



Participatory Irrigation Management

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Abstract: In most developing countries, irrigation development project and their operation and management are heavily dominated by the public sector. Conventional wisdom once assumed that only the state was capable of handling large modern projects requiring heavy capital investment, complicated technical inputs, and the legal mandate to distribute water, and collect fees. Recent experience in many countries has over tuned these assumptions. Government-operated irrigation systems are often poorly maintained with steadily deteriorating infrastructure. Yet some of these same systems have shown dramatic improvement when their management was transferred farmer groups who entered into contracts with the government for operating and maintaining portions of the irrigation system. For the past two decades most countries have adopted policies to encourage greater involvement of farmers on irrigation O&M but only recently has this trend gained momentum to transfer the balance of responsibility from government to farmers. Two of most dramatic management transfer programs have been in Mexico, where the government has transferred more than 1.2 million ha of irrigated lands to WUAs, and in Turkey, where a majority of agency controlled system have been transferred to user management.

Key words: Water Users' Associations, Transfer Forms

Katılımcı Sulama Yönetimi

Özet: Gelişmekte olan çoğu ülkelerde, sulama geliştirme projeleri ve onların işletim-yönetimi devlet tarafından yürütülmektedir. Geleneksel anlayışa göre; su dağıtımı ve ücretlerin toplanması için büyük miktarda yatırımlar, karmaşık teknik gereksinimler ve yasal düzenlemelere ihtiyaç gösteren büyük modern projeleri ancak devletin sahip olabileceği yönündeydi. En son deneyimler birçok ülkede bu anlayışı değiştirmiştir. Devletçe işletilen sulama şebekeleri, sürekli tahrip edilen altyapısıyla çoğunlukla kötü yönetilmektedirler. Ancak aynı projeler, işletim ve bakımı için devletle bazı özel anlaşmalar yapılan çiftçi gruplarına devredildikten sonra yönetilmelerinde çok önemli değişimler göstermişlerdir. Son yirmi yıldır çoğu ülke çiftçilerin sulama şebekelerinin işletme-bakımını üstlenmeleri konusunda cesaretlendirici politikalar uygulamışlardır. Fakat bu eğilim son zamanlarda daha da büyük bir ivme kazanmıştır. Bunlar içerisinde en göze çarpan iki tanesi ise; 1.2 milyon ha sulu tarım arazisinin sulama birliklerine devredildiği Meksika ve çoğunluğu devletçe kontrol edilen sistemlerin kullanıcılara devredildiği Türkiye'dir.

Anahtar Kelimeler: Sulama Birlikleri, Transfer Şekilleri

INTRODUCTION

Around the world, countries that once promoted more government involvement in irrigation management are adopting new policies that do just too opposite: creating incentives for farmers to take over the management of operations and maintenance, while government agencies focus on improving the management of water at the main system level. Is this just another management fad? Will the pendulum that is now swinging towards greater management control by farmers soon swing back the other way, towards greater state control? There is very strong evidence that the current "*fad*" of participatory irrigation management, or PIM, is here to stay. Governments cannot do everything, and there are some things that they are simply not very good at doing. Farmers who depend on irrigation water for their livelihoods have the strongest incentive to manage that water very carefully. No public sector agency could every match the discipline that farmers impose on themselves when they manage their own irrigation systems [8].

The term, *PIM*, was coined by the World Bank in the early 1990s [9] and since 1994, the World Bank has carried out a program of PIM. One of the first countries is Mexico where it was applied in. By the end of February 2000 Mexico's IMT⁵ program had transferred irrigation infrastructure commanding 3.2 million hectares to 474,000 water users organized into 427 Civil Associations [9]. Following Mexico's lead, other countries, including Turkey and some Indian states, have adopted similar systems. PIM is not a new idea. Irrigation associations have existed in many parts of Asia for decades, including Japan and Taiwan. Other countries, including Vietnam and Pakistan, are in the process of implementing PIM-type reforms. Governments benefit from PIM by being able to reduce subsidies for irrigation. Farmers are also usually winners, since they enjoy a sense of ownership and improved services. The irrigation department may be a loser, as its budget, staff and authority are all likely to decrease [25].

