**International E-mail Conference on Irrigation Management Transfer**

June – October 2001

# IMT CASE STUDY

# TURKEY

# IRRIGATION MANAGEMENT TRANSFER IN TURKEY

Prepared by Mark Svendsen

# CONTENTS

# Irrigation Management Transfer in Turkey

**Mark Svendsen**[1]

# 1 Introduction

Irrigation Management Transfer in Turkey represents one of the earlier cases of the "new generation" of transfer experiments which are based on quick delineation of large groupings of water users holding common interests in good quality irrigation service, but which do not involve extensive community organization work at the local level. Its lineage can be traced back to Mexico, and from there to the western United States, but it is ultimately Turkish, with distinctive features adapting it to local conditions.

This paper defines the context in which the transfer reforms took place in Turkey in the mid-1990s, describes the reforms themselves, and finally analyzes the outcomes of the reforms. It is based on extensive fieldwork conducted in Turkey by the authors, and draws extensively on existing works, including Svendsen and Nott (2000), Svendsen and Murray-Rust (2002) and Murray-Rust and Svendsen (2002), as well as other documents cited in the text.

# 2 Context

## *2.1 Geography and Climate*

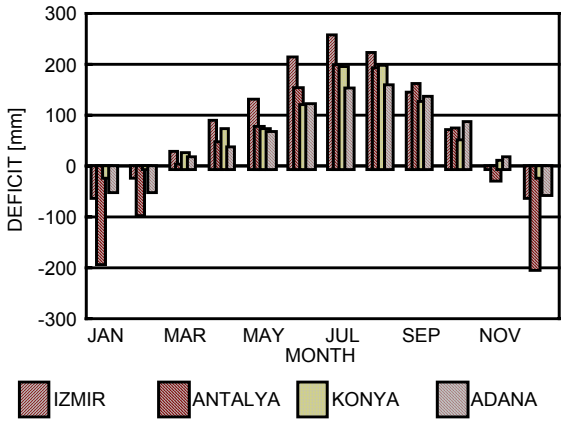
Turkey forms an elongated rectangle roughly 1,700 kilometers in an east-west direction and 1,000 kilometers north to south at the eastern end of the Mediterranean Sea. It comprising a total area of 779,452 square kilometers, roughly the size of Mozambique or Zambia.

Turkey's exposure to both maritime and continental weather patterns combines with a highly varied topography to produce several distinct climatic zones. The Mediterranean region is essentially sub-tropical, characterized by hot dry summers and mild, rainy winters. The Black Sea region receives rain throughout the year and enjoys both mild summers and mild winters. The Aegean Region (Western Anatolia) has mountains which run roughly east to west (i.e. perpendicular to the coast) and which are interspersed with grassy floodplains. Central Anatolia is a vast high plateau with an average altitude of 1,000 meters and a semi-arid continental climate.

Water is a limiting factor for agriculture over much of Turkey. Average annual precipitation is highest in the Black Sea Region (1,120 mm), and it exceeds 800 mm/year in some of the coastal areas. However in the remaining 70 percent of the country, which includes some coastal areas, Thrace and eastern Anatolia, precipitation averages less than 500 mm/year. In the highland plains of central Anatolia it averages less than 400 mm. Agricultural moisture deficits, computed as evapotranspiration minus precipitation, are shown for four agricultural regions in the country in Figure 1. Although these regions vary considerably in average annual temperature, precipitation, and evapotranspiration, all four exhibit some degree of deficit for 8 months of the year, with deficits of more than 100 mm/month during the peak growing season.

[1] Consultant in Water Resource Management and IWMI Fellow. Email: msvendsen@compuserve.com

**Figure 1. Agricultural moisture deficits for sample regions**




## 2.2 Government

Turkey is a parliamentary democracy. The Turkish Grand National Assembly (TGNA) is elected by all citizens who are at least 18 years old. The TGNA is composed of 550 deputies elected by direct general ballot for a term of five years. The President of the Turkish Republic is elected for one seven-year term by the TGNA from among its members, and is the head of state. The prime minister is appointed by the president to form a government, and is generally the head of the majority party.

Because local government units figure importantly in the structure of the new associations being created to manage irrigation services, it is useful to understand the way they are organized. Turkey is administratively divided into 78 provinces (*il*) and 900 districts (*ilce*). Population centers are designated as cities (*sehir*), district centers, towns (*belde*), or villages (*koy*), depending on their population size. Locally elected assemblies include the general provincial assembly (*il genel meclisi*), the municipal assembly (*belediye meclisi*), and the village council of elders (*ihtiyar heyeti*). Mayors of cities, district centers, and towns and village heads (*muhtar*) are also directly elected. The provincial governor (*vali*) and the district administrator (*kaymakam*) are civil servants appointed by the Ministry of the Interior. They represent the State at the provincial and district levels, where they coordinate and administer state policy. Districts are administrative subdivisions of provinces. Cities, district centers, towns, and villages have attached to them an area of surrounding rural land, and so the sum of the areas lying within the boundaries of these four types of units equal the area of the province.

## 2.3 Demographics

The population of Turkey is approximately 66 million, based on an average annual population growth rate since the 1990 national census of 2.2 percent per annum. This brings the estimated current population density to about 80 inhabitants per square kilometer. Although the number of people living in villages has changed little since 1980, remaining at just above 23 million, overall population growth has reduced the share of village residents from 75% of the population in 1950 to just 37% today. The three biggest cities (Istanbul, Ankara and Izmir) together contain about one-quarter of the nation's population.

The accelerating migration from rural areas to urban centers reflects recent developments in the agricultural sector, where mechanization and the loss of prime land near coastal regions to other land uses have led to more capital-intensive cultivation practices on pastures and grasslands previously devoted to extensive animal husbandry. Urban migration, in turn, has increased the need for further mechanization. This same intensification of agriculture has created environmental problems, such as erosion and salinization of the soil, and pollution of surface waters and aquifers.

## 2.4 Economy

At the beginning of the 1980s, Turkey's economic strategy switched from a policy of industrialization based on import substitution to a policy aimed at allowing a greater role for markets. Between 1979 and 1993 the Turkish economy expanded at an average rate of around 5% per year, with growth in recent years being even faster. The GNP per capita in 1994 when the transfer program was initiated was US$ 2,184.

Turkey has experienced continuing problems with inflation. The average annual inflation rate between 1974 and 1993 was 50% (minimum 21 percent, maximum 113 percent) with a rate of 149.6 percent in 1994 and 64.9 percent in 1995.

During this period there have been significant structural shifts in the Turkish economy, with the share of agriculture in overall output and employment decreasing, while the share of the service sector has increased and the relative size of the industrial sector has remained about the same. In 1993 agriculture accounted for 16 percent of total output and 42 percent of employment.

The growth in economic activity overall has not been accompanied by a narrowing of the gap between rural and urban incomes. In fact the gap has probably remained constant or widened. Agricultural incomes are estimated to be around one-fifth to one-quarter of those in non-agricultural sectors. Regional disparities in income and other measures of development remain significant.

## 2.5 Agriculture

Turkey's varied agricultural land and climate permit a diverse range of crops to be grown (Table 1).

**Table 1. Regional variations in agricultural production patterns**

| Climatic Zone | Major Crops |
|---|---|
| MEDITERRANEAN | CITRUS, VEGETABLES, COTTON |
| BLACK SEA | TEA, HAZELNUTS, MAIZE |
| AEGEAN (WESTERN ANATOLIA) | OLIVES, COTTON, TOBACCO, HORTICULTURAL CROPS |
| CENTRAL ANATOLIA | WHEAT, WINE GRAPES, SUGAR BEETS |

Yields for major grain crops, sugar beets, oilseeds, potatoes and cotton grown in Turkey have increased steadily. There are often wide regional differences in yields, which for field crops are generally two or three times higher in the milder coastal regions of the Aegean and Mediterranean than in the colder and generally drier areas of central and eastern Turkey. On average, cereal yields in Turkey are half those of OECD Europe, but are the same or greater than those of Australia. Between 1979 and 1993 the overall volume of agricultural production increased on average by around 2 percent a year.

At the advent of the transfer program in the early 1990s, the composite cropping pattern on the large-scale irrigation schemes in the country subject to transfer is as shown in Table 2.

**Table 2. Composite cropping pattern in DSI irrigation schemes, 1991-1993**

| CROP | SHARE |
|---|---|
| COTTON | 21.6% |
| CEREALS | 19.1% |
| MAIZE | 12.9% |
| SUGAR BEETS | 9.9% |
| VEGETABLES | 5.9% |
| FRUIT | 3.4% |
| FORAGE | 2.7% |
| CITRUS | 2.4% |
| OTHER | 22.0% |

Farms in Turkey are characteristically family-owned, small and fragmented. The average holding size in 1990 was 5.8 hectares, with 68 percent of holdings being less than 5.0 hectares (Table 3). Ninety-five percent of holdings, with 63 percent of the land, were less than 20 hectares. No more than 15 percent of farm holdings are contained in one integrated piece.

