

## Economic Impact of Ensuring the Access to Water by a Dam on Farmers in Ghasredasht Kamin District

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### ABSTRACT

Ensuring access to water reduces the effects of water fluctuations caused by farmers. Under normal conditions, an increase in the reliability of surface water is expected to increase the amount of perennial crops grown and expected farm profits and changes in the distribution of surface water can increase or decrease the amount of supplemental water procured. In this study mathematical model be used to study the effects of water reliability increasing on farmers' income and crop pattern of farm. In this context, the impact of water reliability increasing on farmers' income and crop pattern was then examined using chance constrained programming. For this purpose, expected income maximization model were applied to determine optimal crop pattern, expected gross margin under with and without certainty condition at representative farms of homogenous groups. A sample of 131 farmers was selected for interview and collected necessary farm level data in 2014-2015. The sample farms were drawn using stratified random sampling. The results showed that water reliability increasing lead to increase farmers' income and level of crop compared to the current status. So that the expected earnings for producers who use surface water and combined water in drought conditions, increase by 136.9 -623.9 and 2.01-5.33percent, respectively. Also, results indicated that the largest increasing in expected income as a consequence of the water reliability increasing is directed toward farmers who use surface water from river. These groups of farms ultimately suffered a severe reduction in expected income as a consequence of the drought, water unreliability condition, largely because their access to water was cut substantially. The results also revealed that the least increasing in expected income as a consequence of the water reliability increasing is directed toward homogenous group of farms that use groundwater or conjunctive use of groundwater and surface water. Finally, the results of this study can help farmers to choose crop pattern, irrigation strategies and irrigation method in such a way that farmers' income and water productivity index will be optimized, also due to the effect of increasing the confidence of the amount of available water on farmers' income, it is recommended that this project be considered in the evaluation of water projects that more projects can be implemented.

**Keywords:** Ensuring access to water, dam, expected income, surface water, combined water

### Objectives

Water demand has created a crisis and extends the gap between water supply and demand. Therefore, achieving relative equilibrium in supply and demand for water is a fundamental and essential principle that can only be achieved through systematic management of water resources. But since an aquatic system faces various uncertainties such as the random nature of hydrodynamic conditions, precipitation patterns, rate of river flow, uncertainty in the amount of water available, it has a complex system that has made solving problems a step further and more difficult. Therefore, these uncertainties will increase the uncertainty in the water supply of a system. Reliability is a mean-preserving reduction in the variance of water deliveries or is reducing the probability of

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receiving less than any arbitrary amount of water. An improvement in surface water reliability can increase or decrease the amount of long-run capital investment. The direction of the change depends on whether the investment increases or decreases the productivity of water. Under normal conditions, an increase in the reliability of surface water is expected to increase the amount of perennial crops grown and expected farm profits and changes in the distribution of surface water can increase or decrease the amount of supplemental water procured. Therefore, it is essential that a mathematical model be used to study the effects of water reliability increasing on farmers' income and crop pattern of farm.

### Methods

In this context, the current study first investigated the relationship between Dam and water reliability increasing. The impact of water reliability increasing on farmer's income and crop pattern was then examined using chance constrained programming. For this purpose, expected income maximization model were applied to determine optimal crop pattern, expected gross margin under with and without certainty condition at representative farms of homogenous groups. one of the key inputs in the process of producing is irrigation water crops, the model was designed with the assumption of irrigation water constraint and assuming other factors are sufficient. The optimal cropping pattern and its expected income were obtained at three different probability levels under drought, wet and normal conditions.

A sample of 131 farmers was selected for interview and collected necessary farm level data in 2014-2015 in Ghasredasht Kamin District. The sample farms were drawn using stratified random sampling.

### Results

Based on the rainfall statistics over the past 40 years we have seen 15 wet years, 5 normal years and 20 dry years. Accordingly, annual drought is more than 50 percent likely to occur, and should not be considered as unexpected events, and conditions must be provided for adaptation to this climate and drought management. To establish a year. The results showed that water reliability increasing lead to an increase farmer' income and level of crop compared to the current status. The results showed that water reliability increasing lead to increase farmers' income and level of crop compared to the current status. Farmers who use surface water in the normal year their expected earnings and employment equals 401 thousand tomans and 17.28 people-days respectively, increased compared to a situation where there is no reliable water availability. However, in the group of farmers who conjunctive use of groundwater and surface water, their water is supplied through a well, there is high availability of water. Therefore, dam construction does not have a significant impact on crop pattern and income. As a result, its income increased by 401,000 tomans and employment by 28.27 per day. So that the expected earnings for producers who use surface water and combined water in drought conditions, increase by 136.9 -623.9 and 2.01-5.33percent, respectively. Also, results indicated that the largest increasing in expected income as a consequence of the water reliability increasing is directed toward farmers who use surface water from river. These groups of farms ultimately suffered a severe reduction in expected income as a consequence of the drought, water unreliability condition, largely because their access to water was cut substantially. The results also revealed that the least increasing in expected income as a consequence of the water reliability increasing is directed toward homogenous group of farms that use groundwater or conjunctive use of groundwater and surface water.

### Discussion

droughts and climate change causes uncertainties in water supplies. Due to the increasing uncertainties in the supply of water, the income sources of different of society will be subject to change and risk, that will create economic challenges. the results of this study can help farmers to choose crop pattern, irrigation strategies and irrigation method in such a way that farmers' income and water productivity index will be optimized, also due to the effect of increasing the confidence of the amount of available water on farmers' income, it is recommended that this project be considered in the evaluation of water projects that more projects can be implemented. Based on the cropping pattern presented in each condition of water availability, it is necessary to consider the possibility of water deficit management for farmers. The farmers also select the cropping pattern based on their risk aversion perspective of water availability. Therefore, it is recommended that the farmers have access to water prior to the crop season based on meteorological data for risk management.