Developed countries, such as the US, France, Germany, Japan, Australia, etc., have implemented IMT since the 1960s and 1970s, while developing countries have done so more recently. Many are developing WUAs to implement IMT, and this is spreading. To name a few, Mexico, Peru, and Colombia in South America; India and Pakistan in South Asia; Turkey and Iran in the Middle East; Uzbekistan and Kyrgyzstan in Central Asia; Albania and Romania in Eastern Europe; Philippines, China, Indonesia, and Vietnam in East Asia; and Mali, Niger, Tanzania, and Egypt in Africa [31].

In this text, it is suggested that participatory irrigation management may be even more important in a developing country context, for the following reasons;

- **Cost:** There is a very high financial cost, and a social cost, involved when government agencies assume irrigation management functions which farmers could otherwise handle themselves;

- **Incentives:** Irrigation users have stronger incentives to manage water productively than does a government bureaucracy;

- **Efficiency:** When management is decentralized to users, they can respond more quickly to problems or changes in the system. Aside from theoretical arguments in favor of PIM in both developed and developing countries, there is the empirical fact that participatory management approaches are becoming accepted policy in many developing countries [8].

Three general categories or levels of PIM can be distinguished:

Type 1- Transfer of assets and management to the farmers

Type 2- Transfer of management but not assets to the farmers

Type 3- Strengthening farmer management capacity without management transfer [8].

The most dramatic form of PIM (Type 1) is the transfer not only of management functions, but the legal ownership of the irrigation facilities (canals, pumps, diversion structures, dams, reservoirs, etc.). The “*standard*” type (Type 2) of irrigation management transfer arrangements, as found in Mexico, Turkey, Andhra Pradesh (India), Albania, and other countries, provides for legal transfer of management roles, as well as some transfer of assets. In most cases, the management transfer is presented to farmers as an option, with the possibility of maintaining the current arrangements of agency-management if that is the desire of the farmers.

In many PIM reform efforts, the outcome, whether intentional or not, has been more one of capacity building and improved farmer participation in joint-management (with the agency), rather than genuine transfer to farmer control. Third type of approach, based largely on the experience of the Philippines, takes a participatory development model as the paradigm. With the important exception of Andhra Pradesh (see above), this participatory approach can be referred to as the “*Asian*”

approach to institutional reform in the irrigation sector, in contrast to the “*American*” approach based on Irrigation Management Transfer (IMT) of the Mexican variety.

What Is Participatory Irrigation Management?

Decentralization of water management, including PIM, has been identified as a key water demand management (WDM) tool for better and more efficient water management, especially in water scarce regions. It requires the involvement and decision-making of millions of users and user groups in the design, implementation, operation and maintenance of water services. Decentralization aims to lift the high burden of government involvement in operation, management, maintenance and rehabilitation of irrigation systems. At all levels, multi-stakeholder involvement is, or should be, concerned with water policy formulation, planning, equitable allocation, water conservation and sustainability and pollution control.

Participation must aim for efficient and equitable water use and the promotion of environmental awareness. PIM also provides a basis for fair allocation of water through the collective effort of a group with a common interest, operating on the basis of mutually agreed and binding rules. PIM promotes the economic use of water and the associated increase in productivity. It gives farmers the opportunity to appropriate, directly, true scarcity and the cost of delivering water to the farm gate, while developing a sense of ownership and responsibility over the irrigation system that supplies this scarce resource. It is expected that system sustainability be promoted by enabling water users to adapt the system operation and maintenance practices to the requirements of their cropping patterns [5]. At the same time, PIM offers an approach to local management of irrigation systems that incorporates the key advantages of traditional farmer-managed governance [9].

There are two dominant meanings of PIM that have emerged over the past decade: (1) One is the original definition of PIM promoted by the World Bank and which reflects a flexible concept: “*Participatory Irrigation Management (PIM) refers to the involvement of irrigation users in all aspects of irrigation management, and at all levels*”. The key notion here is that individual farmers participate in irrigation management in some way, but the precise nature of that participation is left open. (2) The other meaning of PIM is that of management transfer from a government body to a farmer body. The term “*transfer*” was made famous in Mexico where the Spanish word, *transferencia* was incorporated into the 1992 water law which called for the transfer of management from government-managed irrigation districts to smaller units (*modulos*) administered directly by farmers through a management board and technical staff hired by the board. The Mexican-style transfer process became known as IMT.