**Table 3. Agricultural holdings in Turkey, by size of holding, 1990**

| SIZE CLASS | HOLDINGS [NUMBER] | AREA [HA] | NUMBER SHARE | AREA SHARE | AVERAGE SIZE [HA] | CUMULATIVE NUMBER SHARE | CUMULATIVE AREA SHARE |
|---|---|---|---|---|---|---|---|
| LANDLESS | 101,610 | 0 | 2.50% | 0.00% | 0.0 | 2.50% | 0.00% |
| <0.5 | 251,686 | 66,706 | 6.19% | 0.28% | 0.3 | 8.68% | 0.28% |
| 0.5 - 0.9 | 381,287 | 251,109 | 9.37% | 1.07% | 0.7 | 18.06% | 1.36% |
| 1.0 - 1.9 | 752,156 | 1,004,250 | 18.49% | 4.28% | 1.3 | 36.54% | 5.64% |
| 2.0 - 4.9 | 1,274,609 | 3,866,896 | 31.33% | 16.49% | 3.0 | 67.87% | 22.13% |
| 5.0 - 9.9 | 713,149 | 4,675,069 | 17.53% | 19.94% | 6.6 | 85.40% | 42.06% |
| 10.0- 19.9 | 383,323 | 4,921,663 | 9.42% | 20.99% | 12.8 | 94.82% | 63.05% |
| 20.0- 49.9 | 173,774 | 4,648,743 | 4.27% | 19.82% | 26.8 | 99.09% | 82.87% |
| 50.0- 99.9 | 24,201 | 1,498,249 | 0.59% | 6.39% | 61.9 | 99.69% | 89.26% |
| 100.0- 249.9 | 10,266 | 1,385,662 | 0.25% | 5.91% | 135.0 | 99.94% | 95.17% |
| 250.0- 499.9 | 1,930 | 653,808 | 0.05% | 2.79% | 338.8 | 99.99% | 97.96% |
| 500 + | 441 | 478,943 | 0.01% | 2.04% | 1086.0 | 100.00% | 100.00% |
| TOTAL | 4,068,432 | 23,451,099 | 100.00% | 100.00% | 5.8 | | |

SOURCE: State Institute of Statistics, 1994

Approximately 14 percent of the area sown in 1990 was irrigated. Around 20 percent of the irrigated area was in holdings of less than 5 hectares while a little more than 40 percent was in holdings of between 5 and 20 hectares (Table 4).

**Table 4. Sown and irrigated areas in Turkey, by size of holding, 1990**

| SIZE CLASS | SOWN AREA [HA] | IRRIGATED AREA [HA] | SHARE OF SOWN AREA | SHARE OF IRR AREA | CUMULATIVE AREA SOWN | CUMULATIVE AREA IRR |
|---|---|---|---|---|---|---|
| <0.5 | 29,240 | 8,456 | 0.19% | 0.37% | 0.19% | 0.37% |
| 0.5 - 0.9 | 135,036 | 28,856 | 0.86% | 1.27% | 1.04% | 1.65% |
| 1.0 - 1.9 | 591,834 | 104,346 | 3.75% | 4.61% | 4.79% | 6.26% |
| 2.0 - 4.9 | 2,385,828 | 386,822 | 15.11% | 17.09% | 19.90% | 23.34% |
| 5.0 - 9.9 | 3,066,784 | 433,681 | 19.43% | 19.16% | 39.33% | 42.50% |
| 10.0 – 19.9 | 3,411,167 | 504,308 | 21.61% | 22.27% | 60.94% | 64.77% |
| 20.0 - 49.9 | 3,216,548 | 436,467 | 20.38% | 19.28% | 81.32% | 84.05% |
| 50.0 - 99.9 | 1,076,758 | 138,087 | 6.82% | 6.10% | 88.14% | 90.15% |
| 100.0 - 249.9 | 995,114 | 145,853 | 6.30% | 6.44% | 94.45% | 96.59% |
| 250.0 - 499.9 | 526,696 | 42,660 | 3.34% | 1.88% | 97.78% | 98.48% |
| 500 + | 349,844 | 34,495 | 2.22% | 1.52% | 100.00% | 100.00% |
| TOTAL | 15,784,847 | 2,264,032 | 100.00% | 100.00% | | |
| SHARE OF TOTAL AREA | | 14.34% | | | | |

SOURCE: State Institute of Statistics, 1994

Most farms rely on family labor. Tenant farming and share-cropping have played a role in a few regions, such as the southeast, but are declining in importance. The effects on agriculture of the high degree of fragmentation of ownership may have been partly alleviated by the fact that some farmers are operating farms on behalf of absent family owners.

Between 1979 and 1993 the total work force in Turkish agriculture was unchanged. Participation rates among women and children in rural families are high. About 55 percent of rural women between the ages of 15 and 64 do agricultural work on a regular basis, mostly as field hands. Participation rates among the 12-14 age group in 1992 were 33 percent for males and 37 percent for females, compared with 19 percent and 4 percent, respectively, among children of urban families. The literacy rate in the agricultural sector was 69 percent in 1990. Illiteracy among female agricultural workers was twice as high as among males.

## *2.6 Water Resources*

### 2.6.1 Water rights

The basic principal governing surface water use rights in Turkey provides that water is a public good which everyone is entitled to use, subject to the rights of prior uses. Surface water use is normally free of any obligation to obtain prior authorization. Conflicts are resolved first by referral to local customary rules and regulations. If the dispute cannot be resolved in this way, rights are settled by court decision. There is no registration system for water rights or water use. In large basins where impacts of new diversions are diffuse, this system is generally unable to resolve conflicts with claimed prior rights, and this is leading to serious problems of overallocation in some basins, such as the Gediz Basin in Izmir. This is a problem that has important implications for the future sustainability of transferred schemes.

### 2.6.2 Resource development

The irrigation potential in Turkey is reckoned by the government at 8.5 M hectares. Of this amount 93% is irrigable from surface water sources, and 7% from groundwater. The groundwater potential is nearly fully developed and is utilized principally by individual farmers and by local groundwater cooperatives.

Only about 53% of the surface irrigation potential has been developed, and the government continues with an aggressive water resource development program to expand the gross irrigated area by about 50,000 hectares annually. The gross area currently irrigated by large-scale surface schemes is 4,156,000 hectares. Figure 2 shows the allocation of this area under different managing entities. It is useful to note that absent the transfer program, half of the surface irrigated are in the country would be operated by the national water resource agency, DSI.

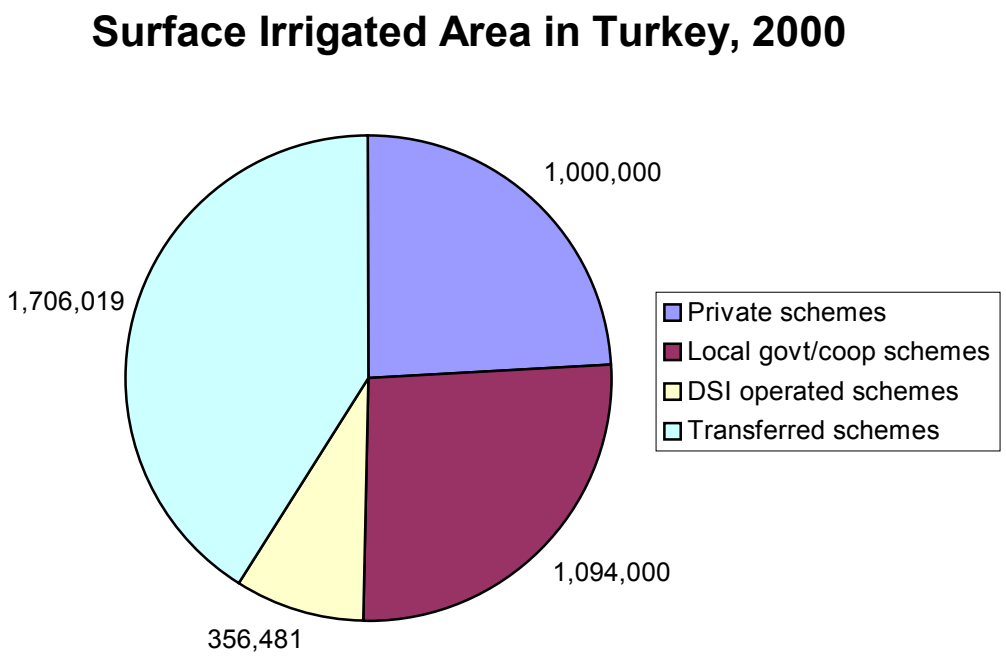



**Figure 2. Shares of surface irrigated area, by managing entity**

## *2.7 Managing Organizations*

There are two principal government organizations concerned with irrigation development and management in Turkey. These are the General Directorate of Rural Services (GDRS) and the General Directorate of State Hydraulic Works (DSI).

