



Scenario-based decision making in water resource management: A case study in the Yellow River Delta

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Decision making in water resource management encounters difficulties due to uncertainties about the future. Scenarios are useful to explore uncertainties and inform decision makers to take actions. Scenarios are originally used to describe the future states in the form of storylines. These are then supplemented with numerical information from model predictions and expert judgement. Probabilities are attached to scenarios to encourage the specific explanation of the assumptions and expectations behind the storylines, and communicate the possibility of each scenario. Bayesian probability offers a prior probability on the basis of available knowledge and beliefs at the presence of uncertainties, and allows for updating to the posterior probability as new evidence arises. Bayesian rules are also applicable for decision making given the existing probabilistic scenarios. Decisions can be ranked according to their performance on the utility function given each possible scenario. A case study is provided to find an optimal solution to alleviate the water stress problem in the Yellow River Delta for the next 30 years. Scenarios of water availability and water demand are developed for the planning period. In order to make decisions rationally, cost-benefit analysis is used to evaluate the performance of viable decisions given the probabilistic scenarios.

Key word: Scenarios, Water Management, Uncertainty, Decision making, Bayesian approach