REDUCING EUTROPHICATION IN THE BALTIC SEA: A CONTINGENT VALUATION STUDY ACROSS NINE LITTORAL COUNTRIES

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Abstract:

Eutrophication remains one of the most significant ecological problems of the Baltic Sea, reducing the benefits provided by the marine ecosystem services. Protection of the Baltic Sea has been called for on many occasions (see e.g. Baltic Sea Action Plan, BSAP; HELCOM 2007, or European Union Marine Strategy Framework Directive, MSFD; 2008/56/EC), and the need for cooperation between the nine littoral countries is evident. The BSAP and the MSFD have a common objective to achieve 'good environmental status' in the Baltic Sea in 2020 (MSFD) and 2021 (BSAP), which – among others – means reducing human-induced eutrophication by controlling nutrient loads. Designing sustainable and socially-optimal management strategies requires country-specific knowledge of the economic costs and benefits of achieving the good environmental status of the Baltic Sea. Substantial research effort has been devoted to identifying cost-efficient measures to reduce nutrient loads to the Baltic Sea (e.g. RECOCA 2011; Gren and Wulff 2004; Elofsson 2003), while the economic benefits of reducing Baltic Sea eutrophication remain to large extent unknown. A previous international study was conducted in selected countries in the mid-1990s (see e.g. Turner et al. 1999 and Markowska and Żylicz 1999), but due to methodological shortcomings of this study and economic development, these benefit estimates are unsuitable for cost-benefit analysis. Our study aims at filling this gap by linking state-of-the-art ecological modeling with valuation of ecosystem services. We report the results of a contingent valuation study conducted in all nine countries around the Baltic Sea in 2011. With identical surveys and over 7000 responses, the study investigated how people use the Baltic Sea, what attitudes they have towards the marine environment and cooperation between the countries, and elicited willingness to pay measures for two future eutrophication scenarios. The eutrophication scenarios, built on 50% and 100% nutrient loading reduction targets set by the HELCOM's BSAP, were based on biogeochemical modeling of open-sea conditions (Ahlvik et al. 2011, Pitkänen et al. 2007). Modeling results were combined to create color maps illustrating the level of eutrophication in each Baltic Sea basin, and the maps were used to present the scenarios to respondents. Eutrophication was described by a five-step water quality scale in terms of water clarity, blue-green algal blooms, underwater meadows, fish species composition and oxygen conditions in deep sea regions. The spike model and grouped data model were used to estimate the mean willingness to pay, representing the benefits of ecological improvements of the sea in each country. The results provide a valuable input for cost-benefit analyses of reducing the eutrophication of the Baltic Sea, and support decision-making by allowing for the calculation of efficient country contributions to the costs of reducing nutrient loads.