



MEDITERRANEAN COMMISSION FOR SUSTAINABLE DEVELOPMENT



**WATER GROUP**  
**Success stories in water demand management improvement**

**“PARTICIPATORY IRRIGATION MANAGEMENT ACTIVITIES  
AND WATER USER ORGANIZATIONS INVOLVEMENT  
IN TURKEY”**

**FOREWORD**

The Mediterranean Commission for Sustainable Development recommended in November 1997 to promote strategies for better water demand management, i.e. better water use efficiency, in the Mediterranean countries.

“Success stories” in this field, explaining how and why the countries have practically implemented such strategies, are very valuable.

The Blue Plan wishes to encourage exchanges on such experiences. In this perspective, this report is aimed at showing one example taken from Turkey<sup>1</sup>.

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<sup>1</sup> It was written by S. Burak with the assistance of Mr Faruk Cenap Erdogan, DSI. See contacts at the end.

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WATER USER ORGANIZATIONS INVOLVEMENT  
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## **1. Study Area**

### **1.1 National Setting**

The study area is the agricultural land spread over the whole country where irrigation management is being carried out either by governmental agencies or water user organizations.

The Republic of Turkey is situated between 26° - 45° East longitude and 36°- 42° North latitude and is surrounded on three sides by the Mediterranean, the Aegean and the Black Sea. Turkey's total land area is 780 600 km<sup>2</sup> of which 23 600 km<sup>2</sup> is in Europe and 757 000 km<sup>2</sup> in Asia. The national census conducted in 1997 gave a population result of 62.6 million with an average annual growth rate of 1.8 %. The related GNP per capita for 1997 was 2 500 \$. 55% of the population lives in urban areas. The largest industrial and commercial center of Turkey is the province of Istanbul and its surroundings where 40 % of the industries are installed.

### **1.2 Climate**

The climate of Turkey is semi-arid with extremes in temperatures. Average annual temperature are 14°-20°C, depending on distance from the sea. There are significant temperature disparities between the inland and coastal regions. The difference in temperature between winter and summer varies from 16°C to 29 °C being highest in the eastern part of the country while it varies between 18°C and 20°C on the coastal area.

A Mediterranean climate prevails in Turkey's Mediterranean and Western Anatolian regions, a temperate climate with high precipitation in every season in the northern regions and a continental climate in the inland regions.

### **1.3 Water Resources**

Most precipitation occurs in the winter months. Total annual rainfall is least in the low lying areas of Eastern Anatolia (220mm), and highest along the Eastern Black Sea coast (2420mm). Average annual rainfall for the entire country is 670mm with a water potential of 510 billion m<sup>3</sup> /year. Surface drainage accounts for 214mm of total precipitation, or 186 billion m<sup>3</sup> /year, so that Turkey has an average drainage coefficient of 36%. Evaporation, transpiration and seepage account for 352 billion m<sup>3</sup> /year, equivalent to 69% of the total potential.

In some watersheds, due to inadequate topographical and geological conditions an estimated amount of 86 billion m<sup>3</sup> (out of the average of 166 billion m<sup>3</sup>) can not be used efficiently.

The existing water potential on a national scale is adequate for the distant future so long as it is provided at the times and places required, and according to the purpose for which it will be used.

#### **1.4 Land Resources**

28 million hectares of land which represent approximately 1/3 of the Turkey surface area can be considered as cultivable land out of which 8.5 million ha is economically irrigable under the available technology that is regular conventional irrigation method. This figure is likely to be reduced due to the decrease in water availability and economic viability. So far, irrigation infrastructure serving 4.1 million ha has been developed in majority by public sector mainly by the State Hydraulic Works (DSI) and the General Directorate of Rural Services (GDRS) and also by private irrigation schemes. A detailed explanation of economically irrigable land is given in Annex 1.

#### **1.5 Institutional Structure in Agriculture**

There are two government agencies responsible for water and soil resources development and management in Turkey that are the State Hydraulic Works (DSI) and the General Directorate of Rural Services (GDRS).

##### **1.5.1 State Hydraulic Works (DSI)**

DSI, established in 1954 under the Ministry of Energy and Natural Resources (MENR), is the main investment agency responsible for the planning, development and management of water and soil resources in general. Its responsibility is therefore in the field of water supply and irrigation for large schemes, which include construction of dams for flood control, irrigation, power generation, water supply and groundwater development. DSI, based in Ankara operates through its regional directorates situated in 26 river basins. In these regions there are 56 sub-directorates and 14 project directorates that carry out O&M activities in irrigation through their field units.

