Coping with change and its uncertainty in water management: Qualitative system analysis as a vehicle to visualize the plurality of practitioners' uncertainty handling routines

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Accelerated environmental and societal change and its dynamic and coupling present a challenge for water resources management as uncertainty becomes a major issue. In order to derive sustainable decisions, the decision-making process needs a rigorous integration of uncertainties. However, science informing policy/practice is challenged by making science's useful uncertainty information usable for decision-makers. We know that practitioners have developed a plurality of routines to cope with uncertainties and we analysed in detail by whom, when and where in the decision-making process these uncertainty routines are used. Based on expert elicitation, we show that depending on the business level unit affiliation and depending on the time horizon of the management objective practitioners use different uncertainty routines and thus are in need of more tailor-made uncertainty information. By deploying a qualitative systems modelling approach using the example of reservoir management under changing conditions we highlight this plurality. The results show, that the qualitative system model serves as a boundary object that visualizes the intersection of uncertainty routines and fosters cross-communication and acknowledgment of different perspectives among practitioners. Moreover, it provides a clear understanding of uncertainty information needs which scientist may cover to increase the usability of their research findings. This research, therefore, contributes to highlight the plurality of practitioners' perspectives on decision-making under change and uncertainty in water management. Furthermore its findings may enable social learning by providing a vehicle for uncertainty acknowledgement and integration which is of utmost importance to derive sustainable solutions to water related problems.