



## IRRIGATION MANAGEMENT TRANSFER TO WATER USER ORGANIZATIONS IN TURKEY

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### ABSTRACT

Irrigation is very significant issue in dry or semi dry regions like Turkey in order to supply adequate food production for the country. The main task is to manage properly irrigation system developed by government. Like in many countries, irrigation projects have been developed and managed by government organizations in past several decades. At the beginning of 1990s, government changed the policy that might be called reform which transfers operation and maintenance responsibility of irrigation schemes to local authorities.

Up to present, Turkey developed slightly more than half of its total potential irrigable area (8.5 million ha). Taking part in the management responsibility of irrigation schemes, users organized as Water Users Organization (WUO) and took the responsibility of the management from the central government. The logic behind the transfer is to enable efficiency in terms of cost of Operation and Maintenance and higher quality of service in irrigation water distribution. This was to be achieved by the participation of water users.

This paper describes the program and assess its effectiveness from a national perspective. The assessment includes changes in staffing levels, operational costs, service fee levels and cost recovery from farmers.

**Key Words:** Irrigation Management Transfer, Water User Association, Participatory Irrigation Management, Monitoring and Evaluation.

### 1. INTRODUCTION

The purpose of this paper is to clarify the irrigation management reform conducted in Turkey during the last decade. The role of central government in the management of irrigation schemes developed by the State has changed and redefined. Users took the new roles in irrigation management. They are not only service receiver anymore but also provider. It is important to answer why users participation is required for irrigation management in state developed and managed irrigation projects. Irrigation Management

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Transfer (IMT) is an outcome of the government policy that it has been implemented by the State Hydraulic Works (DSI), one of the major government organizations, responsible for developing water resources in the Country. Government has changed policy in irrigation water management from central to local (users). Turkey's uneven rainfall regime necessitates irrigated agriculture. Most of the irrigation projects have been developed and managed by the government. In 1993, DSI initiated accelerated transfer of Operation and Maintenance (O&M) services of irrigation schemes to Water User Organizations (WUOs). Irrigation Management Transfer (IMT) program has become very successful and 95% of DSI built irrigation projects were transferred to WUOs up to present. WUOs performance in O&M of their systems has been considerably satisfied. Sustainability of IMT has been the main concern of the government.

## **2. LAND AND WATER RESOURCES**

### **2.1. GENERAL**

Turkey has settled on a large peninsula between 35-42 north latitudes and has been surrounded by the Black Sea in the north, the Mediterranean Sea in the south and the Aegean Sea in the west. Turkey has a total area of 78 million hectares (mha), of which 76.5 mha is land and the remaining 1.5 mha is water surface. The population of Turkey is about 73 million with annual growth rate of 1.5%. The share of agricultural production in GNP is estimated as about 12% of the total whereas 35% of the total population is dealing with agriculture.

The average annual precipitation (643 mm), ranges from 250 mm at the central Anatolia to over 2 500 mm at the eastern Black Sea coast in Rize province. Meteorological data show that over 96 percent of the country gets inadequate moisture during plants' growing periods. Therefore application of irrigation water is necessary over the whole country to secure agricultural production.

### **2.2. LAND RESOURCES**

Almost one third of total area 28.0 million hectares can be clarified as cultivable land, and according to the recent available comprehensive studies an estimated 8.5 million ha is economically irrigable under the available technology. The total area under irrigation is about 5 million hectares, which includes private and public irrigation schemes (DSI and GDRS projects).

### **2.3. WATER RESOURCES**

Turkey's hydrology is divided into 26 drainage basins. The rivers have generally irregular regimes and natural flows cannot be taken directly as usable resources. Average annual precipitation (643 mm), evaporation and surface runoff geographically vary greatly. The average annual runoff of the country is about 186.0 km<sup>3</sup>, and the total safe yield of groundwater resources was determined to be 14 km<sup>3</sup> by means of comprehensive hydro-geological investigations carried out in Turkey. It is estimated

that 98.0 km<sup>3</sup> of surface runoff and 14 km<sup>3</sup> of groundwater could be technically developed for consumptive purposes.

