Water resource allocation for the Songhua River Region, China, under the uncertainty of water supply

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Abstract Water resources allocation (WRA) is a useful and yet complicated topic in water resources management. The solution of WRA may be uncertain due to the uncertainty of the input, the structure itself, and the parameters of the models. So far, very few studies deal with the topic about how much these uncertainties influence the solution and how to adapt the situation. By using Dependent-Chance Goal Programming (DCGP), this paper built a WRA under the uncertainty of water supply for the Songhua River Region (SHRR) located in the northeast of China, one of China's most important commercial grain bases. Two sets of WRA results were obtained under the two ranges of uncertainty relative to bad (S1) and good (S2) water supply situations. Situation S1 takes a higher water shortage rate and S2 takes a lower water shortage rate than the routine WRA results by the SHRR Commission's comprehensive plan, but all keeping the rate of water resources exploitation approaching or lower than the international standards. The result helps SHRR to make a more resilient decision to the change of water supply condition in meeting the national needs of Newly Increasing Yield of 10×10^{11} Jin.

Key words water resources allocation; uncertainty; dependent-chance global programming