There is an important difference between the two acronyms, PIM and IMT. The key feature of PIM is participation by individual farmers in the management of the irrigation system that they depend upon. Whether they participate directly or indirectly, as owners or only advisors, is left open in the definition. What matters is the quality or meaningfulness of the participation; the form is flexible. The key feature of IMT, on the other hand, is the transfer out of government's hands into the users' hands. Whether individual farmers participate actively in the new management arrangements is not addressed by this concept. For example, an individual farmer in Mexico might have no more idea about how decisions are made by the farmer-run management board controlling his *Modulo* than he had previously when the management was in the hands of the government-run irrigation district. From a PIM perspective, that particular farmer may not be participating in management, but from an IMT perspective, the irrigation system has been transferred to farmers. Although many types of PIM are possible, experience has demonstrated that management participation by farmers is much more likely when they are officially in charge of the system. This is the connection between PIM and IMT [9].

Water User Associations (WUAs) are the most common mechanism for implementing a participatory management approach, but they are not the only one. In the Niger River irrigation system in the African country of Mali, for example, farmers are represented in an advisory board that "*participates*" in management decisions, but farmers are not organized into WUAs. Typically, there are two or even three levels of water user associations, each level having a slightly different name to distinguish it from the next level. In Sri Lanka, for example, there are "*field channel organizations*" around the smallest canals serving between 10 and 30 farmers. The next level or organization is called "*D-Channel Organization*" and corresponds to the next higher level of canal, the distributor canal, serving from 50 to 150 farmers. Above this level, organizations can be federated even up to the system level.

Country Overviews Of Pim

Albania

Under communism there were some 150 state farms and 500 co-operatives. However, land was immediately privatized when the system collapsed, and was allocated to about 400,000 families in holdings averaging about 1ha, generally divided into separate plots of differing land classes [34]. The farmers' perception of the need for irrigation is a key factor in relation to the success of institutional reform and irrigation system modernization. Most irrigation schemes were small to moderate in size, and were often fragmented. Under the former communist regime, prior to 1990, most irrigation in Albania was totally managed and owned by Government, from source to field.

Albania is still in transition. In most districts the old institutions still prevail. In others there has been substantial reform. The latter is the result of the World Bank's first Irrigation Rehabilitation Project. Water User Associations (WUA) was introduced in the reform area of the first World Bank project, and a new irrigation and drainage law was enacted in July 1994 [34]. Water User Association refers to the grouping of water users, usually farmers, who are taking water from one or more sources (such as reservoirs, irrigation canals, pumping stations) for the purpose of managing part of an irrigation and drainage system [24]. Initial intentions were very modest, to create village based WUAs and to transfer management of tertiary systems. Within one year it was apparent to Government that this was inadequate target, it didn't provide a sufficient role for WUAs, nor didn't it relieve the government of any significant financial burden. The program was redesigned and the Law amended in March 1996 so that secondary distribution systems and whole small independent systems could be transferred to WUAs.

Under this amendment the Ministry was able to offer very substantial incentives to farmers joining WUAs. The Ministry set very low charges for WUAs paying water enterprises for delivery of water to the head of their system, a discount of over 70% was offered in comparison with systems fully managed by water enterprises. WUAs with independent systems were offered complete freedom in setting their service fee. A further incentive was that WUAs were authorized to charge non-members a service fee up to 50% higher than members. This initiative created a real incentive to join WUAs, and the WUAs in the Bank's project area were quickly strengthened, restructured and consolidated into 208 hydraulic based WUAs, and as rehabilitation was completed the secondary systems and small schemes were immediately transferred. The first project exceeded expectations, but still much work remains in the sector: the second project, which became effective in November 1999, will meet three main challenges; (i) to extend rehabilitations across Albania, (ii) to ensure sustainability through successful irrigation management transfer, (iii) to restructure the water enterprises, which will no longer have responsibility for irrigation, so that they successfully reform their one remaining task, which is management of the major drainage infrastructure.

There are two forms of private sector participation in Albania at the moment: water users associations and federations of water users associations, which are very similar in structure. The survey analysis calculates an overall performance for each WUA. The 1999 results indicated the followings performance ratings; good 22%, satisfactory 27%, adequate 36% and poor 15%. The WUAs in the good and satisfactory categories are probably now self-sufficient and sustainable, with a long-term future, but still need monitoring and support. The poor ones are in immediate danger of failure and closure, the future of their systems are at risk [34].

The Government of Albania started implementing an ambitious program of transferring O&M of irrigation and drainage systems to WUAs in the 7 districts of WB project. As of November 30, 1996 the seven districts of the Project have 100% coverage by legally established, hydraulic-based WUAs, covering about 124,000 ha of irrigated land comprising more than 75,000 farmers. This is three years ahead of the Staff Appraisal Reports (SAR) estimate. The program has been well received by members of WUAs, and since summer 1996 maintenance and operation of about 80 out of 200 areas (including 42 irrigation pumping stations and 40 reservoirs) has been transferred to WUAs [24].