Presently, the actual consumption from surface waters is 40,1 km<sup>3</sup> per year. This shows that only 37.0 percent of the surface water potential has been consumed. Actual annual consumption of groundwater is 6.6 km<sup>3</sup>. Agricultural sector is the major consumer (74%) of water where as domestic use (15%) and industrial use (11%) follow it with smaller portions.

### 3. IRRIGATION DEVELOPMENT

#### 3.1. IRRIGATION DEVELOPMENT AND MANAGEMENT

Irrigation development in Turkey is carried out by both the public sector, represented by DSI and the private sector (farmers and group of farmers). There was another sister organization called General Directorate of Rural Services (GDRS) that is abolished in 2005. DSI, under the Ministry of Energy and Natural Resources (MENR), is a government organization which has been established in 1954 by law coded 6200. This and the subsequent laws authorized DSI almost all aspects of water resources development of Turkey. DSI is responsible for the execution of the following activities; to investigate, search and develop surface and groundwater resources, to construct protective structures against floods and torrents, to construct irrigation and surface drainage systems, to construct big dams and hydroelectric power generation plants, to operate and maintain dams, irrigation and drainage systems, to supply water for drinking, domestic and industrial purposes for the cities with population over 100 000.

By the end of 2006 DSI completed the construction of 591 dams and developed 2 460 000 hectares of irrigation schemes. Proportion of agricultural sector in the investment budget of DSI is about 42%, which constitutes about 850 million USD in 2005. This share has fluctuated from 30 to 55 percent in years passed.

Irrigation demands cover 74 % of the overall water consumption. The growing period for most of the crops covers the summer months June, July and August of which have almost no rain and lowest base flows on the rivers, water storage, therefore, is indispensable. Currently, 591 storage facilities (large and small dams) developed by DSI are in operation. About 70 % of the irrigation projects use the water supplied by reservoirs and regulated natural lakes.

Table 1: Development achieved so far, as of end of 2006 is as follows:

Potential for Irrigation Projects	8 500 000 ha
Projects in Operation	4 565 033 ha (net)
DSI	2 527 502 ha
GDRS(abolished in 2006)	1 037 531 ha
Farmers	1 000 000 ha
Projects under Construction	650 000 ha

On public schemes, the national average of the irrigation ratio (the part of the equipped area actually irrigated) varies by years between 60 and 70 % with wide regional fluctuations. DSI and GDRS have jointly developed about 434 120 ha groundwater irrigation projects. DSI drill the wells, install the pumps and set the power transmission lines while GDRS constructs the irrigation canals or pipes.

#### **4. IRRIGATION MANAGEMENT TRANSFER**

##### **4.1. BACKGROUND OF TRANSFER OF IRRIGATION SCHEMES IN TURKEY**

Since 1954, Turkey has had a legal framework allowing the transfer of management responsibility for public constructed irrigation schemes to local control irrigation management by the Government. At the early sixties some small-scale irrigation schemes, which were isolated and far from the administrative units of DSI, had initially transferred to users with different approach from the Participatory Irrigation Management (PIM) concept we perceived today.

Before the accelerated transfer program was commenced, Irrigation Communities (IC) had been working at DSI managed irrigation schemes, which was accounted for 40 % of command area. Before 1993, DSI's policy focused on transferring only small and isolated schemes, the management of which was difficult and uneconomical. Until 1993, small schemes total area of which was about 50 000 ha were gradually transferred to users. DSI's policy shifted from transferring only small and isolated schemes to an accelerated approach of transferring large-scale irrigation system as well as small and isolated ones.

