

Reservoir operation and the frequency of decision making

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Abstract Restricting water use during times of drought is an accepted practice in many arid countries to ensure the sustainable use of reservoirs and large systems of interlinked reservoirs. The timing and magnitude of restrictions, referred to in this paper as an operating rule, has been investigated in terms of how often the decision is made as to whether or not to apply restrictions at any point in time. The current practice in South Africa is to make a decision once a year based on the state of storage in the reservoir or system of reservoirs together with stochastic projections of likely inflows over the next 5 to 10 years. The question that is explored in this paper is whether there is an advantage in making this decision more frequently. This analysis has been carried out by adapting an existing water resources model to be able to toggle between annual and monthly decisions. Several hypothetical systems were modelled using both annual and monthly decisions based on the state of storage of the system. The systems modelled varied from those with large carry-over periods, or long critical periods, to those with short critical periods. Multiple users with high and low risk profiles were included in the simulations. The outcome of these simulations in terms of the volume of water supplied to high and low risk users was recorded for each simulation. The conclusion reached is that there is a significant benefit to users from systems with short critical periods to make more frequent decisions on water restrictions rather than an annual decision. Based on this conclusion a recommendation is made about the appropriate frequency of decision making based on the type of system and the risk profile of the user.

Key words Reservoir Operation; assurance of supply; water restrictions; hedging