

Role of Modern Irrigation Methods and Farmers' Participation in Agricultural Water Consumption Management of Urmia Lake Basin, Iran

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Abstract

Increasing urban and rural water demands in arid and semi-arid regions calls for comprehensive water resources and demands management considering all complications in such areas. Iran, like other semi-arid regions, faces severe water scarcity in most parts especially in Urmia Lake basin. Urmia Lake, the greatest inland salt lake of the country, has been experiencing dramatic shrinkage these years that endangers its existence seriously. Over-extracting water from surface and ground resources especially for agricultural purposes is named as one of the main roots of the Lake's catastrophic situation. The economy of Urmia Lake basin is based on irrigated agriculture due to insufficient precipitation. Therefore agriculture is the main water user sector in this basin. Meanwhile considerable amount of water is lost due to low irrigation efficiency of traditional methods that are still popular among the farmers. Available agricultural data shows that in 2006 pressurized irrigation methods were only applied in 16 percent of agricultural lands of Urmia Lake basin. Furthermore, according to results of site investigations there are illegal wells and also water diversions from rivers all around the basin that make monitoring and control of water withdrawal from surface and ground resources almost impossible. On the other hand in Urmia Lake basin like many other basins in developing countries, management of agricultural development projects is governmental. Although there are limited and local farmers' participations in the basin, farmers are not involved in management and operation of agricultural development projects. Therefore, the lack of organized farmers' participations is essential factor that not only prevents from efficient operation of irrigation and drainage systems but also makes monitoring and management of water withdrawal and consumption nearly impossible. It is proved by experience that agricultural development projects should be managed and operated by farmers' direct participation otherwise, even modern irrigation systems are not operated efficiently. All these led to recommend agricultural water consumption management as one of the main strategies for recovering Urmia Lake. Although agricultural water consumption management is not a short-term solution, it can be resulted in a fundamental action plan for saving the lake and preventing such critical situations in future. Agricultural water consumption management can be implemented by altering traditional irrigation systems to modern practices, adjusting crop pattern according to the amount of available water and climate change

adaptation methods, deficit irrigation, water harvesting, renewing water conveyance and distribution systems and operating and managing development projects with participation of farmers and stakeholders of the basin.

Therefore, this study attempts to demonstrate the role of applying modern irrigation methods in reducing water loss and improving irrigation efficiency to reach an effective agricultural water consumption management in Urmia Lake basin and rescue the Lake from complete drying up.

As it has been mentioned in different researches, one of the main obstacles in way of water resources management in Urmia Lake basin is lack of reliable and sufficient data especially in case of agricultural water consumption as the main water user of the basin (93 percent). Therefore the main step in the present study was proposing a method to estimate agricultural water consumption in this basin. The proposed method resulted from experiences of the same studies in several great river basins of Iran and relevant challenges and uncertainties. Results of field investigations, satellite images, available water withdrawal and agricultural databases were applied to estimate agricultural water consumption amount of Urmia Lake basin. Like many other estimating methods, uncertainties in results are unavoidable due to lack of proper measured and observed records. Therefore, results were controlled and adjusted to minimize errors using available data. The next step was to define scenarios regarding irrigation practice improvement and considering farmers' participations as the main core of agricultural development projects. The final step was estimating agricultural water consumption in the basin due to each scenario and studying the role of each scenario in agricultural water consumption management of Urmia Lake basin.

Results show that by improving irrigation efficiencies from the current traditional irrigation practices (less than 40 percent) to about 65 percent by applying modern irrigation methods total agricultural water consumption would have reached to about 4.5 billion cubic meters instead of 5.3 billion cubic meters. Moreover, Water Productivity (WP) as one of the other important parameters would have improved about 17 percent.

Achievements of this study reveal that altering traditional irrigation practices to modern methods will help to save a considerable amount of water which is valuable for saving Urmia Lake. On the other hand organized farmers' participations will lead to efficient operation and management of development projects which will prevent illegal water withdrawal and improve operation and maintenance of water conveyance and distribution systems.

Key Words: Modern Irrigation Methods; Farmers' Participation; Agricultural Water Consumption Management; Urmia Lake