eutrophication service. The use of direct and indirect methods eliminates mistakes connected with the construction of a hypothetical market, as in the case of using the CVM. It is assumed that the RCM, under certain conditions, can be used for the valuation of indirect use values and a perfect substitute may provide the same non-use benefits as the natural system [4].

**Results:** Economic value of a mitigation service in the Gulf of Gdansk based on a replacement cost is from 2.5 m € to 3.1 m €. However, it should be noted that the mitigation of eutrophication in connection with the definition has much broader range in terms

of involved processes. Thus, this value might be regarded as a lower bound of the socio-economic value of this service.

**Discussion:** Only one out of the many benefits provided by the Gulf of Gdansk ecosystem was estimated. In the context of marine spatial planning there is a need to estimate value of benefits which are provided by sediments also in the frame of other types of ecosystem services. To make the marine spatial plans deciding upon conflicting uses, the monetary value of various benefits might provide a useful insight and guidelines. Nonetheless, at the same time they can bias planning towards quantifiable benefits only. Many research questions are still pending. What form of the results of economic valuation is needed to support a knowledge based (evidence based) decision in marine spatial planning? To what extent will the understanding of space requirements change if we introduce economic values to MSP?

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