### 2.7.1 General Directorate of Rural Services

The General Directorate of Rural Services, a part of the Prime Ministry, is responsible for developing small-scale groundwater resources for irrigation, developing surface water sources with flows of less than 500 liters per second for irrigation, on-farm irrigation development, and the construction of rural roads and village water supplies. GDRS's minor irrigation schemes are transferred to farmers' cooperatives or local governments upon completion. GDRS does not have an operation and maintenance capacity. Because it is concerned with smaller schemes, and because it has traditionally turned the systems it constructs over to local entities to manage, it is not an important player in the transfer program.

### 2.7.2 General Directorate of State Hydraulic Works (DSI)

The General Directorate of State Hydraulic Works (DSI) is the main executive agency of the Government of Turkey for the country's overall water resources planning, execution and operation. It was established in 1954. Until 1996, it was a part of the Ministry of Public Works and Settlement. In that year it was transferred to the Ministry of Energy and Natural Resources. The mandate of the DSI is "to develop water and land resources in Turkey" (DSI, 1995). It is responsible for major irrigation, flood control, drainage, hydropower development, and supplying water to cities with a population over 100,000. It also has responsibilities related to river basin planning, water quality monitoring and improvement, outdoor recreation, basic studies on stream gaging and soils classification, and research on water-related structural design and construction materials. DSI centralizes most of the state functions involved in planning and developing large scale water resources. Until recently, DSI's policy has been to manage the schemes it designs and constructs.

DSI maintains offices for O&M at the following levels.

- General Directorate Office: this is the top-level of management, based in Ankara
- Regional Directorate Offices: there are 26 Regional Directorates in Turkey, covering the entire country
- O&M Division Offices: these cover a number of schemes
- O&M Engineering Offices: these serve one or more of the schemes within a O&M Division

The General Directorate Office and the Regional Directorate Offices are divided into functional departments, of which O&M is one. The departments are, in turn, divided into divisions. Within the central O&M Department, the Planning and Coordination Division has had primary responsibility for developing and implementing the ATP. This division is comprised of 8 members — 6 engineers, a director, and one training assistant. Within the Division, a three-person transfer team, headed by the division director, has taken the lead role in this process (Figure 3)

Each department at the General Directorate and Regional Directorate level is headed by a director who is supported by engineers, technicians, and clerical staff. At the O&M Division Office level, the Branch Chief Engineer is supported by Division Chief Engineers for operations, maintenance, pumping and electromechanics, and machinery operation and maintenance. Other staff include technicians, clerical staff, and skilled and unskilled laborers. Staff at the O&M Engineering Office level include the Chief Engineer, plus an Operations Engineer, a Maintenance Engineer, technicians, clerical staff, and skilled and unskilled laborers.

In December 1994, when the ATP began to gain momentum, the total number of staff employed by DSI was over 25,000. Of these about 10 percent were in Headquarters and 90 percent were in the regions. About one-quarter were employed as regular civil service employees and three-quarters were laborers or contract staff. Of the civil service employees, about two-thirds were technical staff and one-third were clerical and other support staff.

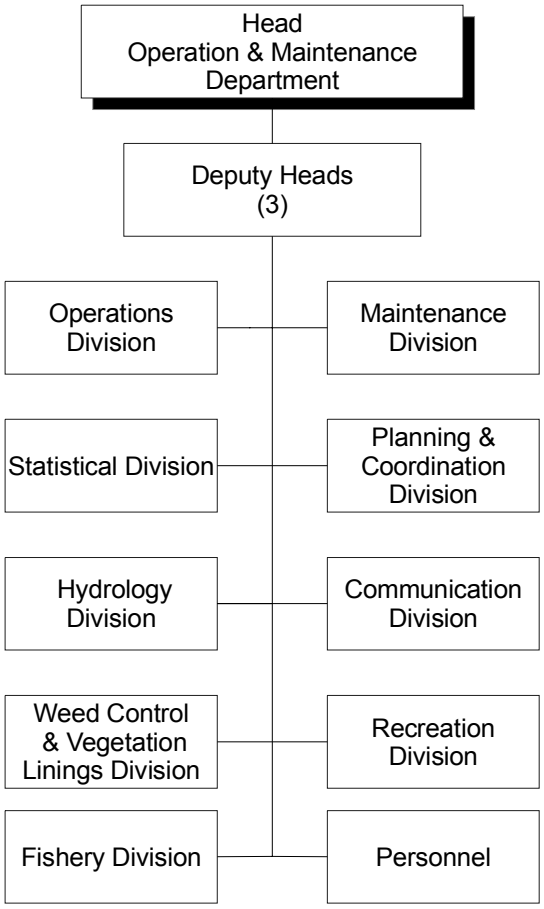



**Figure 3. Organizational structure of the DSI O&M Department**

# 3 The Transfer Program

## *3.1 Terminology*

The international literature on irrigation management has long used the terms *Water Users' Association* and *Irrigators' Group* in discussing irrigation management institutions. The term Water Users' Association (WUA) usually refers to a local-level organization based on the active involvement of water users who come together for the purpose of organizing and practicing irrigation system operation and maintenance. The term Irrigators' Group suggests a less formal grassroots collective effort aimed at operating and maintaining lower level facilities in an irrigation scheme.

By contrast, the ATP in Turkey has been founded on a downward reaching link between DSI and local administrations, rather than through the bottom-up organization of village-level associations of irrigators. In order to avoid misunderstandings regarding the social and institutional characteristics of the organizations involved, this paper will therefore use the term *Irrigation Association* (IA) to refer to the organizations which have been formed for the purposes of managing irrigation units covering more than one village or municipality[2]. The term *Irrigation Group* (IG)[3], which correlates literally with the

[2]The Turkish term is *Sulama Birligi*, literally *irrigation unions*.

[3]The Turkish term is *Sulayici Grubu*.

corresponding Turkish term, will be retained but given a somewhat special meaning, referring to a sub-unit of a local administration which participated in an earlier DSI program to promote village level involvement in irrigation system operation and maintenance. It does not denote here a group of irrigators organizing for self-help, but rather a municipal service function. The term *Irrigation Management Organization* (IMO) is used to refer generically to the various organizational forms which serve as receptors of responsibility in Turkey's transfer program.

## 3.2 Indigenous Management Practices

About one-quarter of the irrigated area in Turkey has been created independently of central government support. This irrigation may have been developed by individuals (particularly for groundwater irrigation or pumping from natural watercourses) or by village groups.

In village-based schemes, the *muhtar* acts as the coordinator of operation and maintenance activities. When requested by farmers in the village, or when he thinks the time is appropriate, he informs the irrigators that preparations for the irrigation season are to start. Necessary activities, such as construction of diversion structures and canal reconstruction and cleaning, have traditionally been done on the basis of *imece*, a form of communal exchange labor. Most structures are built with local materials contributed by the irrigators. For example, weirs might be made from woven sticks, mud and matting. These structures frequently need reconstruction in the course of the irrigation season. Irrigation schedules are agreed upon informally by the irrigators who share an irrigation channel, with the *muhtar* acting as mediator if required.

The increase in migration from rural to urban areas is weakening the traditional arrangements for village-based irrigation. Contributions in labor and in kind are being replaced with payment in cash. As younger people are often away at critical times for system maintenance and operation, older residents are faced with heavy tasks which they find difficult to do in a timely fashion. One *muhtar* interviewed by Svendsen and Nott (2000) foresaw the death of his village irrigation scheme, at least in its current form, within the next ten years. Still there is a clear tradition in Turkey of local-level joint action to provide a common good such as irrigation service.

## 3.3 The Irrigation Group Program

Since the early 1960s DSI has had a program to transfer O&M responsibility for secondary and tertiary distribution networks to *Irrigation Groups* (IGs). Under this program village headmen (*muhtars*) or mayors of municipalities, designated as heads of *Irrigation Groups*, enter into a contractual arrangement with DSI to take administrative responsibility for tasks such as collecting and submitting farmer water demand application forms to DSI, managing water distribution below the secondary canal, and cleaning and minor repair of canals, siphons, and *kanalets*[4]. The *muhtar* or mayor is responsible for hiring laborers for maintenance work and ditch riders for water distribution. In exchange, DSI agrees to give farmers a discount of between 20 percent and 40 percent on the DSI irrigation fees due. The local administration then has the right to collect the value of this discount from farmers itself in order to finance the costs incurred in local irrigation O&M. The local administration is allowed to keep any savings from the difference between fees collected and actual O&M expenditure as a contribution to the local administration budget.

