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Conflicting goals and best strategies for reaching Good Environmental Status in the Baltic Sea

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There has been growing interest in the need for a sustainable utilization of marine resources and sound ecosystem-based management, which is reflected by the establishment of various legal frameworks. All of these frameworks apply an integrated indicator-based approach to managing human activities based on the best available scientific knowledge about the ecosystem.

However, the highly stochastic, interlinked and complex dynamics of marine ecosystems make it particularly challenging for marine managers to evaluate the best strategies for maintaining ecosystem integrity and achieving Good Environmental Status (GES) across various system components. The latest computational developments show a great deal of potential as tools for decision-support and management strategy evaluation for data certification and knowledge transfer but have not been widely used on marine indicators.

Here, we present a new framework, a synthesis of already existing approaches, that will facilitate the influx of information that politicians and managers need to make sound decisions to achieve cost-effective improvements in environmental status, based on expert knowledge and stakeholders' opinion. With this framework we are able to assess the overall ecosystem status and the evaluation of potential trade-offs between objectives, introduces best strategies for achieving GES based on a suite of robust indicators and guides management actions.

We demonstrate the framework in the context of the Baltic Sea and show the implications of different management strategies in tackling the key problems of eutrophication and overfishing. This approach will provide managers with a simple decision-support tool in their mission to achieve healthy and sustainable European marine waters.

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