

## **Multi-objective optimization analysis for the Canberra water supply system**

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**Abstract** Planning and management of urban water supply headworks systems is a complex and difficult task. Typically, such systems have not only multiple users with different objectives and risk tolerances, but also multiple sources with different levels of quality. This complexity gives rise to an incredibly large number of infrastructure and operating policy options. This is often complicated by the existence of multiple competing objectives, whereby a gain in one particular objective may result in a loss in another objective. The solution to these problems requires simultaneous consideration of conflicting objectives. Multi-objective optimization deals with the process of simultaneously optimizing two or more conflicting objectives subject to certain constraints. The genetic algorithm is a highly suitable technique for solving multi-objective optimization problems. This study demonstrates the applicability of multi-objective optimization method, in particular, the  $\epsilon$ -dominance multi-objective evolutionary algorithm ( $\epsilon$ MOEA) for an urban water supply system.

**Key words** multi-objective optimization; genetic algorithm; water supply