Some observers have considered the IG system more cost efficient than DSI in implementing O&M tasks, with local administration seen to use less labor at lower cost. It is also claimed that the system improves the effectiveness of water use. For example, in 1990 IGs were found to have achieved an irrigation ratio[5] of 77 percent, compared with 60 percent on the schemes run entirely by DSI (WB, 1993).

---

[4]Raised concrete canal sections.

[5]Ratio of area actually irrigated to area equipped with facilities.

However, the IG program has had only a limited effect on overall scheme O&M costs, on cost recovery rates, and on DSI staff levels and personnel costs. Several fundamental problems weaken the program. Among these are lack of direct farmer involvement in IG establishment and operation, reluctance by some IGs to take management responsibility, and variations in DSI staff commitment to the IG program. IGs have also faced difficulties associated with the fact that IG boundaries are based on settlement areas rather than irrigation boundaries, complicating operation and maintenance of canals that cut across village boundaries. Perhaps the most serious constraint, however, has been the absence of any mechanism for articulating local units into a structure which could manage entire schemes or hydrologic units. Without such a mechanism, the potential impact on public O&M expenditures, staff levels, and cost recovery rates is extremely limited, even if IGs work effectively and efficiently.

Nevertheless, the presence of IGs has provided an important foundation for Turkey's irrigation management transfer process. In 1994, at the outset of the ATP, approximately 600,000 hectares, or about 40 percent of the DSI-developed area, were partly managed by *Irrigation Groups*. This has generated widespread experience within village and municipal administrations with irrigation management tasks and has created sizeable cadres of local workers familiar with operation and maintenance practices. DSI Regions have utilized this experience in different ways in developing Irrigation Associations.

## *3.4 Accelerated Transfer Program*

### 3.4.1 Origins and pace

DSI has had the policy of transferring O&M responsibility of smaller and more remote projects to local administrations since the 1950s. However, until 1993 the pace of this transfer activity was slow. The average area transferred for the first 40 years of the program was only about 2,000 hectares per year.

During the early 1990s, the World Bank was supporting a Drainage and On-Farm Development Project in Turkey. World Bank supervision missions for this project participated in discussions on the crisis facing the irrigation sector and they encouraged DSI to explore new ways to put O&M financing on a sounder footing. Turkey's previous experience with the transfer of O&M responsibilities to IGs, IAs and cooperatives was seen as a valuable precedent. Funds available from the Drainage and On-Farm Development Project were made available to broaden the experience of DSI staff by supporting study tours to other countries with experience with devolution of authority. Ultimately, more than 50 DSI personnel participated in these tours. Most of these tours focused on Mexico, where a very similar program of establishing locally controlled irrigation districts had been underway for several years[6]. These visits turned out to be extremely influential in helping create, among the Turkish participants, a vision of what was possible and providing examples of how to undertake such a program. In 1993, inspired by what they had observed abroad, senior DSI managers developed a program for the accelerated transfer of O&M responsibilities to local management. The program was initiated in 4 pilot regions, Adana, Antalya, Izmir and Konya. The initial intention was to start with smaller schemes (i.e. those less than 3,000 hectares) and to gradually expand the area covered. With the introduction of the Accelerated Transfer Program (ATP), transfer rates increased dramatically(Figure 4).

[6]Other tours included the United States, which provided, indirectly, the conceptual model for the Mexican program, and to Pakistan, which has (as yet unrealized) aspirations similar to those of Turkey.

Initial plans under the ATP called for transferring about 150,000 ha of irrigated area annually, achieving 1.35 M ha by the year 2000 (Uskay, 1999). However, the transfer process gathered momentum rapidly and quickly exceeded the originally anticipated rate of transfer. In 1995 the area transferred was more than three times the area planned for transfer in that year, and new higher targets for subsequent years were established. The extraordinary pace of transfer in 1995 resulted in 61% of the DSI-developed irrigated area in the country having been shifted to local control by the end of that year. The pace declined somewhat in subsequent years, but still averaged about 120 thousand hectares per year through the end of the decade. Presently just over 80 percent of the irrigated area developed by DSI has been transferred to local entities to manage.

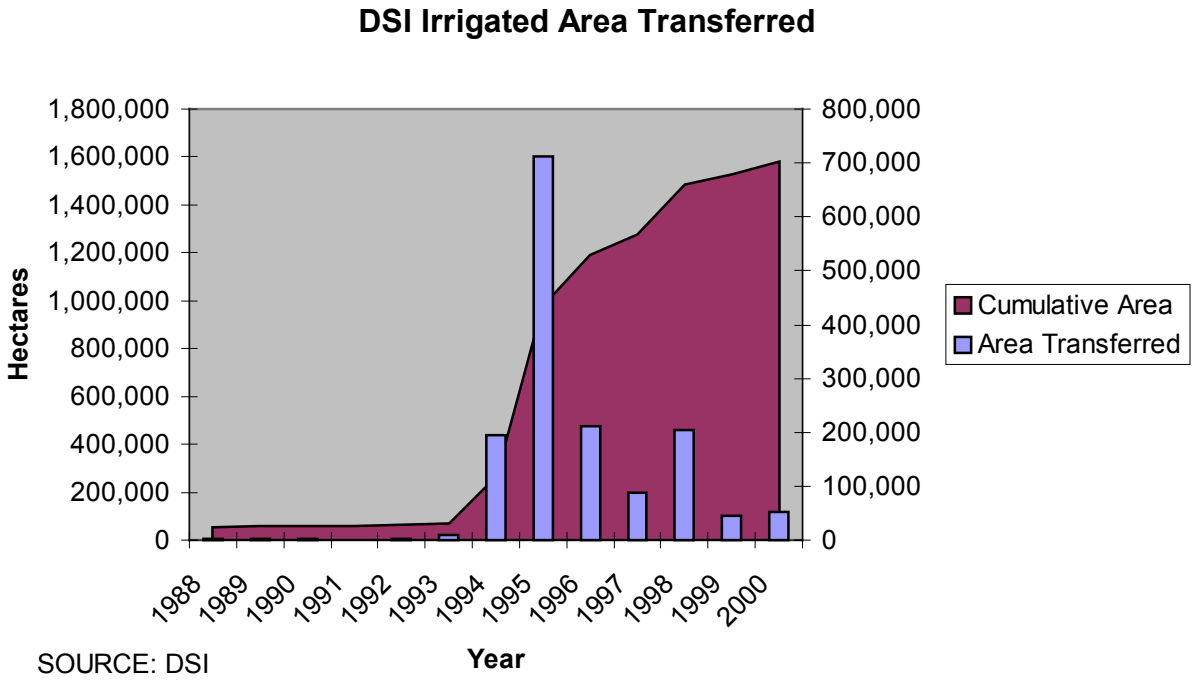



**Figure 4. Pace of transfer program**

The current pace of transfer is more constrained by the rate at which new irrigation capacity is being created in the country, than by limitations of the transfer program itself. Remaining areas of older irrigation are more difficult to transfer because they are more isolated, less market-oriented, and often harbor a more traditional outlook. Partial transfer of management responsibilities in some of these areas has taken place, but progress toward full transfer is expected to remain slow.

Turkey has over 100 major dams and 750,000 hectares of irrigation development currently under construction throughout the country. The largest single share of irrigation development is slated for southeastern Turkey under the Southeastern Anatolia Project (GAP), which intends to develop nearly 1.7 million hectares of new irrigation by 2020, only about 10 percent of which has thus far been completed. As these new areas come on-line, much of the continued growth in transferred area will come from the handing over of these newly irrigated areas to local Irrigation Associations. Newly-created areas in other regions are also being transferred as they are completed.

### 3.4.2 Motives for initiating the ATP

The impetus for this dramatic transfer of responsibility was the combined effect of a national budgetary crisis and rapid growth in the wage costs of unionized labor in the early 1990s. The budgetary crisis led to a squeeze on financial allocations to DSI in general and to the O&M Department in particular. The growth of wage costs raised the proportion of expenditure on operation and maintenance personnel while

reducing the funds available for materials and equipment. This brought on the prospect of an approaching need for widespread rehabilitation of large-scale irrigation schemes caused by deferred maintenance resulting from the underfunding of O&M. The existing cost recovery system offered no help in this regard. In the first instance, collections were taken up and retained by the Ministry of Finance, and amounts collected bore no relationship to the DSI budget. In the second, the fee collection rate was low — averaging 37.2 percent of collectibles in the period 1990 to 1993. Moreover the charging system which was designed to collect fees two-years after the year in which expenditures were incurred and minimal late payment penalties, coupled with inflation rates in excess of 50 percent per year, meant that by the time farmers did pay fees, the real value of the payments had decreased substantially. It was estimated in 1993 that there was a shortfall between O&M allocations to DSI and collected tariffs of 83 percent (WB, 1993, 38).

