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A risk-based interactive multi-stage stochastic programming approach for water resources planning under dual uncertainties

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**Highlights**

- We develop a risk-based interactive multi-stage stochastic programming (RIMSP) approach to reflect uncertainties existing in both objective function and constraints of a general water-allocation optimization system, which enhance the applicability of the traditional methods.
- We can obtain a number of alternatives by setting different combinations of risk levels applied to the stochastic objective function and constraints, which is meaningful for performing an in-depth analysis of trade-offs between total net benefits and associated risks, as well as policies making.
- RIMSP approach is capable of reflecting dynamics of uncertainties and decision processes by constructing a set of scenarios that are representative for all possible random outcomes within a multi-stage context.
- In comparison with IMSP, the RIMSP model can not only provide robust water-allocation schemes, but also reduce the system risk.

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