Mexico

At the end of the 1980s, Mexico had approximately 1,300 storage dams, 2,100 diversion dams, 68,000 km of canals, 47,000 km of drains, 54,000 km of service roads, and in excess of 60,000 deep irrigation wells to serve 3.3 million ha of public irrigation districts. The economic crisis of 1982 not only reduced the availability of funds for new irrigation investment, it also significantly constrained government funds available for maintenance. By the end of the decade there were estimated to be around 800,000 ha of irrigated land that were out of production or being used only at a reduced level due to deterioration of the infrastructure. Another 1.5 million ha required rehabilitation in order to bring overall system efficiency back to its original level [12]. In 1989, as part of the National Development Plan (1989-1994), the government created the National Water Commission (CNA) with a mandate to define a new policy for the management of the waters of the country.

In December 1992, Mexico adopted sweeping changes to its national water policy that presaged the possibility of a new state-citizen relationship [29]. This led to the development of the National Program for Decentralization of the Irrigation Districts under the National Development Plan. The National Program for Decentralization of the Irrigation Districts (or the transfer program) [30] was designed to establish a system of co-responsibility between CNA and the water users where the 80 public irrigation systems would become financially self-sufficient.

The transfer program includes a period of shared management between the CNA and WUA. During the first phase, there is parallel management of the works of the minor network of the canals, drains and the roads, in which the CNA and WUA staff jointly carry out O&M so that the new staff receives on-the-job training in these activities. This shared O&M generally lasts for about six months. After that, the CNA staff is removed, and operation and maintenance of minor network of canals, drains, and waterways are performed by WUA. During the second phase, the WUAs operating and maintaining the minor network become part of a Limited Responsibility Societies (SRL), which assumes charge of the operation

and maintenance of the major network of canals, drains, and waterways. The CNA's responsibilities after that time are the limited to operation and maintenance of the headwork's, drainage and irrigation technical assistance, and the supervision of the activities carried out by the WUAs and the SRLs [20].

The Mexican government initiated the IMT programme at the end of the 1980s in response to mounting budgetary pressures at a time of financial crisis in Mexico. [21]. The Mexico transfer program is built around the creation of irrigation modules, which are operated by water user associations-legal civil associations under Mexican law. Modules cover a specified service area. The physical boundaries for the modules are based upon: (a) hydraulic considerations; (b) social aspects, and; (c) economic concerns. Figure 2 presents a flow chart of the transfer process that illustrates the steps involved. In the early years of the transfer program in Mexico, the modules were relatively small (around 2,000 to 5,000 ha) as it was felt these would be easier for the users to manage. However, with experience it became obvious modules that were too small could not afford the fixed overhead costs of administering O&M. Consequently, in order to have a viable management size the districts that have been transferred more recently have much larger modules (5,000-50,000 ha) than the modules in the earlier districts. For example, the Rio Yaqui Irrigation District in Sonora was one of the first districts transferred in 1991. The service area of 232,944 ha was divided into 51 modules with an average size of 4,500 ha. In contrast, Alto Rio Lerma District with a service area of 112,772 was transferred in 1992 to 11 modules with an average size of 10,000 ha. Another unique aspect of the Mexican model is that the water concession granted by the government is part of the legal agreement between the government and the module (the water users' association). As such, the users do not have individual water rights but instead each association has a proportional right (the proportion is based on area) to the supply of water available to the district for that season. Concessions are for a fixed time-frame, five to 50 years, and can be taken away if an association does not fulfill its agreement with the government [13].

Pakistan

The concept of participation of the farming community in irrigated agriculture in the Indo-Pak subcontinent is not new, as it has been practiced since time immemorial. The civil canals in the North West Frontier Province (NWFP) of Pakistan is an example of participatory irrigation management and these have been constructed, operated and maintained by the beneficiaries since long (1568-1800) [16].

As part of a strategy to improve the country's irrigated agriculture performance, Pakistan initiated its program (On-Farm Water Management) about two decades ago with financial support from the World Bank and USAID.