There were also national restrictions on agency growth. Since the mid-1980s the State has had a policy of restricting new hiring in state agencies. The last general examination for government service was held in 1983. This restriction applies to DSI and restricts even replacement of retiring workers, though there are several minor pathways for new entrants. Internal DSI policy had stopped entirely any new assignments to the O&M Department. New hires are typically assigned to construction-related departments.

A program devolving responsibility for irrigation system O&M to the local level was also highly consistent with more general national policies promoting privatization. This may have encouraged DSI to undertake a transfer program and helped convince farmers and local officials of the correctness, and perhaps the inevitability, of such a change.

### 3.4.3 The transfer process

The transfer program is being implemented entirely by DSI O&M staff members, organized and coordinated by the three-person transfer team of the DSI O&M Department. The lead role in the regions is played by the heads of the Regional O&M Departments. In some cases the head of the Regional O&M Department has assigned an officer on his staff to take responsibility for the transfer program. In other cases, the department head himself has been the prime mover. The heads of Branch Offices and operations engineers for each of the schemes have also been involved in promoting and implementing the program. The operations engineers and their supporting technical staff have then provided follow-up support to the newly-formed IMOs.

An important question arising here is the reason that DSI staff supported rather than thwarted the transfer program. There are several possible explanations for this. First, because Turkey has a large ongoing program of developing new irrigated hectarage, there are other professional opportunities within DSI for engineers and technical staff. This would tend to reduce anxiety over possible job losses by these groups. This effect was reinforced by the hiring freeze in effect since the mid-1980s. Secondly, as shown in a subsequent section, the heaviest cuts in DSI staff levels were of skilled and unskilled laborers, while technical staff, the ones implementing the transfer process, were relatively less affected. Third, DSI engineers are reasonably well-paid and have generally high professional standards. Fourth, Turkey has a rapidly expanding economy and a vibrant private sector[7] providing professional jobs outside the public sector and making retaining a public sinecure a less powerful motive than it is in some developing countries.

The study tours funded by the World Bank provided an important learning experience for DSI staff and an incentive to promote the transfer program. At the outset of the program, the transfer team of the DSI O&M Department embarked on a program of staff orientation meetings and seminars for DSI headquarters and regional personnel and for IA Chairmen. Between October 1993 and October 1995 the team organized 41 in-country meetings and seminars each lasting between one day and one week. Most

[7] Recent economic problems have altered this picture somewhat, but during the first 5 years or so of the program, this picture held.

of these were held in the regions for technical staff and IA representatives. But seminars were also conducted for World Bank missions and for visiting delegations from Bulgaria, Macedonia and Egypt.

In selecting the four pilot regions, DSI applied the following considerations.

- **A range of experience with Irrigation Groups**: Adana and Izmir had wide coverage (80 to 90 percent), Antalya about 50 percent coverage and Konya 17 percent coverage of total irrigation area by IGs.
- **Representation of coastal regions and Central Anatolia**: Konya is in Central Anatolia, the other 3 regions are coastal.
- **A range of experience with small scale transfer**: Adana, Antalya and Konya had transfer experience dating back to the 1960s, and by 1990 they had transferred between 5,000 and 10,000 hectares to local management. There had been very little transfer activity in Izmir prior to the 1990s
- **Active and receptive staff**: this was characteristic of all four regions.
- **Irrigation ratios**: out of the 22 DSI regions reporting in 1994, Adana ranked 5th, Konya 10th, Antalya 15th, and Izmir 16th in the fraction of irrigation area irrigated.

The selected pilot regions were also 4 of the 5 largest DSI regions, in terms of irrigation area.

### 3.4.4 Types of management organizations

There are four forms of local irrigation organizations which act as recipients of O&M responsibility in the transfer program: (a) cooperatives, (b) villages, (c) municipalities, and (d) Irrigation Associations. As described earlier, cooperative management is most common among schemes developed by GDRS, though GDRS also engages in informal transfers to local public administrations. DSI's transfer program is based on shifting O&M responsibilities to local administrations, to Irrigation Associations which are based on local administrations, and, occasionally, to cooperatives. Irrigation Associations differ from villages and municipalities, though, in that the IA constitutes a new institution with a legal personality that is distinct from any existing government body. The most important forms are thus the following three.

- **Village management**: where the irrigation scheme serves only a single village, the transfer of the scheme is undersigned by DSI and the *muhtar*, with the approval of the village council of elders. The transfer requires the approval of the Minister of Public Works and Settlement. The responsibility for scheme operation and maintenance then passes to the village administration, with the *muhtar* functioning as the executive officer for irrigation management. The *muhtar* may select one or two people to assist him with O&M administration.
- **Municipal management**: where the irrigation scheme serves only a single municipality, the transfer of the scheme is undersigned by the DSI and the mayor of the municipality, with the approval of the municipal assembly. As with transfer to the village administration, transfer requires the approval of the Minister of Public Works and Settlement. The responsibility for scheme operation and maintenance then passes to the municipal administration, with the mayor functioning as chairman and the municipal assembly functioning as the "general assembly" for irrigation management. The mayor usually appoints several existing staff members to assist him with O&M administration. Alternatively, he may hire new staff for this purpose.
- **Irrigation association management**: this is the form of transfer used where the irrigation scheme covers more than one local administrative unit (village or municipality). In this case, a new institution is created under municipal law. The *transfer agreement* and the "statutes" or *articles of association* are the legal basis for the creation. The transfer agreement requires the approval of the Minister of Public Works and Settlement while the articles of association require the approval of the Cabinet of Ministers. In large schemes composed of two or more hydrological units (e.g. left and right main canals) a separate association is often formed for each segment. The general assembly of the IA is made up of *muhtars* and mayors of participating villages and municipalities plus additional

members. Selection procedures for additional members differ among regions. They can be selected by *muhtars* and mayors or directly elected by irrigators. Elected members may be from local assemblies, representatives of farmers= organizations such as the Union of Farmers or the Farmer Protection Organization, or members of the community. In most cases in the pilot regions, additional members appear to be selected by *muhtars* or mayors from among the members of local assemblies.

As would be expected, units managed by villages, municipalities, and cooperatives tend to be small. In the four pilot regions the average irrigation area of these three types of units is less than 700 hectares. In contrast, the average size of an irrigation unit managed by an Irrigation Association is approximately 6,500 hectares. Although the largest number of transfers, more than 300, have been to individual villages and municipalities, these schemes are typically very small and comprised only 5.4% of the total area transferred as of 2000. Transfers to cooperatives account for another 3.4% of transferred area. The bulk of the area transferred, 91%, has gone to IAs.

### Steps in the transfer process

There are five basic steps in the transfer process. The steps, and the individuals and agencies involved in each step, are summarized for each form of local irrigation management in Table 5. The entire process generally takes 6 to 9 months from initiation to implementation.

1. **Initiation:** the first step is to create the interest or willingness of the receiving group to participate in the transfer process. DSI takes the initiative in informing local administration representatives of the need for, and possible benefits from, participating in the transfer. Initial information meetings initiated by DSI are followed by internal meetings and discussions involving the relevant local administration representatives and irrigators. Initial approaches have often been met with suspicion which must be allayed through additional discussion.

   Each IA must be legally established with the approval of the Council of Ministers. The articles of association for the IA spell out the method of formation and selection of the governing bodies, the qualifications for membership on the governing bodies, the obligations and authorities of the governing bodies, staff requirements and conditions for staff appointment, required provisions for financial management and reporting, and provisions for the liquidation of the association. This step is not necessary for transfers to village or municipal administration.

   Once the IA has been formally constituted, a general assembly meeting is called. The chairman and the management committee (also referred to as a "council") are elected by the general assembly.

2. **Transfer agreement**: this document sets out the rights and responsibilities of the new IMO and of DSI. This agreement is developed by DSI with the approval of the association chairman and the management committee of the IMO. It is signed by the chairman and the DSI regional director. The transfer becomes effective with the approved of the Minister of Public Works and Settlement after all other steps are accomplished.

3. **Transfer protocol**: after the transfer agreement is approved, the regional director of DSI and the chairman of the IMO sign the transfer protocol. This catalogs and describes all of the characteristics and facilities of the irrigation unit being transferred (e.g. principal components, type of irrigation, electrical and mechanical components of pumping stations, and so on), and includes a map of all irrigable lands. Special instructions concerning the operation and maintenance of the transferred unit are attached as appropriate.

