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**Title:** *Sustaining Profitable and Financially Viable Irrigated Agriculture in an Extremely Water Scarce Region*

**Country:** JORDAN

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**Problem Statement**

Jordan is one of the most water scarce countries in the world. Consequently, water is the single most critical natural resource since virtually all aspects of sustainable economic, social, and political development in the country depend on the availability of an adequate water supply.

Water resources consist primarily of surface and ground water sources. The safe yield of renewable aquifers is estimated at 275 million m<sup>3</sup> (MCM) while ground water abstractions are almost double that. Consequently, the water level in these basins is declining and some aquifers are showing deterioration of water quality due to increased salinity.

There are few remaining fresh water resources to be developed in Jordan. As urban demand for domestic and industrial uses increases, alternative sources of water will have to be utilized. Reclaimed urban wastewater is the only water resource that will become available in increasing quantities. Accordingly, reclaimed wastewater will become an increasingly important element of the national water resource management strategy.

With an irrigated area of about 84,300 ha distributed between the Jordan Rift Valley the highlands and desert areas agriculture is the biggest water consumer. Agriculture in Jordan consumes about 63.5% of all the available water and constitutes 53% of groundwater use. Thus, reducing agricultural demand for fresh water is the most feasible option for reducing the gap between water demand and supply. A 15% reduction in agricultural water use could release approximately 90MCM of water per year; more than 30% of Jordan's current municipal use.

Research carried out in the Jordan Valley during the late 1990s demonstrated that if properly done, agricultural demand for water can be reduced without decreasing the total irrigated area or the value of agricultural production. Indeed, proper water usages along with proper crop selection might actually increase agriculture's contribution to the economy and at the same time decrease its water usage.

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Generally, fully treated wastewater is suitable for unrestricted use in agriculture and for aquifer recharge. In Jordan, about 80 MCM/year of wastewater is treated (secondary treatment) and discharged into various water courses or used directly for irrigation, mostly in the Jordan Valley. By the year 2020 the population is projected to be about 9.9 million with 65% provided with sewerage services, around 237MCM/year of wastewater will be generated.

Reduced overall usage, combined with widespread use of treated wastewater in agriculture, would greatly add to the effective supply of water in the Kingdom. Switching cropping patterns to encourage the import of “virtual water” would further benefit the Kingdom.

The challenges facing irrigated agriculture whether in the quantities of water made available for agriculture or in using or reclaimed water cannot be overemphasized. To sustain irrigated agriculture in the future requires that the skills, awareness and knowledge of the majority of farmers be significantly improved. Farmers need to know crop-water requirements, crop differences in sensitivity to salinity, as well as basic principals of irrigation management and best farm practices.

The objective of improving on-farm water management is to optimize water use at the farm level which involves getting the maximum value output for a minimum input of water.

Farmers need to receive information about the latest technology in agricultural water conservation and crop selection. Decision makers need information about policies supportive of best practices and public support of these policies.

Many constraints are inhibiting efficient and profitable export of Jordanian vegetables and fruits. The traditional business mentality is resistant to change and dominated by short-term thinking; weak information systems fail to prepare Jordanian producers and exporters to understand and meet the demands of foreign markets; unfavorable government policies that regulate prices, support a monopoly in transportation; and the low level of post harvest technology, limited facilities and poor practices that diminish the quality and quantity, need to be addressed if Jordan seeks to optimize the economic return of the water it invests in irrigated agriculture.

## **Objectives**

1. Initiate a long-term program of water-use efficiency in agriculture.
2. Increase value per cubic meter of water used in agriculture.

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3. Encourage appropriate product marketing through regional and international channels.
  4. Upgrade the extension capabilities to sustain and expand water use efficiency techniques and programs developed under the USAID program.
  5. Provide farmers with the information and tools necessary to help them overcome the problems that face the agricultural sector and encourage the development of new attitudes and behavioral patterns.
  6. Implement safe, profitable, socially acceptable and environmentally sustainable wastewater reuse.
  7. Develop local capacity to plan, manage, monitor and properly use reclaimed water.

### **Procedures**

The USAID water program in Jordan has been actively pursuing changes to the existing environment to achieve the objective listed above. It provides support through different efforts:

1. KAFPA'A: Knowledge and Action Fostering Advances in Agriculture. The purpose of this effort is to initiate a long-term program of water-use efficiency in agriculture. This includes increasing knowledge about the issues facing irrigated agriculture and the changes required in the decision-making environment as well as initiating changes in on-farm practices, especially practices that involve irrigation water efficiency. The aim of these changes is to establish a profitable but less water intensive agricultural sector in Jordan that produces fruits and vegetables of high export quality.
2. Evaluation of the Ministry of Agriculture - National Center for Agricultural Research and Technology Transfer (NCARTT). The NCARTT review, undertaken by a team from the US Department of Agriculture, will provide implementable recommendations and a constructive critique and enhancement plan regarding programs of the Center.
3. Wastewater Reuse Implementation (two phases). The purpose of these two efforts is to facilitate implementation of water reuse in Jordan by demonstrating that it is reliable, commercially viable, environmentally sustainable and safe. In addition the effort aims to enhance institutional capacity for reuse management and regulation and to demonstrate to decision-makers and the public at large that reclaimed water reuse provides an effective, viable and safe means of augmenting Jordan's water resources.

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4. Grass Root Community Grants to Promote Water Efficiency. The purpose of this effort is to provide grants to local Community Based Organizations and Public Voluntary Organizations to establish revolving funds that would enhance water use efficiency in those communities in a way that will also improve the communities' lives, augment their income, and/or establish self-sustaining activities. Grantees should contribute positively to rural development and combat poverty at the grassroots level.

### **Expected Main Results**

1. Improve the capacity of farmers and associations to effectively market regionally and internationally.
2. Establish a profitable but less water intensive agricultural sector that produces fruits and vegetables of appropriate quality for export.
3. Create changes in on-farm practices, cropping patterns, and improved domestic and international marketing.
4. Promote more high value, less water intensive crops of suitable quality.
5. Demonstrate improved on-farm water management practices to poor, rural communities through management of community grant programs.
6. Demonstrate improved on-farm water management practices, safe and efficient reuse of reclaimed water, new crop patterns and varieties and proper post harvest techniques through collaboration with natural leaders among local farmers, and from the staff of universities, cooperatives and wastewater treatment plants.
7. Establish a cadre of trained professionals in the areas pursued.
8. Change the enabling environment by revising policies/regulations promoting unsustainable practices and encouraging one that promotes sustainable agricultural use of water resources. Build constituency and advocacy for agricultural water conservation policy.
9. Carry an external institutional review of NCARTT to review and assess its mandate, strategic plan, staffing plans, effectiveness of programs and provide recommendations with implementation potential.
10. Help establish an active and involved high quality extension system that encourages improved farming practices related to on-farm water management techniques, crop

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water requirements, drought resistant crops, cash crops, crops suitable for irrigation with reclaimed/brackish water, rain-water harvesting, and marketing channels.