Following up on its initial progress and pressure from the donors, Provincial Governments legislated in the early 1980s allowing for the formation of WUAs on individual watercourses. Since that time, over twenty thousand WUAs have been organized in the Punjab Province alone with government subsidy and support given under the OFWM Program [19].

The World Bank's post-project evaluations concluded that the projects achieved their physical components, but failed in most of their institutional objectives. The evaluations further commented that the OFWM and Command Water Management (CWM) Projects ignored the traditional watercourse comities and tried to form new WUAs to meet projects conditions, but many of these new WUAs were merely token associations or the old comities renamed, making the whole exercise an empty ritual. In recent years, there has been a growing awareness among Pakistan policy makers and academics regarding the necessity for organizing farmers at the level of minors and distributaries, so that farmers will have better control over water is expected to improve tertiary level water management by way of increasing the compatibility between water delivers and crop water requirements throughout the cropping season, both in terms of quantity, as well as timeliness.

Many people, both within and outside the country, asserted that organizing water users for distributary level management in Pakistan was a very difficult task; some believed that it was impossible. Preliminary field investigations indicated that organizing water users for a federation at the distributary level were going to be an enormously difficult task. Only some of the watercourses in the pilot area had experienced the formation of WUAs sponsored by the OFWM, and these WUAs were already defunct. The water users in these watercourses were particularly hostile to the idea of yet another attempt "organize" them. People in the area appeared to be overwhelmed by problems of salinity and unproductive farming, and showed little patience to listen to possible long-term solutions. **Organizing people is a socially sensitive and politically vulnerable activity.** In Pakistan, a gradual step-wise approval was chosen for the process of organizing of water users. The important aspect of this iterative process was the progressively enhanced interactions in a series of meetings with the water users, which culminated in forming water user's federations (FO) in the pilot areas. Since the interactions were initially between the catalysts and the water users, the stage of this iterative process of social organization was named "Five Dialogic Steps" as indicated below [19].

Formation of Water User Federation

5. Step: Federation Meetings

4. Step: Selection Meetings

3. Step: Consultation Meetings

2. Step: Rapport-Building Meetings

1. Step: Familiarization Meetings

After formation of Farmer's Organizations and enhancing the capacity for taking the responsibilities of operation and maintenance of the Distributary FO entered into a crucial phase of Irrigation Management Transfer (IMT) with Provincial Irrigation Department. Because there was no enabling legal framework for IMT, it looks almost two years to transfer the Distributary O&M responsibilities to Pilot FOs.

The Government of Pakistan decided on the devolution of powers to the beneficiaries at the secondary canal (distributaries/minors) level. Accordingly, the Provincial Irrigation and Drainage Authorities (PIDAs) in all four provinces of Pakistan have been established through enactment of Provincial Irrigation & Drainage Authority Acts in 1997. Newly formed institutions were organized in three tiers: 1. Punjab Irrigation and Drainage Authority (PIDA); 2. Area Water Boards (AWB); 3. Farmers' Organizations (FOs) and Khal Panchayat (KP) [3].

The PIDA will be responsible for the intra-Provincial management aspects of the system from barrages to canal head works, and from main drains that cross canal commands and major drainage basins to inter-provincial drains. Area Water Boards (AWB) is being formed at canal command level. Farmer Organization (FO) is the third link of the chain of the new institutions formed under the process of reforms in the irrigation sector. FO is constituted at the distributary level of the canal system and consisted of the presidents of all the Water User Organizations (WUAs) called 'Khal Panchayats' in local system. Collections of irrigation service fee (ISF) from farmers were assigned to the FOs [16]. Fourth and last link of the chain is 'Khal Panchayat' or WUA (Water User Organization) which is being established at water course level of each distributary. Each WUA is consisted of five members including one president of the WUA [18, 3].

The passing of the Provincial Irrigation and Drainage Authority (PIDA) Acts in each province has formally initiated a policy of Participatory Irrigation Management (PIM) in the country [2]. Key to the proposed institutional changes is the participation of beneficiaries in the O&M of the irrigation and drainage infrastructure, which will lead to a more economical and effective management of the irrigation system. Executive members of FOs will share management responsibilities with irrigation officials reporting to the Area Water Board (AWB). This will require a new partnership in management between AWB officials and FO officials. Members of both groups need to obtain the skills to take up their responsibilities in this new way of irrigation management. A capacity building program will enable them to achieve this. The International Management Institute (IMI) has built up a vast and unique field experience over the last five years in working with Irrigation Department officials on supporting O&M of the canal infrastructure, as well as organizing water users into FOs [19].