4. **Preparation of operation and maintenance plans**: once the transfer agreement is cleared and the transfer protocol is prepared and signed, DSI staff work with representatives and staff of the IMO in preparing operation and maintenance plans and budgets for the first post-transfer irrigation season.

5. **Implementation**: the IMO begins unit operation with assistance from DSI as needed.

### 3.4.5 Variations

There are some variations between regions, and indeed between branch and scheme offices, in the extent of DSI involvement with irrigator consultation prior to the transfer. In some cases DSI staff appear to work almost exclusively with local administration representatives, leaving it to these representatives to inform and consult with local irrigators. In other cases, DSI staff have more direct contact with the irrigators in promoting the transfer, though formal transactions are made with local government leaders.

### 3.4.6 What is transferred

Under the transfer agreement, the IMO becomes responsible for providing all services related to the operation and maintenance of the specified irrigation facilities and for bearing the costs of providing these services. Ownership of facilities is not transferred to the IMO and remains with the state. Likewise because of the loosely-defined character of Turkish water rights, there is no conveyance of any formal right to use water to the IMO.

### 3.4.7 Ongoing DSI responsibilities

During the transition phase the IMO takes progressively greater financial and management responsibility for operating and maintaining the unit below the main canal. DSI provides on-the-job training to field and administrative staff, backstops their work and operates and maintains various portions of the unit above the main canal. The level and pace of the transition varies and the "endpoint" sharing relationship is still undefined.

DSI Regions and branches are given freedom to be flexible in reaching agreements with the IMOs regarding the amount of support that DSI will provide at different stages in the transfer process. The main variation can be observed in the extent of material and service support provided free of charge by DSI to the IMO. For example some IMOs have paid for fuel costs on DSI-operated heavy equipment from the outset whereas other IMOs have not had to pay in the first year. In general both DSI and IAs have been remarkably pragmatic in developing and refining the transfer process. This has contributed importantly to its successes.

DSI retains responsibility for operating and maintaining reservoirs and main canal facilities for most schemes. It coordinates with local IAs on annual delivery schedules, but has ultimate control of bulk water deliveries by virtue of its control over reservoir operations. Presently no bulk water charges are levied by DSI for these services. DSI also retains *de facto* responsibility for cleaning main drains and for operating any drainage pumping stations required for disposing of drainage water.

**Table 5. Stages in the transfer of DSI irrigation schemes, by type of management**

| Stage | IA Management | Village Management | Municipality Management | Co-operative Management |
|---|---|---|---|---|
| **1. Initiation** | Initiative generally comes from DSI; involves meetings with Muhtars, Mayors and local assemblies; agreement to continue must be given by Muhtars, Mayors and their respective assemblies | Initiative generally comes from DSI; involves meetings with the Muhtar and council of elders; agreement to continue must be given by the Muhtar and the council of elders | Initiative generally comes from DSI; involves meetings with the Mayor and municipal assembly; agreement to continue must be given by the Mayor and municipal assembly | Initiative must come from a minimum of 15 farmers prior to construction of a groundwater or surface scheme |
| **1a. Legal establishment of the management agency** | 1)Application for the legal establishment of an Irrigation Association signed by Muhtars and Mayors with the authority of their respective local councils; 2) reviewed by the Provincial Governor's office; 3) reviewed by the Ministry of Interior; 4) approved by the Council of Ministers | Not necessary | Not necessary | Co-operative registered as a legal entity in accordance with co-operatives legislation administered by the Ministry of Agriculture and Rural Affairs |
| **1b. Selection of Chairman and Board** | 1) General Assembly constituted by Muhtars, Mayors (automatic members) and 2 to 3 times as many additional members selected either by the automatic members or (less often) by irrigators; 2) the General Assembly elects a Chairman and 4 members of the Management Committee | Constituted by the Muhtar and the Council of Elders | Constituted by the Mayor and the Municipal Council | Elected annually by the General Assembly made up of member/partners of the co-operative |
| **2. Transfer Agreement** | 1) Prepared by DSI; 2) signed by the Chairman of the IA with the approval of the IA Management Committee; 3) signed by DSI regional office; 4) reviewed in Ankara by DSI O&M Transfer Section; 5) approved by Minister of Public Works and Settlement | 1)'Prepared by DSI; 2) signed by Muhtar with the authority given by the village council of elders;3) signed by DSI Regional Office; 4) reviewed in Ankara by DSI O&M Transfer Section; 5) approved by Minister of Public Works and Settlement | 1)Prepared by DSI; 2) signed by the Mayor with the authority given by the Municipal Council; 3) signed by DSI Regional Office; 4) reviewed in Ankara by DSI O&M Transfer Section; 5) approved by Minister of Public Works and Settlement | Incorporated in the regulations relating to the establishment of the co-operative |
| **3. Transfer Protocol** | Prepared by DSI: sets out the characteristics of the irrigation system | Prepared by DSI: sets out the characteristics of the irrigation system | Prepared by DSI: sets out the characteristics of the irrigation system | Prepared by GDRS in accordance with the provisions of co-operatives legislation |
| **4. Preparation of Operation and Maintenance Plans** | Prepared by DSI with Management Committee and staff appointed by the Management Committee | Prepared by DSI with Muhtar and other staff appointed by the Muhtar | Prepared by DSI with Mayor and other staff appointed by the Mayor | Prepared by Operational Staff employed by the Co-operative under the supervision of a 5-person Board of Directors elected annually by the General Assembly; all partner/members of the co-operative constitute the General Assembly |
| **5. Implementation** | Responsibility of the Chairman, the Management Committee and staff appointed by the Chairman | Responsibility of Muhtar and other staff appointed by the Muhtar | Responsibility of Mayor and other staff appointed by the Mayor | Responsibility of the Board of Directors and Operational Staff employed by the co-operative |

Currently there is program, administered by DSI allowing IAs to purchase maintenance equipment with subsidized credit. A World Bank loan funds credit for between 55and 75 percent of the cost of the equipment, depending on the region and type of equipment. The remainder is provided as a program subsidy.

In at least some cases, transfer agreements between DSI and IMOs call for joint annual inspections of facilities and for any remedial maintenance to be undertaken by the IMO, or by DSI and reimbursed by the IMO. Written permission from DSI is required to modify or expand any DSI facilities being operated and maintained by an IMO. Annual IA budgets must be approved by the district administrator, though this is largely pro forma.

As part of the agreement between DSI and IAs, each IA must provide a set of performance-oriented information to DSI after each irrigation season. This information includes data on cropping intensities and dropping patterns, a financial statement and a financial plan for the next year, an inventory of staff and equipment including costs and salaries, and other related matters. It does not include volumes of water utilized.

An important unresolved issue is the way in which future rehabilitations will be handled. Policies on this point remain unclear, which leads to confusion and may encourage deferral of routine maintenance in the expectation that subsequent rehabilitation will be supported by the government. There is no evidence that this is yet happening, but the potential generates a certain risk for sustainability.

### 3.4.8 Farmers and the ATP program

This program gives little appearance of being driven by farmer demand. It is a program that is driven by pressing national budgetary and programmatic needs, reinforced by the support, advice, and encouragement of an international body. Farmers have often responded skeptically to the idea at the outset and many are still adopting a wait and see attitude.

The main incentive to participate in the program appears to be that it represents a way of avoiding the terminal deterioration of schemes and a decline in the quality of irrigation services they provide which many irrigators felt they were facing. In the early 1990s financial constraints led to the curtailment of overtime work by DSI field staff[8]. This served as a convincing example of the need for local groups to take over scheme management. Other incentives include the material, service, and technical support that DSI promised and is providing to IMOs to set them off on a firm footing.

The response of farmers interviewed by the study team in coffee houses (non-members of the IMO assembly or committee) to the transfer program can be characterized as guarded acceptance. The transfer appears to have been presented to them as an accomplished fact. Their principal concerns relate to fee payment (after years of very relaxed treatment of obligations), to the quality of service which can be provided by the smaller IMO staff, to the technical competence of the IMO staff relative to that of DSI, and to the accountability and fairness of Association management to farmers' needs and wishes.

That said, the leadership of most Associations visited have embraced the concept enthusiastically and are taking vigorous steps to implement it. If this results in high quality irrigation services at a reasonable cost, then the farmers will be satisfied.

[8]One DSI staff member pointed out that by working one weekend as overtime, a union technician receives additional pay equivalent to one-half of his monthly salary.

