Optimal allocation strategies of irrigation water and coastal land under Mollasadra dam in Fars province

Abstract:

In this study, simultaneously allocation of surface and underground waters in coastal farms under Mollasadra dam containing Kamfiruz and Korbal plains is optimized, a cropping pattern based on increase of irrigation efficiency and applying uncertainty condition is provided, and total annual net return of crops in the area is maximized. To achieve these goals, at first deterministic linear programming (DLP) was estimated. Then, by using of chanced constrained linear programming (CCLP) and GAMS software package, uncertainty conditions was applied. To investigate the extent of increasing efficiency impact on irrigation, four irrigation efficiency scenarios of 50%, 60%, 70% and 80% in certainty condition and uncertainty (in three levels of 90%, 95% and 99%) were used. In order to predict the net return of each crop in the area for horizon of the programming, ARIMA model was used. Considering adoption of main crops in the area under study, two types of agriculture, rainfed and irrigated farming in two seasons of spring (dry) and autumn (rainy), 75 decision variables and 73 constrained were proposed in the model. The results of integrated scenarios show that with only 30% improve on irrigation efficiency in the farm, total annual net return of farmers increases from 390 billion Rials to 602 billion Rials and 1 million m³ water will be saved. Therefore, investment in new irrigation systems, which leads to improvement of irrigation efficiency and extension of researches about water saving, is recommended.

Key Words: Mollasadra dam, Kamfiruz plain, Water optimal allocation, Chance constrained
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