Conceptual framework and first practical tests for a cumulative effects assessment with regard to the Marine Strategy Framework Directive

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Abstract

Comprehensive assessments of the ecological status based on the integrative ecosystem approach need the integration of cumulative effects to provide a more realistic picture of actual impacts on the environment. Within a research project funded by the German Federal Environmental Agency, we developed a modular and flexible concept for cumulative effects assessment, which allowed the handling of different levels and qualities of information while maximising the integration of available information for the assessment.
The overall concept combines matrix models, individual based models and geographical analyses. The systematic organisation and integration of literature data for the different modules is facilitated by a literature database and analysis tool with various graphical and tabular outputs for the cumulative effects analyses.

First promising tests of the concept were conducted for blue mussels (*Mytilus edulis*) as well as for seagrass species (*Zostera spp*) with a selected number of pressures.
The concept can easily be adapted to other species groups or other types of pressures and addresses the holistic ecological view of the Marine Strategy Framework Directive. However, the huge number of theoretical possible cumulative effects and the complexity of their pathways and combined impacts are still big challenges and need further development.

Keywords: cumulative effects, Marine Strategy Framework Directive, seagrass, mussels, online tool, assessment, DEB model

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