Paper Presented at the "National Conference on Participatory Irrigation Management," New Delhi, India, 20-22 January, 1997.

IRRIGATION MANAGEMENT TRANSFER IN INDIAN CANAL SYSTEMS

Jeffrey D. Brewer
International Irrigation Management Institute
17 January 1997

1. INTRODUCTION

Irrigation management transfer (IMT) can be defined as ***the transfer of rights and responsibilities for irrigation management activities of an irrigation system from a government agency to private or local persons or organizations; management transfer need not be total but can be limited to specific parts of irrigation systems or to specific management responsibilities.***

In a number of countries, IMT is seen as a way to reduce pressures on thinly stretched government finances while at the same time improving the agricultural production from irrigation systems and ensuring the long term sustainability of those irrigation systems (Geijer et al 1996, Kloezen and Samad 1995, Vermillion 1991). Several countries, notably Philippines (Wijayaratna and Vermillion 1994, Svendsen 1992), Indonesia (Bruns and Atmanto 1995), China (Chen and Ji 1995) and Sri Lanka (IIMI/ARTI 1995) in Asia, Mexico (Gorriz et al 1995) and Colombia (Garcia-Betancourt 1994) in Latin America, and others such as New Zealand (Farley 1994) and Turkey (Groenfeldt 1995, Devlet su lsleri et al 1996), have made major efforts towards irrigation management transfer.

In India too, IMT is being is being tried as a means to reduce pressures on government finances, improve performance of irrigated agriculture, and ensure sustainability of irrigation systems (MOWR 1995). Because irrigation is a state subject, the efforts are being made by the states, although supported by the Government of India in various ways. These efforts differ from each other in many ways because of differing state traditions, interests and needs.

The present paper presents findings on the status of irrigation management transfer in India from a *two* year study of irrigation management transfer in India, funded largely by the Ford Foundation and partly by Government of Germany, and carried out collaboratively during 1994-96 by the International Irrigation Management Institute (IIMI) and the Indian Institute of Management, Ahmedabad (IIMA).

The basic goal of the IIMI/IIMA study was to survey policies and activities being carried out in different parts of India. The IIMI/IIMA study sampled the variation among the states by focusing on six states, including Bihar, Haryana, Gujarat, Maharashtra, Kerala, and Tamil Nadu. These states represent the four major cultural regions of India where irrigation is important and includes the states that had reputedly made good progress in IMT activities.

For the study, the IIMI/IIMA team undertook a review of the literature on IMT in India, rapid assessments of policies and activities in each state, and detailed studies of 21 cases of IMT in three of the states. The IIMI/IIMA study covered all types of irrigation systems. This paper discusses the findings on large-scale canal systems only. Data on WUAs is based on data from twelve sites in canal systems.

In this paper, Section 2 describes and classifies the IMT policies in the six selected states. Section 3 describes study findings on twelve specific cases of irrigation management transfer from three states Section 4 relates the two and draws some lessons for policy. Section 5 summarizes the main conclusions.

2 VARIATIONS IN IMT POLICIES'

2.1 Irrigation Management in India

The states differ widely in many ways that affect IMT policies and activities. A clearly defined approach to imgation management exists in each state. For systems managed by government agencies, the approach include three basic components:

- A basic rule or system for allocating water to farmers.
- A plan or a set of customary practices for distributing water to outlets.
- A system for collecting irrigation fees from farmers.

The six sample states use four approaches:

- *Warabandi* Under the warabandi system used in Northwestern India and Pakistan, the basic allocation rule is that each farmer is entitled to a fraction of the total flow available to the system proportional to his land area within the command. To achieve this, water is to be delivered to famiers below *each* outlet by means of a strict rotation schedule in which the length of *each* turn is proportional to the size of each farmer's holding. This system of turns is supported by canal design and operation that delivers water to each outlet in proportion to the command of the outlet. Irrigation fees are charged to each farmer in proportion to the area of his holding hut may also depend upon the crop planted. The warabandi system is used in one sample state: Haryana.

