

Optimized allocation of water resources in the Jiulong River Watershed under cooperative game based on linear programming

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Received 6 August 2021; Accepted 23 September 2021

ABSTRACT

Optimized allocation of water resources in relatively water-scarce areas is the basis for rational development and utilization of regional water resources and the fundamental guarantee for sustainable utilization of water resources. In this paper, game theory and linear programming from the aspect of non-engineering measures are used to construct a cooperative game mode (maximizing economic benefits of urban agglomerations in the watershed) and a non-cooperative game mode (maximizing economic benefits of individual cities in the watershed), and it is concluded that the water consumption benefit of the cooperative game mode in the techno garden scenario (rationality of urban agglomerations in the Jiulong River Watershed) is 64.442 billion yuan higher than that of the non-cooperative game (rationality of each city). Moreover, under this scenario, water resource allocation is optimized and the water quality is also significantly improved. Therefore, the cooperative game is the optimum model for the development of urban agglomerations in the watershed, and more attention should be paid to the comprehensive management of water resources, ecological resources, and human activities from the aspect of the river catchment areas given the particularity of water resources.

Keywords: Optimized allocation of water resources; Cooperative game; Linear programming; Sustainable development

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