An integrated assessment framework for the analysis of multiple pressures in aquatic ecosystems and the appraisal of management options

Abstract:
The contribution illustrates an integrated assessment framework aimed at evaluating the relationships between multiple pressures and water body status for the purposes of river basin management. The framework includes the following steps. (1) Understanding how the different pressures affect the status of water bodies. This entails the characterization of biophysical state variables and the definition of a causal relationship between pressures and status. Therefore this step involves interaction between experts bearing ecological understanding and experts providing models to represent the effect of pressures. (2) Identifying the relevant pressures to be addressed through appropriate measures to improve the status of water bodies. (3) Evaluating reduction targets for the relevant pressures identified in a river basin, on the basis of a proposed, simple multicriteria optimization approach, which requires a qualitative weighting of the effort associated to reducing individual pressures and the assessment of potential benefits in terms of water body status. This method produces frontiers of optimal trade-offs between effort spent on measures and achievements. (4) Designing management measures through a creative process and political discussion of alternative options, balancing costs, benefits and effectiveness based on engineering and economic analysis. (5) Simulating scenarios of implementation of a programme of measures in order to check their effectiveness and robustness against climate and land use change. We discuss the five steps of the assessment framework highlighting how the interaction between science and policy is involved in the different stages. We review the assessment tools required at each step and for setting optimal pressure reduction targets (step 3) we propose a simplified approach based on semi-quantitative assessment of the entailed efforts.

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