

Chahnimeh water reservoir allocation using game theory

Abstract

A cooperative water allocation model (CWAM) is designed for modeling equitable and efficient water allocation among competing users at the basin scale, based on network including node and arc. This model contains two steps: first model is initial water allocation by using Lexicographic minimax water shortage ratios (LMWSR), the water allocated among users. The second step comprises three sub-models: the irrigation water planning model (IWPM) is a model for deriving benefit function of irrigation water; the hydrologic-economic river basin model (HERBM) is a tool for searching optimal water allocation and net benefit various coalitions of stakeholders. The third sub-model is cooperative reallocation game (CRG) that it is a model for allocating equitable net benefit coalition that is allocated by using shaply concept value of net benefit between coalition stakeholders.

The considered duration of the study was a 12 month term that was done for the year 2005. The results of estimate LMWSR model showed that satisfaction ratios for drink water are between 1 and 0.89 and less than one 0.49 for agricultural sector. And also it was calculated less of 1 for water that is allocated to reservoirs. The result of HERBM model is the optimum economical allocation of water. Result comparison to initial allocation on LMWSR model showed that benefits and water allocation on the term that studied was increased for drink water in the optimal allocation state and decreased for agricultural sector than initial allocation. In the reallocation benefit on the base concept of shaply value, maximum benefit was for Zahedan drink water and also has maximum payment side and value added of other stakeholders in the total duration. And the minimum benefit was for agricultural sector.

Key word: Game theory, Water allocation, Chahnimeh reservoir, Sistan



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