In 1993, pilot transfer program was implemented effectively for transferring the irrigation schemes in the regions that ICs had already been existed and worked efficiently, Antalya, Adana, Konya and Izmir regions, where DSI officials had shown a higher level of preparation and dedication and farmers were more receptive. At initial, overseas training program including Mexico and USA for DSI senior staff had great contribution as well as internal training program, including seminars and workshops for DSI and water users. The main underlying reason for accelerating transfer program has been the operation and maintenance financial burden for DSI and the Government, which was getting unsustainable. The operation and maintenance cost recovery (rate of collection of water fees), has been unsatisfactory (about 40%). The present Government's general policy of promoting local control was also a contributing factor.

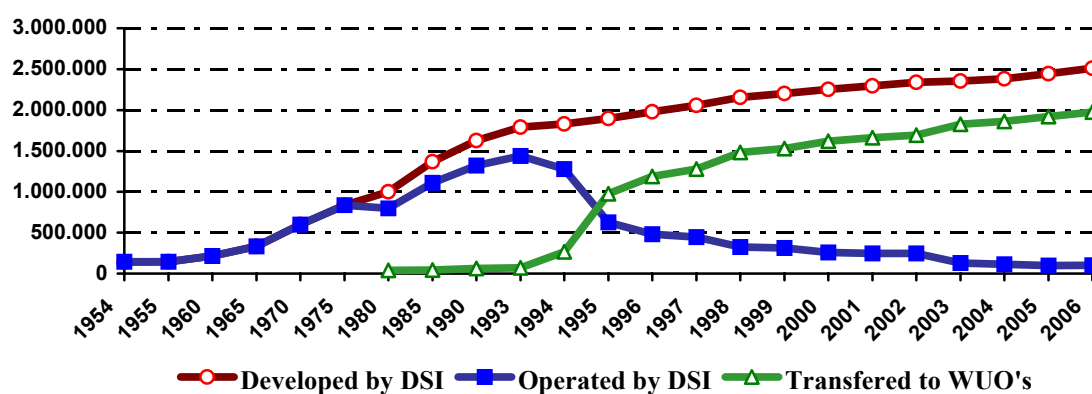
##### **4.2. PRESENT STATUS OF IRRIGATION MANAGEMENT TRANSFER**

At present, O&M responsibility of about 1.92 million hectares have been transferred (95%) to water users organizations established in several different forms. Transfer is not restricted to a single type of user organization. Based on the user's preference and size of the related schemes, irrigation systems have been transferred to WUOs such as Water Users Associations (WUA), municipalities, village authorities and cooperatives.

Table2: Organizational Distribution of Transferred Irrigation Schemes

ORGANIZATIONS	No's	Rate (%)	Area (ha)	Rate (%)
Village authority	227	27,9	39 302	2.0
Municipality	152	118,7	66 157	3.3
WUA	343	42,1	1 786 405	90.4
Cooperatives	88	10,8	83 080	4,2
Others	5	0.6	1 150	0.1
<b>TOTAL</b>	<b>815</b>	<b>100</b>	<b>1 976 094</b>	<b>100</b>

Graphic: Transfer Progressing



#### 4.3. BENEFITS OF TRANSFER

In the 2006 Human Development Report, It is expressed that “One of the most influential institutional changes in governance in recent years has been the introduction of participatory irrigation management and the development of water user associations. In the best cases—as in Indonesia, Mexico and Turkey—institutional reforms have transferred management to irrigation users, with marked increases in revenue collection, maintenance spending and irrigation returns. *The lesson: where producers have more authority and responsibility for water management, transparency can improve pricing, cost-recovery and performance.*”

##### a. Participation of Users and Self Management

Economic and technical efficiency of irrigation systems can be attained by developing a concept which can be formulized as "sense of ownership". A successful transfer should encourage water users to operate and maintain their systems through assigning them as stakeholders and through making these services without free of charge. This approach will in turn provide water security and sustainability. Water users constitute the major portion of the agricultural population (40%) in Turkey. In the past, because of the social pressure, their responsibility to join the irrigation management in the schemes developed by DSI was negligible. Turnover process has provided beneficiaries to take

part in the governance such as electing their own board members and the management, determining the water charges to be collected. DSI has transferred the responsibility of O&M not only the tertiary and secondary but also main canal of the irrigation schemes in order to strengthen user responsibility. IMT created a self-control both adequacy and quality of services supplied by WUA and control of budget with respect to revenue and expenditures.

