Portfolio optimisation of water management investments

Oswald Marinoni, Andrew Higgins, Stefan Hajkowicz

CSIRO Sustainable Ecosystems, St Lucia, Australia

Abstract

Typical water management or natural resource management decision problems require decision makers to select a subset of available decision options that return a maximum benefit whilst satisfying limiting constraints, usually a budget constraint. This optimisation problem becomes increasingly difficult to solve if uncertainty aspects are being considered and/or as more decision options are included. To tackle this selection problem the multi-criteria analysis tool (MCAT) which contains both multi-criteria functionality and solution methods was developed. The benefit scores for the decision options are computed with the well known compromise programming technique. To optimise the selection of options subject to the constraints, two heuristics, namely Local Search and Tabu Search were coded. MCAT was primarily developed to optimise water management decision making in Australia. However it can also be used to solve a range of other decision problems in natural resources management as well.