

On the complementary roles of the hydrological analyst and the decision-maker in water resources management

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Abstract Decisions about water resource management are made in the presence of uncertainty about future events, whether these be reservoir inflows, water demand, or the consequences of climate change. The framework for any decision-making process therefore consists of the following elements: (a) a list of future events that may or may not occur; (b) the probabilities of these events; (c) a list of possible decisions, from which one – the “optimum” – must be selected by the decision-maker; (d) measures of the consequences of each decision according to which uncertain event occurs. These consequences may sometimes be expressed in monetary terms (losses), but more often must be expressed in terms of utility. When the optimal decision is that which maximizes expected utility (minimizes expected loss), the paper discusses the roles of the hydrologist and the decision-maker in assessing the elements (a) to (d) above, showing how these roles complement each other. In particular the role of the hydrologist in determining probabilities (item (b) of the above) is discussed, in the context where probabilities must be evaluated for events which have not occurred in the past. The paper also shows why maximizing expected utility (or minimizing expected loss, when consequences can be expressed in terms of money) is better than minimizing the maximum loss (MINIMAX) criterion for selecting the best decision.

Key words risk; probability; decision-making; degrees of belief