The picture is quite different after the IMT, same farmer now does not dare to ask or demand water out of his schedule and feels like using water more efficiently to avoid paying high electricity cost in pumped irrigation. Damages to irrigation structures could not be recovered due to failure of finding the offender. Now, with the PIM all the users feel obliged to safeguard the facilities and easily catch the offender. The person who causes damage pays normal cost of that damage before he is asked. Otherwise he pays fine which accounts for about 4 to 10 times more than that of the cost.

### ***b. Good Governance***

By transfer, WUA management consisted of chairman and WUA board become accountable for WUA assembly convenes three times in a year where quality of irrigation scheme performance with respect to equitable water distribution, water use efficiency and upkeep of project facilities as well as budgetary control are discussed. Satisfactory performance of the WUA management and transparency are prerequisites for the next board election. This constitutes true self-control of WUAs at a democratic level. Water users are now well organized. They establish their own organization by and manage it themselves. Instead of individual demand of user WUA managers make their requests from government institutions on behalf of WUA. This make easier to meet the demand for both government and users. Farmers, accounted for about 33 percent of the employment in the country, have had the right and responsibility to join the irrigation management such as choosing the manager, water charges to be implemented, making a decision on system management with the participatory irrigation management. In transferred pump irrigations, users are very sensitive in running the pumps and using the water for irrigation.

### ***c. Financial Sustainability***

WUAs self-financing and budgetary control provides flexibility in finding better solutions to operate and maintain and further improvement of the system. Financing normal operations is accomplished by charging water users an irrigation fee related to the area irrigated. Several types of charging have been used, a seasonal flat rate per hectare, a pay per-irrigation and time and volumetric basis systems. WUAs must account for their financial dealings to the membership. Presently, there are routine financial transactions between the WUAs and DSI for cost recovery of investment.

### ***d. Decreasing O&M Cost and Increasing Collection Rate***

Operation and maintenance cost of government decreased with transfer. The number of operation and maintenance Staff of DSI decreased about 69%. At present staff intensity (person/10 000 ha) of WUAs is 23 and DSI O&M staff intensity 20. Considering the

total staff intensity of O&M services we can conclude that that is 43. This was 74 in 1993 before the IMT. After the IMT, staff efficiency increased 58%. Labor cost of DSI is considerably higher than that of WUOs because of unionized labor at DSI whereas WUOs pay minimum wage and employ seasonal labor when needed. This lower labor cost results in lower operation cost. Efficiency of seasonal labor employed by WUOs has been highly satisfied. WUOs collection ratio (83%) of water charges has doubled.

## **5. PROBLEMS FACED BEFORE AND AFTER TRANSFER**

There were experiences in transferring small scale and individual irrigation projects which are isolated and far from management unit of DSI. Besides this these projects were serving to only one village or small town. But in this case large irrigation schemes are subject to transfer to users. It was a big challenge that government has transferred management of irrigation projects without considering how large they are. How can users manage these large irrigation areas without having any help from government? There was a great suspicion on losing jobs for DSI's staff after the transfer. Some old projects needed rehabilitation may not be easy to operate for users. WUOs were newly established and they needed training, technical guidance and capacity building on the management of the irrigation system.

Technical guidance and training needs of WUOs have been met by DSI and will be met in the future. However those trained technical staff of WUOs is not to be sustainable because of lower wage and not having of work guarantee. This makes WUOs employ new technical staff for managing the irrigation system. Nobody lost his job because of transfer of irrigation management in DSI. DSI is such a large organization that staff have been moved to another department such as planning, design and construction or retired voluntarily and employ elsewhere.

