Water Consumption and Distribution Management in Tajan Irrigation and Drainage Network with Emphasis on Water Resource Sustainability

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Abstract

Water supply and demand Management plays an important role in the agricultural sector. In recent years, due to inadequate management of agricultural water distribution, agricultural lands in Tajan Irrigation and Drainage Networks are suffering from excessive use of groundwater and salinity. Therefore, the purpose of this study was to investigate the sustainability of groundwater, water consumption, and distribution management in Tajan Irrigation and Drainage Network after implementing water-pricing policies and reducing available water of upstream lands. For this purpose, Positive Mathematical Programming model and the Asano sustainability index were used. The required data were collected from Agricultural Jihad Statistics, direct referral to Jihad-e-Agriculture Organization and Mazandaran Regional Water Company in years 2016 and 2017. The results showed that the situation of water resources in the region is not stable, while changing the cropping pattern and adopting different irrigation policies in the region will increase the sustainability of water resources from 0.45 to 0.27, which corresponds to changing from critical to good situation. The higher price policy for water up to 30% compared to the current conditions has little effect on irrigation water use. However, reducing available water of the upstream lands, in addition to reducing the amount of consumed water and managing its consumption, would improve the economic benefits of the network, with a minimum reduction in the upstream economic benefits. Therefore, in order to contribute to the sustainability of groundwater in the region, it is suggested that managers of the Tajan Network should adopt the policy of reducing available water to the upstream lands.

Keywords:Groundwater sustainability, Positive Mathematical Programming, Water demand management, Water resources management

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