##### **1.5.2 General Directorate of Rural Services (GDRS)**

GDRS was established in 1985 by the reorganization of the General Directorate of Soil and Water, the General Directorate of Roads, Water and Electricity and the General Directorate of Soil and Resettlement. The responsibility of GDRS consists of mainly on-farm development and small (up to 500l/sec) irrigation works. In addition to its headquarters in Ankara, GDRS operates through its 22 regional directorates dealing with irrigation activities. Whilst it has completed a large quantity of irrigation and on-farm development works, one of the main challenges it faces is to handle the growing on-farm development (OFD) requirements of large scale schemes equipped with irrigation infrastructure by DSI.

## **2. Background of Irrigation Development and Transfer**

Anatolia, crossroads of civilization is an attractive open air museum with its several water structures. Some of these old structures are still in good conditions thus in use. The first modern irrigation and drainage project called 'Çumra Irrigation and Drainage Project' was designed and constructed in 1908-1914 by the Ottoman Empire. After the foundation of the Republic of Turkey in 1923, priority had been given to swamp areas reclamation to fight the malaria disease. Subsequently some small irrigation projects were implemented. After the establishment of the State Hydraulic Works in 1954, many water related projects especially irrigation schemes had been given importance as Turkey has vast and fertile plains.

The agricultural sector is the major water consuming sector as in the rest of the Mediterranean with a ratio of more than 70% of the total water consumption on the average.

Water scarcity has become of major concern since 1960's and efforts have been made to better manage and ensure the efficient use of water for sustainable agricultural development.

In Turkey, similar to other countries there are two practices to operate the irrigation schemes developed by the Government:

1. Irrigation management by the Central Government
2. Irrigation Management by the local authorities and Water Users Organizations (WUOs)

As a matter of fact the centralized approach that had been adopted so far for the O&M issues constituted an institutional and financial burden on the government i.e. very low ratio of billing and collection rates or no collection at all, very high water consumption, even wastage, no cost recovery of investment, no local interest by the farmers to protect the infrastructure.

Transfer of irrigation systems to users started to be initiated at a slow pace in the early 1950's. Until 1993 each year small schemes have been gradually transferred to users with an average annual area of about 2000 ha. DSI was also encouraging participatory approach through establishing Irrigation Groups (IGs) or Water User Groups (WUGs) with limited responsibility for O&M. But generally, the central government officials were reluctant to adopt a decentralized approach with the main concern of losing power and control on the management of the facilities.

### **3. Transfer Forms in Turkey**

#### **3.1 Full Transfer**

All O&M activities on irrigation projects developed by DSI are taken over by WUO's. The responsibility of O&M is transferred to WUO's on an agreement that is signed by WUO's and DSI and approved subsequently by the Ministry of Energy and Natural Resources (MENR).

#### **3.2 Participation through Joint Management**

This type of transfer has been experienced in the irrigation projects developed and operated by DSI. Limited responsibility in O&M is taken over by the so-called Water User Groups (WUGs) with an agreement signed between DSI and WUG's. No approval by MENR is requested. No agreement is signed between water users and GDRS.

#### **3.3 Informal Transfer**

In this system all O&M activities in irrigation projects developed by GDRS that are generally of small scale and serve generally one village are managed by the farmers. No agreement is signed between water users and GDRS.

**Among the three transfer systems explained above, the full transfer has been the preferred one.**

**DSI keeps on monitoring and evaluating the O&M performance schemes. Since 1993's DSI has been collecting O&M data related to transferred schemes and a yearly evaluation report is published but a full assessment is not available and a post-evaluation report has not yet been published.**

## 4. Rationale of Participatory Irrigation Management (PIM)

The PIM was adopted in 1986 mainly for the three following issues that are:

- a) users' participation
- b) self-control of the irrigation management
- c) decreasing in O&M cost

### a) users' participation

Farmers' share to the employment in Turkey accounts for a significant ratio of 45%. Before the participatory process, the farmers did not have the right nor the responsibility to take part in the irrigation management i.e. setting water tariff, election of the chairmen and in decision-making in general. The introduction of PIM created the sense of ownership by farmers which led to protect the facilities and improve the O&M.