China

In China, one of the main reforms is the Self-Financing Irrigation and Drainage Districts (SIDD) supporting farmer participation in local irrigation management. In rural China only 40 per cent of the water that is allocated to irrigation is effectively used a figure much lower than many developed countries [11].

Although irrigation accounts for less than forty percent of cultivated area in this country, the agricultural output of irrigation districts amounts to two thirds of that of the whole nation. For this reason, the Chinese government and farmers have invested immense resources in irrigation especially in the recent several decades. However, there still are many constraints and problems with irrigation systems, such as especially low system efficiencies averaging thirty-forty percent, massive waste of water, and low productivity of water used, that center round both lack of funds for irrigation maintenance and overhaul and poor irrigation operation and management. For decades, the irrigation systems/ districts in many places have become degraded not too long after their establishment, causing local irrigation conditions to deteriorate and farmers to suffer from shortage of water again [17].

To counter this irrigation deterioration, the SIDD model was developed in China in order to create and maintain a "virtuous cycle" of water delivery in irrigation districts, and to achieve sustainable use of water resources for agricultural development. As an irrigation management system, SIDD is structured mainly in two integrated parts: a water supply corporation (WSC) or organization (WSO) serving as water supplier from the main headwork and the water user associations (WUAs) operating as the farmers' own water use organizations taking care of the lower distribution network on the ground. A WUA is in principle a farmer-based, participatory organization that manages the village's irrigation water [12].

Water is treated as economic good to play the role of a commodity between the two parts, reflecting the buy-and-sale nature of a market. In this case, however, neither WSC nor WUA is profit-oriented entity but functions as a non-profit social/productive service for farmers as end users of irrigation water.

By nature, the SIDD model is characterized by two meaningful transfer processes, namely, transfer of local irrigation management from government to farmers themselves, and transfer of the economic foundation of local irrigation system from a command economy to a market-oriented one. The SIDD model was first introduced and studied in 1993, and established in Hubei and Hunan Provinces in 1995, under the World Bank assisted Yangtze River Basin Water Resources Project. Since then, more than 500 WUAs and 40 WSCs/WSOs have been established with charters and regulations in ten provinces on a pilot basis, supported under several World Bank assisted agricultural and rural development projects. Most WUAs have proven to be successful in terms of enhanced efficiency of local system operation

and maintenance (O&M) and increased benefits to farmers. In Hubei, for instance, water delivery efficiency through branch and lateral canals has been enhanced by 50-100% under WUAs' management; and paddy yields have increased about 25-40kg per mu (equivalent to 1/15 ha) on average. Because of both unit grain yield increase and irrigation water decrease, the grain output value per cubic meter of water has been enhanced from Y 0.47 to Y 1.70. Farmers are happy with the benefits and the Participatory approach. In addition, since WSC charter requires that farmers from WUAs sit on WSC's board of directors, water users have voice even in WSC management. This has enhanced bottom-up participation in decision-making. Influenced by the positive results of the SIDD pilots, many other places beyond the World Bank supported projects have adopted similar approach in improvement of local irrigation management -especially the participatory methods of WUA- to enhance efficiency and effectiveness of local irrigation system. Calling for the PIM reform in the water sector, Ministry of Water Resources of China (MWR) has been promoting the dissemination and extension of SIDD/WUA as a good example to use throughout the country. As a result, there now roughly are 2,000 WUAs in total spreading over most provinces in China [17].

India

In India, the state exploited irrigation water resources by constructing large barrages and reservoirs. Most large command areas in India are more than 100000 ha, especially in canal irrigation. At the time of independence in 1946, India had 22.5 million ha under irrigation, of which 9.7 million ha were under major and medium schemes [7]. By 1985, a total potential of 68 million ha had been created – 30.6 million ha in major and medium schemes and 37.4 million ha under minor irrigation projects.

However, there were many problems in agency managed irrigation. Poor maintenance of irrigation facilities under public provision is a salient feature in many countries. Poor maintenance also led to adverse environmental consequences. Another major deficiency has been the wrong pricing policies in irrigation. Over the last two decades, emphasis has moved from irrigation development to improving irrigation water management in India [10].

In India, irrigation management transfer is being implemented under the broader framework of participatory irrigation management. Irrigation is a state matter and there are considerable variations in the institutional framework relating to participatory irrigation management between the various states. These range from cosmetic changes in Haryana, where farmer involvement is only below the outlet, to more comprehensive efforts in Maharashtra and Gujarat, where WUAs are vested with the responsibility of managing minor canal commands of 500 ha [22].