# 4 Results of the Transfer Program

## *4.1 Staff levels*

One of the expected impacts of the IMT program, and a step necessary if potential cost savings are to be realized, is a reduction in the number of staff working for the state to operate and maintain irrigation schemes. Svendsen and Nott (2000), working with data through 1994, noted a modest 10 percent drop in

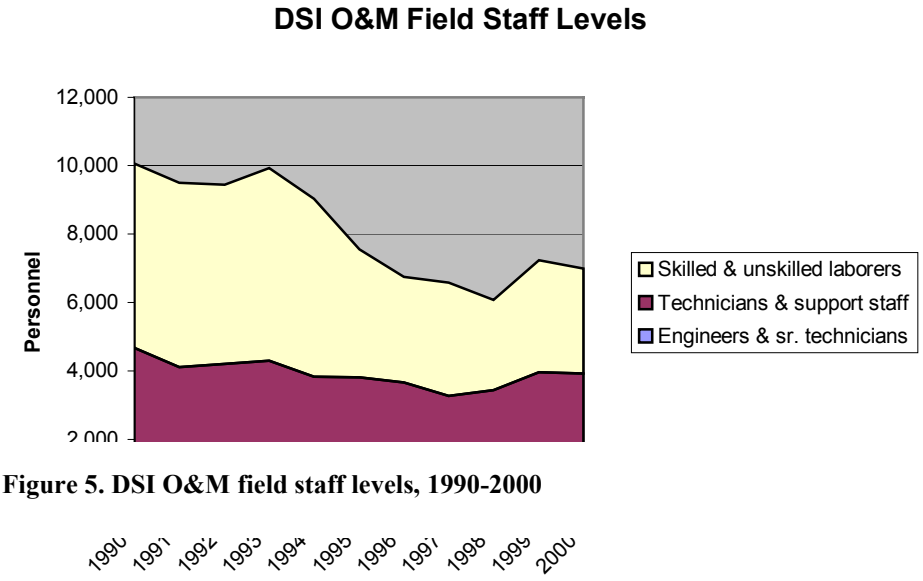



**Figure 5. DSI O&M field staff levels, 1990-2000**

DSI O&M staff levels between 1990 and 1994, attributed to general downsizing efforts, but were unable to draw conclusions about the impact of the transfer program itself. With an additional 6 years of data now available, the picture is much clearer.

As seen in Figure 5, O&M staff levels fell sharply (32%) between 1993 and 1996 and have since stabilized. This drop coincides precisely with the period of maximum transfer activity under the ATP, and seems clearly associated with it. Moreover, the group most strongly affected by the decline were skilled and unskilled laborers, precisely the group least needed following a reduction in O&M activity. This group shrank by 45%. The number of engineers and technical staff, who have continuing responsibilities for the O&M of shared facilities and an increased monitoring role, declined by a smaller 15% between 1993 and 1996. The pattern with respect to the central office O&M division is similar though more spread out, with technicians and support staff declining by 40% between 1990 and 2000 while engineering staff shrank by 11% (Figure 6). All of the attrition has been voluntary and it is likely that at least some of the displaced staff have transferred to construction-related activities in the Southeast Anatolian Project (GAP) and elsewhere.

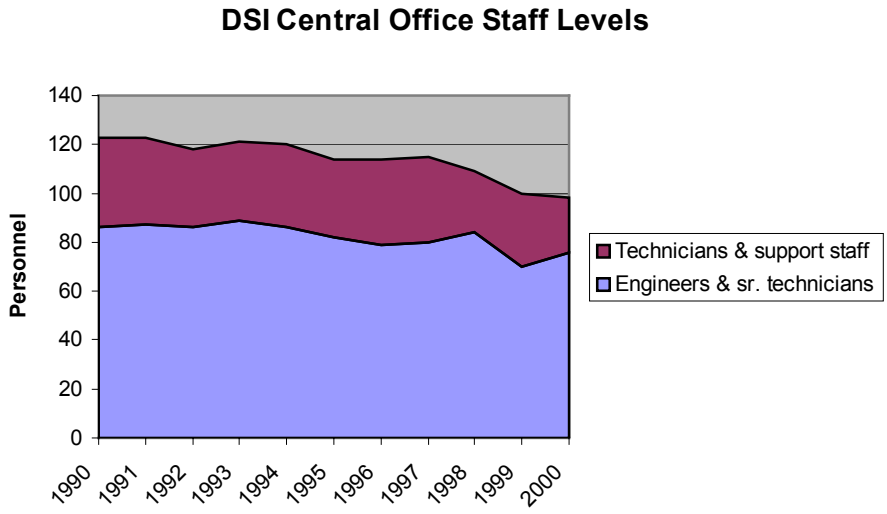



**Figure 6. DSI central office staff levels, 1990-2000**

This would seem to be a ringing endorsement of the ATP and irrigation management transfer, and it is certainly a positive accomplishment. The actual picture, though, is a little more complicated. Comparing the number of O&M staff working for DSI in 1993, when it managed the entire portfolio, and combined number of O&M staff working for DSI and the IAs in 1999, we see that the total now is considerably larger than in 1993 (Table 6). This is true for both permanent and temporary workers. Moreover, the staffing intensity (staff/1000 hectares) is about 30% higher than it was in 1993.

**Table 6. O&M staffing for DSI developed irrigation, 1993 and 1999**

| | Labor | | | | |
|---|---|---|---|---|---|
| | Permanent | Temporary | Total | Irrigated Area | Staff/1000 Ha |
| **1993** | | | | | |
| DSI | 4,294 | 5,624 | 9,918 | 1,177,356 | 8.4 |
| **1999** | | | | | |
| DSI | 3,956 | 3,276 | 7,232 | 102,792 | 70.4 |
| IAs | 1,133 | 3,587 | 4,720 | 994,145 | 4.7 |
| Total | 5,089 | 6,863 | 11,952 | 1,096,937 | 10.9 |

Interestingly, though, the staff intensity of IA-managed systems is now only about 4.7, while under an exclusive DSI franchise in 1993, it was 8.4. This constitutes a very significant increase in efficiency and helps to validate the core concept of IMT, which is that, in general, locally-controlled organizations can manage an irrigation service provider more efficiently than a large civil service bureaucracy.

However, the small area still managed directly by DSI now has a staffing intensity of an astonishing 70.4, more than 8 times the 1993 level. This comparison, is, of course, not completely fair. DSI has other O&M responsibilities besides scheme-level management, including dam operation and maintenance, O&M of main supply and drainage channels, technical assistance to IAs, and monitoring and recordkeeping, and these responsibilities now have to be mathematically allocated across a much smaller base area in computing a staffing intensity ratio. Still, it appears that there is very significant downsizing yet to be done by DSI to achieve the potential cost savings theoretically afforded by management transfer.

## 4.2 Expenditures

Another indicator of program impact is expenditure on maintenance. Table 7 shows O&M expenditures, in real terms, for the period 1985 to 2000.

**Table 7. DSI O&M expenditures, in million 2000 Turkish Lira, 1985-1999**

| YEAR | OPERATIONS | | | | | MAINTENANCE | TOTAL O&M |
|---|---|---|---|---|---|---|---|
| | PERSONNEL | ENERGY | TRANSPORT | OTHER | TOTAL | TOTAL | |
| 90-93 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1997 | 27.3 | 70.5 | 33.2 | 69.5 | 37.3 | 22.8 | 33.1 |
| 1998 | 20.3 | 53.2 | 24.6 | 41.5 | 27.5 | 19.8 | 25.3 |
| 1999 | 29.6 | 58.1 | 28.5 | 56.0 | 35.5 | 23.8 | 32.1 |
| 2000 | 27.7 | 53.0 | 20.8 | 43.2 | 31.9 | 22.8 | 29.2 |
| 97-98 | 26.2 | 58.7 | 26.7 | 52.5 | 33.1 | 22.3 | 29.9 |