After PIM 'the irrigation program that was a government program with assistance of the farmers' became 'a farmer program with assistance of the government'

### b) self-control

The WUO's are established under the Municipal Act No: 1580 and operate accordingly. There are a president, a general secretary, an accountant as ruling staff supported and supervised by the executive board and the general assembly. The chairman is generally at the same time the mayor of one of the small communities falling under the service area of the organization and the general secretary is the technical person who must be an agricultural engineer.

At every general assembly, the chairman and the board of directors give the account details and the technical and managerial issues are discussed and the water tariff set.

### c) decrease in O&M cost

The decrease in O&M results in savings in allocation by the government that are used in additional investment in the same sector.

## 5. Introduction of Accelerated Transfer to Water User Organizations

In Turkey, different types of water user organizations (WUOs ) exist. These are: (1) the **water user associations (WUAs)**, (2) **municipalities**, (3) **village authorities** and (4) **cooperatives**. Among these, it has been experienced that the best model of transfer is the **water user associations** since these are non-profit organizations having the right to irrigate within their hydraulic boundary which varies within a range of 300 ha up to 35 000 ha. Furthermore the associations have managerial, financial and technical discretion whereas the cooperatives do not. As of today 91% of the whole transfer has been realized to the associations.

In 1986, the World Bank initiated the participatory process and the establishment of water user organizations was accepted as a prerequisite for loan allocation to Turkey.

Before 1993's the main objective of DSI was to transfer the small and isolated schemes since these were difficult and uneconomical to manage. But this approach was limited to small schemes and DSI was reluctant to hand over the O&M of large ones to farmers.

On the one hand, raising governmental awareness and difficulties encountered in the management of irrigation systems by central agencies and persuasion of the World Bank on the other, have led the decision makers to adopt a new system that was the accelerated transfer of irrigation schemes to water user organizations. Following national working group meetings in 1993, DSI's policy shifted from limited transfer of small schemes to larger ones.

With the World Bank's support, DSI sent more than 50 senior officials to USA and in particular to Mexico in 1993 and in 1994 subsequently to investigate the technical, legal and institutional aspects of the transfer of irrigation systems. These visits have had substantial effect on further encouraging DSI's staff to pursue accelerated transfer.

Finally, starting from 1993's DSI took the decision of launching a pilot program of accelerated transfer where water user groups were already existing and operating efficiently. The timely decision was based on the following issues:

- financial burden on DSI and the government created by the O&M costs (the cost recovery of O&M was about 40%),
- political awareness (the government's general policy of decentralized approach was an important contributing factor to speed up the process),  
(Ref. 'Farmer's Participation to Investments in Agriculture and O&M Activities'-National Working Group Report, November 1993)
- satisfactory O&M results of transferred schemes (these positive results had an important role as convincing factor).

Four provinces namely Antalya, Adana, Konya and Izmir were selected for the pilot program of accelerated transfer mainly because the officials of these provinces had shown interest and dedication and the farmers were more receptive there. The transfer was supported with enhanced internal training, including seminars and workshops. A friendly competition among various regions in promoting successful transfer was another contributing factor to the process.

The result of the pilot study where DSI engineers played the role of promoters and interacted very closely with the local people, municipal councils and chairmen was successful in two respects:

1. The engineers realized that they would not lose their job as a result of transfer but on the contrary, they would have an important role after the transfer to assist the local people.
2. A more efficient system of O&M (decrease in O&M costs and increase in the collection rate) was run by the users that were assisted by the water user organizations.