In India, the concept of PIM has evolved gradually through three distinct phases. In the early 1980s, the concept was in its nascent stage and was limited to farmers' participation through their representatives. It was felt then that in the decision-making process of the irrigation sector the views of farmers should be taken into account and they should be consulted in the planning, development, and management of the system. However, merely having farmers' representation in project management committees was not successful. In the latter part of the 1980s, it became clear that farmers could not have a significant role in irrigation management without a formal structure or forum to express their views [26].

Therefore, the catchword became farmers' organization. In various states, such as Andhra Pradesh, Tamil Nadu and Maharashtra, thousands of outlet associations and chak (outlet) committees were formed. But these committees remained on paper only and became dysfunctional after a short period. By the 1990s the concept of PIM had received recognition through the implementation of the Water Resources Management and Training Project of the Government of India, supported by the United States Agency for International Development. Motivating farmers to foster WUAs was an essential feature of the action research program carried out by Water and Land Management Institutes in 11 states of India. By the early part of the 1990 became apparent that the concept of farmers' participation in a few activities was not sufficient. Because irrigation is for the farmers, irrigation systems should be owned and managed by them. Therefore, a radical concept of creating farmers' organizations and of system turnover to farmers was adopted under the World Bank-funded Water Resources Consolidation Project, in which thousands of WUAs were formed that took responsibility for operation and maintenance, including the allocation of water among farmers and collection of water charges from water users. During the late 1990s, most of the state governments in India made policy decisions and enacted exclusive legislation to implement PIM.

Turkey

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. In 1993, Turkey started an accelerated transfer program in which operation and management responsibilities for the irrigation schemes were transferred to farmers, who were mostly organized as 'irrigation associations' (IAs) [8], and transfer rates accelerated dramatically [14, 15]. Until 1993, each year small schemes have been gradually transferred to users with an average annual area of about 2000 ha [4, 32]. The operation and maintenance services of 95% of the irrigation infrastructure developed by the General Directorate of State Hydraulic Works (DSI) had been transferred to various organizations until the end of 2005 [28]. As of today, 96 % of the whole transfer to the associations has been realized [<http://www.dsi.gov.tr/>]. Turkey's IMT program has received significant attention in the literature [6].

The state organization (State Hydraulic Works-DSI) has transferred most of the irrigation schemes to different types of organizations [32, 33]. State Hydraulic Works 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.

Transfer Forms in Turkey

In Turkey, the first transfer was realized in 1964 with the transfer of Alata Left Bank irrigation scheme to Erdemli Municipality. The types of transfers can be divided into three groups as follows [33].

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).

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 Group (WUG)'s with an agreement signed between DSI and WUG's. No approval by MENR is requested. No agreement is signed between water users and General Directorate of Rural Services (GDRS).

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. The DSI has responsibilities for monitoring and evaluation of irrigation schemes [33]. 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.

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 as an additional investment in the same sector. In Turkey, different types of water user organizations (WUOs) exist. These are: **(1) the water user associations, (2) municipalities, (3) village authorities and (4) cooperatives**. Among these, it has been experienced that the best model of transfer is the WUAs 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. 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 hand, 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), 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.

This is a very positive development observed all over the country.

- WUOs, which have effective equipment park for maintenance, do not rent equipment from DSI, since the Government staff does not work effectively and in the quality they want.
- We always observe during the field visits that the farmers keep their eyes on the equipment of WUO working on their canals.
- In most cases, irrigation ratios have been expanded by successful operation of WUOs.
- It is believed that, a common understanding on participatory management, participatory rehabilitation/modernization and even participatory new irrigation investments will become a Government policy [23].
- How Turkey Succeeded Transfer of Large Irrigation Systems?

- i. DSI staff believed in the transfer works.
- ii. Lessons learned from each transfer work.
- iii. All of the interested DSI workers called for seminars as a part of training program.
- iv. Several meetings held at the villages that farmers' doubts answered.
- v. DSI continued to give its technical and mechanical support to the farmers.
- vi. Organizations especially in the first and second years.
- vii. DSI is still giving technical assistance, training, sharing its experience and trying to solve some of the problems of the Organizations.
- viii. Climate is warm enough for privatization in Turkey.
- ix. Farmers had awareness that irrigation projects developed for themselves [27].

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