SOURCE: DSI DATA

**Table 8. Index numbers of real DSI O&M expenditures, 1990-1999**

| YEAR | COST INDEX (2000) | OPERATIONS | | | | | MAINTENANCE | TOTAL O&M |
|---|---|---|---|---|---|---|---|---|
| | | PERSONNEL | ENERGY | TRANSPORT | OTHER | TOTAL | TOTAL | |
| 1985 | 1504.70 | 4,091,290 | 9,748,977 | 1,677,745 | 168,527 | 15,686,539 | 14,105,095 | 29,791,634 |
| 1986 | 1161.32 | 4,454,824 | 10,672,531 | 1,584,040 | 202,070 | 16,913,464 | 14,719,731 | 31,633,195 |
| 1987 | 879.55 | 4,818,186 | 6,331,015 | 1,518,986 | 252,431 | 12,920,619 | 15,257,589 | 28,178,207 |
| 1988 | 515.86 | 3,906,122 | 4,120,722 | 1,706,994 | 245,035 | 9,978,873 | 11,292,263 | 21,271,136 |
| 1989 | 314.69 | 9,537,564 | 3,924,474 | 3,099,991 | 313,744 | 16,875,773 | 7,921,956 | 24,797,729 |
| 1990 | 206.62 | 11,448,386 | 3,027,751 | 2,624,643 | 496,911 | 17,597,691 | 8,539,026 | 26,136,717 |
| 1991 | 132.98 | 13,583,784 | 4,225,301 | 2,797,850 | 723,034 | 21,329,969 | 8,805,802 | 30,135,770 |
| 1992 | 82.05 | 12,546,206 | 3,770,844 | 2,604,860 | 524,205 | 19,446,114 | 7,994,675 | 27,440,790 |
| 1993 | 51.80 | 17,608,426 | 4,344,777 | 3,103,131 | 1,025,122 | 26,081,455 | 9,558,965 | 35,640,420 |
| 1994 | 23.47 | 11,240,858 | 5,580,304 | 2,435,642 | 771,830 | 20,028,634 | 6,767,189 | 26,795,823 |
| 1995 | 12.62 | 9,623,540 | 4,901,887 | 1,767,953 | 713,938 | 17,007,318 | 4,330,827 | 21,338,145 |
| 1996 | 7.17 | 4,523,969 | 4,399,776 | 954,448 | 448,129 | 10,326,321 | 2,131,878 | 12,458,199 |
| 1997 | 3.94 | 3,771,612 | 2,707,927 | 923,634 | 481,290 | 7,884,462 | 1,988,486 | 9,872,948 |
| 1998 | 2.30 | 2,798,953 | 2,042,216 | 683,822 | 287,103 | 5,812,094 | 1,726,707 | 7,538,801 |
| 1999 | 1.50 | 4,084,921 | 2,231,913 | 791,898 | 387,591 | 7,496,324 | 2,078,772 | 9,575,096 |
| 2000 | 1.00 | 3,821,690 | 2,035,528 | 578,048 | 298,885 | 6,734,151 | 1,991,645 | 8,725,796 |

SOURCE: DSI DATA

NOTE: COST INDEX BASED ON WHOLESALE PRICE INDEX, 2000=1.00

As seen in Table 7, there is a striking reduction in expenditures on O&M items across the board, with expenditures today less than a third of what they were prior to the ATP. As shown by the index numbers in Table 8, the sharpest decreases have been in the maintenance, personnel, and transport categories, while energy costs have dropped by a more modest 40%. Total O&M expenditures today are just 30 percent of the average values for the 1990-93 period immediately preceding the transfer program.

Another point evident in Table 7 is that maintenance expenditures were already declining rapidly before the accelerated transfer program got underway. By 1993 the maintenance budget had fallen, in real terms, to less than two-thirds of its peak, reached in 1987. At the same time, personnel costs were skyrocketing — from 4.1 trillion (2000) TL in 1985 to 17.6 trillion (2000) TL in 1993. It is probable that as personnel costs for unionized labor went out of control, maintenance expenditures were pared to free funds for paychecks[9]. There seems little doubt that dealing with runaway personnel costs and vanishing maintenance funding were primary motives driving DSI in its push to transfer O&M responsibilities to local control with such rapidity.

The extremely low level of the current maintenance budget, just 22 percent of its early 1990s level, is a cause of concern, however, as DSI remains responsible for storage dams, main water delivery and drainage works, and for operating and maintaining some 20 percent of the systems it has build throughout the country. As seen above, staffing levels are still extremely high and must be pared further to free up budget for preventative maintenance and improvement.

Because DSI still manages about 20 percent of the irrigated area it has created, it is possible to compare operating expenditures by DSI and the IAs on a per hectare basis. For 1999, DSI's per hectare expenditures on 102,792 hectares averaged 32.75 M TL (US$ 142). IA expenditures on 994,145 hectares averaged just 15.65 M TL (US$ 68) per hectare, less than half of the DSI expenditure rate.

## *4.3 Revenues*

The other side of the budget equation is revenue, and DSI, operating under a restrictive legislative mandate(see earlier discussion), has had enormous difficulties, and a weak track record, in collecting revenue for irrigation system operation. DSI levies for the systems still under its control are actually somewhat higher than IA-set levels. In 1999, the average IA fee assessment per irrigated hectare was 18.00 M TL (US$ 78), while the average DSI levy was 20.25 M TL (US$ 88). Collections, however, are another matter.

Between 1989 and 1993 when it was the sole system operator, DSI was able to collect just 36.7% of its collectables (Svendsen and Nott, 2000). And because the collections were made two years after expenses were incurred, the real value of the collections was rendered nearly trivial by inflation. Between 1997 and 1999, DSI collection rates averaged 43% (Unal, 2001). By contrast, IA collections in 1999 averaged 78.9% across more than 1.5 million hectares and took place in the year in which costs were incurred. Actual collections by IAs in 1999 were 14.2 million TL per irrigated hectare (about US$62/hectare)[10]. This is a respectable performance, and vastly better than that of DSI.

# 5 Conclusions

The Turkish Irrigation Management Transfer program remains impressive. Begun in 1993, the program has now shifted 80 percent of the large-scale irrigation in the country to local management. The transfer

[9]One DSI staff member pointed out that by working one weekend as overtime, a union technician receives additional pay equivalent to one-half of his monthly salary.

[10] Assumes that actual irrigated area is 65% of potential irrigation area.

program developed by DSI, the Turkish national water resources agency, was home-grown but inspired by experience in Mexico and elsewhere. The World Bank played an important facilitating role in initiating and sustaining the program in its early stages. The primary driver for the change was labor costs which spiraled out of control in the late 1980s and early 1990, starving the agency of funds to maintain irrigation and drainage facilities. Transferring management to local control was seen as a way of containing these costs by devolving responsibility for employing staff. The program was also expected to lead to general improvements in efficiency and system performance.

Staffing intensity on IA-managed schemes is only about 56% 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, principally affecting unionized skilled and unskilled labor. However staffing intensity for the remaining schemes under DSI control and overall DSI staffing levels remain extremely high. Significant additional staff cuts appear warranted.

DSI operating costs have also fallen sharply. However, per hectare operating costs on the 20% of schemes still managed by DSI are roughly double those on IA-managed schemes. Existing schemes remaining under DSI control are proving difficult to transfer completely to local control, for a variety of reasons.

IAs are currently charging about US$78 per hectare in irrigation fees. DSI charges about 13 percent more than this, in nominal terms, but collects far less. In 1999, IAs succeeded in collecting 79% of the amounts due to them from water users. DSI collected about 43% of its collectibles at rates which are effectively much lower than IA rates.

While documenting a number of successes, this assessment also suggests several areas of concern.

- Agency downsizing seems stuck at a level well above the optimum. In fact, O&M staff levels were higher in 1999 and 2000 than they were in 1998.
- Very low DSI maintenance budget figures relative to levels of the mid-1980s suggest that preventative maintenance of main facilities and irrigation facilities still under DSI control may be subject to neglect.
- Maintenance quality on IA-managed schemes is largely unknown; per hectare expenditure levels and the inherent incentives which promote maintenance deferral suggest the need for a program of regular maintenance monitoring of IA-managed facilities by DSI.
- Current assistance to IAs for equipment purchases establishes a *de facto* principle of cost sharing for capital expenditures. A clear policy on cost allocation for future system rehabilitation and improvement expenditures needs to be established.
- DSI needs to continue to rethink its new role in water resources development and management. Important steps have been taken, but additional thinking is needed, particularly in the areas of water rights, basin planning, and surface and groundwater linkages.

# 6 Acknowledgements

Special thanks are due to Mr Savas Uskay, head of the DSI O&M Division, for providing data and advice which were extremely helpful in preparing this cast study. Analysis and conclusions remain entirely the responsibility of the authors.

# 7 References

DSI. 1995. DSI in brief. Ankara:DSI.

Murray-Rust, H. and M. Svenden. 2002. Performance of locally-managed irrigation in Turkey: Gediz Case Study. *Irrigation and Drainage Systems*. Forthcoming.

Svendsen, M. and G. Nott, 2000. Irrigation management transfer in Turkey: process and outcomes. IN *Case studies in participatory irrigation management*. Eds D. Groenfeldt and M. Svendsen. Washington DC: World Bank Institute.

Svendsen, M., and H. Murray-Rust. 2002. Creating and consolidating locally managed irrigation in Turkey: the national perspective. *Irrigation and Drainage Systems*. Forthcoming.

Unal, Adem. 2001. Participatory privatization of irrigation management in Turkey. *INPIM Newsletter*, March

Uskay, Savas. 1999. Participatory irrigation management practices in Turkey. Paper presented to the 11th Seminar in the Development of Appropriate Technology, 12-19 December, Tokyo, Japan.

World Bank. 1993. Turkey: irrigation management and investment review (Report No 11589-TU). Washington DC: World Bank.