



Integrating Water Quality and River Rehabilitation Management - A Decision-Analytical Perspective

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Integrative river management involves difficult decisions about alternative measures to improve their ecological state. For this reason, it seems useful to apply knowledge from the decision sciences to support river management. We discuss how decision-analytical elements can be employed for designing an integrated river management procedure. An important aspect of this procedure is to clearly separate scientific predictions of the consequences of alternatives from objectives to be achieved by river management. The key elements of the suggested procedure are (i) the quantitative elicitation of the objectives from different stakeholder groups, (ii) the compilation of the current scientific knowledge about the consequences of the effects resulting from suggested measures in the form of a probabilistic mathematical model, and (iii) the use of these predictions and valuations to prioritize alternatives, to uncover conflicting objectives, to support the design of better alternatives, and to improve the transparency of communication about the chosen management strategy. The development of this procedure led to insights regarding necessary steps to be taken for rational decision-making in river management, to guidelines about the use of decision-analytical techniques for performing these steps, but also to new insights about the application of decision-analytical techniques in general. In particular, the consideration of the spatial distribution of the effects of measures and the potential added value of connected rehabilitated river reaches leads to favoring measures that have a positive effect beyond a single river reach. As these effects only propagate within the river network, this results in a river basin oriented management concept as a consequence of a rational decision support procedure, rather than as an a priori management paradigm. There are also limitations to the support that can be expected from the decision-analytical perspective. It will not provide the societal values that are driving prioritization in river management, it will only support their elicitation and rational use. This is particularly important for the assessment of micro-pollutants because of severe limitations in scientific knowledge of their effects on river ecosystems. This makes the influence of pollution by micro-pollutants on prioritization of measures strongly dependent on the weight of the precautionary principle relative to other societal objectives of river management.