

عنوان مقاله:

Achieving Optimal Path of Extracting Groundwater Resources Considering Side Effects in Hamadan-Bahar Plain

محل انتشار:

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نویسندگان:

A. Dadras Moghadam - Assistant Professor of Agriculture Economic, University of Sistan and Baluchestan, Zahedan, Iran

S.M. Seyedan - Assistant Professor of Economic, Social and Extension Research Department, Hamedan, Iran

خلاصه مقاله:

Stable modelling in water resources management, on one hand, requires recognizing the relations between the different applications of water and their long-term results and on the other hand taking into account the current and future access to water resources and demands for them. In recent years, the basin of Kabudarahang plain has been identified as one of the critical groundwater areas in Hamedan province. In this plain, the groundwater level has been decreased remarkably due to lack of the proper water usage management. The purpose of this study is to provide a model to maximize the net benefit of farmers considering the stability of the groundwater reservoir. Since the effect of the groundwater discharge is accumulated over time, time is taken as an essential variable in solving water optimization problems. Accordingly, applying dynamic models such as the optimal control method is appropriate for this purpose. The optimal path for water extraction from groundwater resources can be determined using the optimal control model. In this model, the additional cost of water extraction due to the further exploitation has been considered as a constraint in the modeling process and the effect of the cost internalization are determined by the optimal path of the extraction and the price. Considering the optimal use of water and maximum welfare of the farmers, the results show that it will take about 38 years to increase the water level from 1716 meters to the optimal level of 1749 meters. During this period, the price of water will decrease from 1820 to 1180 Riyals per cubic meter and the annual harvest from the groundwater resources will reduce to the level of 1.7 million cubic meters. Therefore, the observation of the specified limit not only results in stable groundwater resources, but also leads to a sustainable agricultural development and the increase of farmers' income in this area.

کلمات کلیدی:

Optimal Water Extraction, Groundwater Basin Stability, Optimal Control Method, Net Benefit, Water Resources Management, Net Benefits of Farmers

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