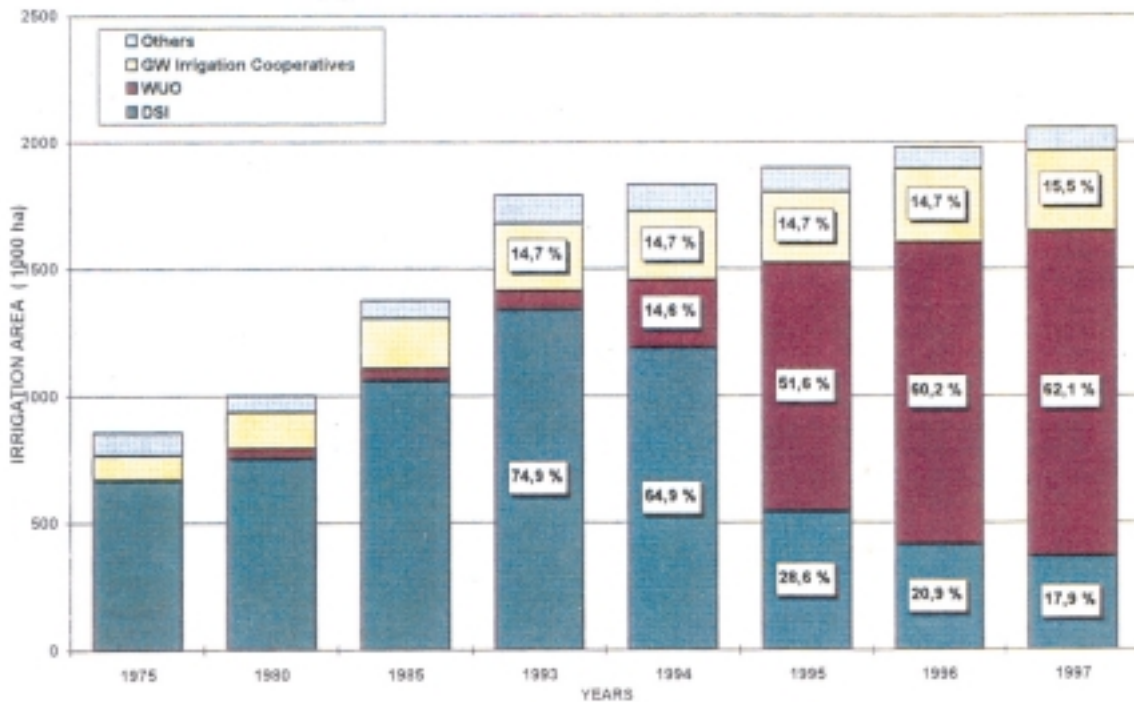
## **6. Discussion**

The transfer from the government to users proved correct and highlighted the sustainability of the participatory irrigation management (PIM) and the decentralized approach of the water user organizations (WUO's) model. The pros and cons of this process are discussed below in detail and illustrated with recent performance figures where available.

### **6.1 Improvements Experienced after the Transfer to WUO's**

DSI's objective is to construct irrigation facilities in the remaining 3.5 Million ha of land out of the total area that covers 8.5 Million ha approximately with a rate of 120 000 ha/year. When the accelerated transfer program to WUO's for O&M of irrigation facilities started in 1993, DSI estimated to transfer 1,350, 000 ha till the end of 2000 but this figure was already reached by the end of 1997 which proved this system efficient. (See Tables 'Land Use In Turkey' and 'Cropping Pattern in the DSI Irrigation Schemes' in Annex).

**“ Increased Areas under WUOs’ responsibility in irrigation development”**



The table below shows the distribution of the irrigation facilities being operated under the various existing systems.

**Table 6.1 O&M of Irrigation Activities by Various Users (in 1998)**

O&M being carried out by:	Irrigated land ** (ha)	No. Per group	Percentage of irrigated land %
WUA's	1 483 000	265	69
Privately owned*	15 000		1
Cooperatives (groundwater)	330 000	1 272 (DSI has ownership in 735)	15
DSI	325 000		15
Total	2 153 000		100

\* DSI implement these schemes on behalf of the owner and hand them over upon payment.

As a pilot case, the DSI Antalya Regional Directorate carried out a comparative study for the so-called 'tenth transfer' whose results are given below:

The transfer of O&M services to the Water User Organizations has had significant and quantifiable positive impact on the O&M issues both on technical and financial point of view:

- The participatory approach by the users generated the sense of responsibility that had not existed before to better use the resources and the facilities and protect them.
- The water use is more reliable and equitable, the plots situated at the upstream or the downstream of the irrigated land are equally served.
- Studies to increase the irrigation efficiency by using modern techniques are being investigated, e.g. a pilot projects to compare drip irrigation, sprinkler and the California systems are being implemented with the assistance of DSI.

- The user pays approach' has increased awareness in water savings. The WUO's charge an interest on the market rate for non-payment (12%) and charge fines for illegal connections and for misuse or wastage of water (40 times the regular rate) and/or damage caused to the infrastructure (80 times the regular rate). There is a mutual supervision mechanism between farmers which brings social pressure thus efficiency in this process.
- The chairmen of the WUA's are obliged to provide services regardless of the political tendency of the communities that fall under the service area of the associations. There is no political influence in water distribution.
- the collection rate increased from **42%** (in 1993: irrigation by DSI) to more than **80%**(in 1997: irrigation management transferred to WUO's).
- energy consumption decreased after the transfer, the saving in energy cost is approximately 25%.

