

Hydro-economic optimization under inflow uncertainty using the SDP_GAMS generalized optimization tool

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Abstract The use of methodologies that explicitly take into account inflow uncertainties in the optimization of the management of water resource systems is hindered by the lack of a generalized software. A general-purpose package named SDP_GAMS has been developed, facilitating the resolution of the stochastic dynamic programming problem. It obtains optimal policies, associated optimal benefits and optimal decisions in response to specific inflow time series and demands. The tool has been tested in the Mijares River basin (Spain), with two reservoirs and four major demands. Inflow variability has been described by the use of a 1-lag Markov chain, and a 91-class two-reservoir discrete mesh was used in calculations. Polynomial economic demand curves were used. The results showed that the use of the SDP hydro-economic modelling procedure obtains optimal policies taking into account inflow uncertainty, which can lead to an improvement in the efficiency of water resources systems.

Key words integrated water resources management; hydro-economic modelling; decision support system; stochastic dynamic programming; uncertainty; optimization