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Water resources management during droughts in South Africa

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In the past, South Africa's water resources management focus was on the larger systems such as the Integrated Vaal River System, a complex system of interlinked catchments with numerous large dams and transfer schemes. Sophisticated, risk-based stochastic water resources models were developed to better understand the behaviour of the Vaal system, not just for the planning of new water-related infrastructure but also to manage the system during droughts. These water resources tools and techniques were later also applied to other large bulk water supply systems in South Africa such as the Mgeni, Algoa, Western Cape and Orange River systems. More recently, the 'large system' water resources management methodologies were deployed to smaller water supply schemes across the whole of South Africa. While the focus was to develop drought operating rules for small dams supplying rural communities, it was soon realised that even small dams can seldom be managed in isolation. Often there are other water resources supplying communities, such as direct river abstractions, groundwater, desalination and even effluent recycling. Also, while the focus was on rural water supply, the water resource is more often than not shared with other water users, such as irrigators, industrial users and power generation. Hence, what appeared initially to be 'Stand-Alone' schemes, invariably required complex integrated systems modelling to understand the water resource and its utilisation. Once models had been set up for each stand-alone system, operating rules were developed to manage the water resource sustainably. These rules include restricting water use during times of drought. This paper presents the methodologies used, the challenges faced and the lessons learnt during drought management of the smaller systems. In addition to lack of monitoring of the water resource, the necessary skills required to manage smaller bulk water supply schemes were also often identified as stumbling blocks towards efficient water resources management.

Keywords:
Reservoir Operation, drought, integrated water resources management, stochastic, risk