The results of the monitoring of the WUA's proved that the transfer process has performed successfully but DSI considers not having the required time span for post-evaluation at each of the transferred facilities.

**Table 6.2 Comparative Table for the Antalya Region**

<b>Results by the end of 1998</b>	<b>Regular irrigation in 1993</b>	<b>Transferred irrigation in 1998</b>	<b>Increase in efficiency %</b>
Water saving	16 109 m <sup>3</sup> /ha	10 684 m <sup>3</sup> /ha	34
Energy saving	1 502 kWh/ha	1 030 kWh/ha	31
Area with high water table	8 892 ha (20 %)	6 683 ha (15 %)	5
Salinisation: area improved	38 692 ha (89 %)	39 610 (91 %)	2
Increase in collection rate	71%	95%	24

## **6.2 Constraints and Required Reforms in Legal Issues**

So far DSI has given technical assistance to WUO's that consists of repair and maintenance of water structures with equipment, training support and guidance on technical and administrative issues. This support is still continuing but on a decreasing way over the years. Unless the WUO's are strengthened institutionally and technically, they will need to be supported by the central government. It has been experienced that the transferred schemes can not keep on performing satisfactorily and contributing to an increased production in irrigated land and this in particular during the initial years of the transfer without a sound assistance program by the government. This is a crucial issue since especially the small organizations may face difficulties and fail to fulfill their task properly in which case the sustainability of the participatory irrigation management concept would be put in doubt for replication.

Therefore the following improvements/reforms will be needed to ensure the performance of the system enabling its replicability:

- Urgent legal reforms are required with the main objective that the WUA's should operate within a well defined legal framework enabling the sustainability of the PIM. Actually, WUAS operate under the Municipal Act N°1580 which is not specifically drawn up for these kinds of organisation. DSI technical and advisory staff drafted a law with the WUA's representatives and submitted to the MENR in 1997.
- The WUO's should be given technical assistance and guidance at the beginning of the transfer until they gain the required experience in irrigation management,
- A provision for the required O&M equipment and machinery should be made to the WUO's and this should be done on a cost sharing basis,

(The World Bank financed project of 20 M US\$ spread over 5 years for equipment procurement will be granted by 30% by the Turkish Government, the rest will be reimbursed by the WUO's). This project was initiated in 1997 under Loan No. 4235 TU to improve the institutional framework, performance and sustainability of the WUO's). Ref. Staff Appraisal Report No. 16525-TU dated September 18, 1997.

- In a transferred irrigation area, if the related WUO asks for a system modernization on a cost-sharing basis, the government should give investment priority to this project.  
(Uluborlu Irrigation Rehabilitation Project situated in the province of Isparta which is one of the above mentioned WB project exhibits a good example in this respect).
- Flexibility in structural changes in order to choose the most suitable model should be allowed. If the regulations are not appropriate to meet the WUO's needs, some unexpected incidents such as low yield, inadequate water distribution, violation of rules and social turmoil may happen.

## 7. Conclusion

In Turkey, the WUO's have at a great percentage demonstrated their ability to operate and maintain the facilities satisfactorily by recruiting the required staff, purchasing urgently transportation and communication equipment, assessing and collecting water fees, improving water distribution at a cost generally less than the rate set by DSI.

The concept of PIM and transfer to WUO's is recommended to be replicated elsewhere baring in mind that there is a need to improve the legal structure where it is believed inadequate in order to ensure a fully viable system in irrigation management.

*This report was prepared by:  
**Selmin Burak** (University of Istanbul, Institute of Marine Sciences and  
Management)/Istanbul)*

**For more information on this project, please contact**

**Faruk Cenap Erdogan,**  
**DSI Operation and Maintenance Department,**  
**Genel Müdürlüğü İşletme ve Bakım Dairesi**  
**06100 Yüce-tepe: Ankara, Turkey,**  
**tel: 90 312 418 70 79 Fax: 90 312 418 33 85**

## 8. References

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- 4-DSI in Brief - Ankara, 1998
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Messrs. Süleyman Sayın (Coordinator of the World Bank Project on Participatory Privatization of Irrigation Management and Investment Project) and Saim Yıldırym (Deputy Team Leader of the World Bank Project)
- 6-Mrs. Nevin Kanadıkryk (State Planning Organization (SPO) Specialist at Agriculture Department)
- 7- Privitization of irrigation O&M Project, legal aspects-1998

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