Aging problem for O&M Department because of not recruiting new staff for O&M services seems to be one of serious problems. By the time DSI may lose its O&M experience and be weakened. Although policies for the rehabilitation and modernization have been defined as participatory approach, Government should develop an action plan for the long run. Role of the O&M Department is to be modified for sustaining O&M services in the long run and necessary measurements have to be taken. WUAs can be organized as Irrigation Federation because they need this organizational structure in order to increase their capacity for O&M. This requires legal arrangement that has been drafted.

In order to mainly meet the needs of machinery and equipment of WUOs, a project named Participatory Privatization of Irrigation Management and Investment Project (PPIMIP) was commenced by DSI with support of World Bank in 1998.

### **5.1. A PROJECT IMPLEMENTED (1998-2004) TO SUSTAIN IMT**

#### **Participatory Privatization of Irrigation Management and Investment Project (PPIMIP - Loan 4235)**

DSI wanted to help meeting the urgent equipment needs of WUOs, which have been recently and rapidly established and took over the operation and maintenance (O&M) responsibilities from DSI, starting from 1993, for uninterrupted and successful O&M

activities. At the same time, GDRS (abolished in 2005) wanted to initiate changing its traditional investment policies that fully subsidized by the Government, as well as to help modernization of classical irrigation systems, operated by WUOs. Therefore, both state agencies DSI and GDRS, which are responsible for irrigation investments in Turkey, decided to implement this project, financed by the World Bank and executed by DSI, GDRS and WUOs (Water User Organizations = Water User Associations, Irrigation Cooperatives etc.).

Out of those, 308 WUOs, commanding an irrigated area of 1.59 million ha, have actually benefited from this component through the purchase of 567 pieces of heavy equipment (graders, excavators, loaders, tractors, etc.), and 3,204 pieces of small equipment (pumps, computers, motorcycles, etc.) at a total cost of about USD 36,5 million. The beneficiaries contributed more than 63 percent of that total cost, the remaining part being financed under the Project.

Under Pilot Rehabilitation Program component introduced with the amendment dated June 2001, investment activities have been implemented under contracts to be financed on a 50 percent basis by the loan and 50 percent contributions by the participating WUOs. Sixteen WUAs have participated in the pilot with rehabilitation contracts of about USD 3,800,000. These are the first examples in the country that have done substantial rehabilitation with large financial contributions from the members. These experiences have increased the interest among members of the WUOs and improved the trust between WUO management and members.

## **6. TRAINING**

Since 1994, DSI have organized several training programs in order to increase capacity building of WUOs. A total number of 1 212 staff of WUOs has been trained. 519 engineer, 408 accountants, 285 pump operators participated those programs organized in different times and years in local or national level. In addition to these, in the year 2000 and 2003 a three-day seminar was organized for the Chairmen of WUAs and Cooperatives to discuss over all issues. A follow up seminar was organized at national level for the Chairmen of WUAs and Cooperatives in May 2004.

## **7. RESULTS OF MONITORING AND EVALUATION**

Monitoring and Evaluation (M&E) studies have been carried out by O&M Department of DSI. WUOs have generally demonstrated the ability to operate and maintain the system satisfactorily, specifically setting up balance and equity in water distribution. Some findings from M&E study as average for 2006 are given below:

1. Irrigation ratio in transferred irrigation schemes and DSI managed were 61 % and 24 % respectively.
2. Irrigation efficiency was 41% when irrigation schemes were being managed by DSI, after transferring this ratio increased to 43%.
3. Power consumption of pump irrigation schemes decreased about 20 % after the transfer.



4. By transfer, the number of DSI's O&M staff declined about 69 % and it will continue to go down until it reaches a certain number.

5- WUAs have an average water charges US\$ 99.85 per hectare. Expenditures are operation cost US\$ 52.3, and maintenance cost US\$24. For DSI, average water charges 157 US\$ per hectare, operation cost US\$ 83,2 and maintenance cost US\$ 73.8 per hectare.

6. Collection rates of water charges are recorded about 26 % and 85% for DSI and WUOs, respectively.

7. Total budget of WUOs amounted 245 Million YTL (180 million USD) in 2006.

8. In 2006, expenditures of WUOs are 58% for operation, 28 % for maintenance-repair and 14% for others.

9. Technical managers of WUOs are usually agricultural engineers (71 %).

Those performance indicators given above show that WUOs have performed quite well comparing to the government managed ones.

#### 8. WHAT IS NEXT FOR SUSTAINING OF WUA?

The following measurements should be taken to sustain IMT:

1. Flexibility should be given to WUOs in order to achieve their required and needed structural changes by new Irrigation Associations Law.

2. Given training, technical assistance and guidance by DSI to WUOs should continue until they get adequate experience in irrigation management.

3. In a transferred irrigation area, modernization and rehabilitation of irrigation system or network on cost sharing basis, should be given priority by the government. It was implemented with Pilot Rehabilitation Program (PRP) that is a sub component of PPIMIP.

4. As a matter of fact, a huge portion of the budget only covers the electricity cost in pump irrigation. In order to provide sustainability of transferred pump irrigations, water charges should be determined realistically, irrigation ratio should be increased and irrigation methods should be replaced with efficient ones by WUOs. Price of electricity used in pump irrigation should be kept modest. Otherwise it may not be possible to compete with surface irrigation.

5. To change stakeholders' (users, politicians, technicians, farmers) mentality expecting full support from government is highly difficult handicap to be exceeded. Providing a close collaboration, information exchange among stakeholders and organizing training programs to train them are needed.

6. WUOs should set their fees (tariff) realistically in order to balance with their expenditures of operation, maintenance, energy and equipment purchase.

7. If a large irrigation project is required to transfer to a number of WUOs, command areas of each one should be kept larger as much as possible.

8. DSI is monitoring and controlling the activities of WUOs but has not enough power of sanction for WUOs to fulfill operation and maintenance deficiencies in proper time with enough budget.

9. Shortcomings of WUO O&M services should be accountable for DSI. This topic can be surmounted by legislation proceeded.

10. Agricultural extension services have to be intensified in order to shift farmer's customary habits, to tell the latest development in the sector and agricultural policy and outdated farming practices, which hinder improvement of irrigated agriculture and reduce efficiency of the project.

11. Encourage users in participation of WUA management in order to create competitive environment.

12. Close contact of O&M staff with WUAs in the field should be kept alive to sustain O&M activities properly.

## 9. CONCLUSIONS

The Turkish Irrigation Management Transfer Program remains impressive. Begun in 1993, the program has now shifted 95% of the large-scale irrigation in the country to local management. The primary driver for the change was labor costs which spiraled out of control in the late 1980s and early 1990s, starving the agency of funds to maintain irrigation and drainage facilities. Staffing intensity on WUA-managed schemes is only about 58% of that prevailing when DSI was the sole managing entity, showing strong gains in operational efficiency from the transfer program. For DSI, the transfer program has resulted in significant declines in its own O&M staff levels ( 69% ), principally affecting unionized skilled and unskilled labor.

DSI operating costs have also fallen sharply. However, per hectare operating costs on the 5% of schemes still managed by DSI are 59,2 % more than those on WUA-managed schemes. Existing schemes remaining under DSI control are proving difficult to transfer completely to local control for a variety of reasons.

WUAs are currently (2005 ) charging about US\$ 88,35 per hectare irrigation fees. DSI charges (US\$ 157) about 78 % more than this in nominal terms, but collects for less. In 2006 WUAs succeeded in collecting 85% of the amounts due to them from water users. DSI collected about 26% of its collectibles at rates effectively much lower than WUA rates.

DSI changed design policy in 2003 from open canal to piped system. This will make a number of benefits for both government and users as well as changing irrigation techniques. Considering operation and maintenance activities, users will replace their irrigation method from traditional surface to sprinkler and drip. Besides farmers, WUAs have to learn and apply new rules and techniques with in their modern irrigation networks. Of course training programs with the projects are implemented but additional ones required both DSI and WUAs.

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