- *Shejpali* Under the shejpali system found in Western India, every farmer is required to apply for irrigation each season for specific crops and areas. The irrigation agency sanctions those applications it *can* satisfy. Farmers are required to pay crop-area fees for sanctioned irrigation. Once an application is sanctioned, the agency is responsible for delivering water so as to bring the crop to maturity. Farmers below each outlet are expected to take water in turns. Shejpali makes the government concerned not just with irrigation but also with control over crops. It also imposes a high administrative burden on the farmers and the states. The shejpali system is the basic irrigation management system for two sample states: Gujarat and Maharashtra.

- *Land Classes* In much of Southern India, water rights are assigned to land. Some land is entitled to two rice crops per year; other land is entitled to only I crop per year. The irrigation agency is responsible for delivering adequate water on an appropriate schedule to bring the craps to maturity. Below each outlet, farmers are expected to share water among themselves. Fees are assessed based on the water rights of the land and are collected as part of the land tax. Where water supplies are variable, seasonal adjustments to allocations are made through discussions to which farmers or their representative are usually invited. Versions of the land classes system are used in two sample states: Tamil Nadu and Kerala.

- *Assured Irrigation Area* Historically, most of Eastern India followed the *satta* system Under this system, farmers applied for water each season for an assumed crop. Enough water was to be delivered to each famier to bring the crop to maturity. In Bihar, the requirement to submit applications has been replaced by identification of most of the command as an "assured irrigation area" in which it is assumed every farmer will take water. Within the assured irrigation area, the agency is responsible for delivering water so as to bring the assumed crop to maturity. Every farmer within the assured irrigation area has to pay the irrigation fee whether or not he takes water.

[1] This section is based on analyses undertaken in association with K.V. Raju.

Each these approaches to irrigation management is supported by government policy and law. Warabandi has explicit legal sanction in the Northern India Irrigation and Drainage Act of 1873 which is the basic imgation law for the states of Haryana, Punjab, Rajasthan, and Uttar Pradesh. Shejpali has legal support in the Bombay Irrigation Act of 1879 which remains the basic irrigation law for Gujarat; for Maharashtra, the Maharashtra Irrigation Act of 1976 recognizes shejpali as the basic approach to irrigation management. The satta system is based on the Bengal Irrigation Act of 1876 which remains the basic irrigation law for the states of Bihar, West Bengal, and Orissa.

2.2 IMT Policies and Programs in the States

Irrigation Management Transfer Policy Government policy consists of the way the government wishes to carry out its functions. It exists in several forms, including taw, written policy statements, government agency regulations and guidelines, and widespread beliefs among government agency personnel that things should be done in a particular fashion. There may be multiple policies, each held by one or more agencies.

An irrigation management transfer policy is a government policy mandating transfer of irrigation management responsibilities from a government agency to private persons or organizations and specifying the changes to be accomplished or that accompany transfer. The specific elements that should be specified by an irrigation management transfer policy include:

1. Organizations or persons to whom responsibilities and rights are transferred.
2. The form and level of the organization to whom responsibilities and rights are transferred.
3. Irrigation management responsibilities and rights transferred.
4. Changes in means of mobilizing resources for irrigation management.
5. Changes in conflict resolution institutions, if any
6. IMT implementation means

Since IMT is a change from the preexisting policy, the IMT policy needs to specify only those items that change. The absolute minimal set of items that must be specified to have an IMT policy are items 1 and 2 in the above list.

IMT Progress in the States All six sample states have or are considering IMT policies and programs for canal systems. The following summarizes progress in these states as of late 1995.

- *Bihar* Irrigation in Bihar's plains area is dominated by large canal systems (three over 500,000 hectares each) that divert water from the rivers that flow to the Ganges. These canal systems are managed by the Water Resources Department. Bihar is considering a policy to
  - create water user associations (WUAs) at village and distributary channel levels up to 15,000 hectares,
  - transfer fill operations and maintenance responsibilities for distributary channels and below to these WUAs,
  - require the WUAs to collect imgation fees in return for keeping 70% of the fees collected for WUA expenditures.

  Bihar will continue to allocate water to the assured irrigation area within each irrigation system.

  This proposed policy is modeled directly on the experiment begun in 1988 at Paligani Distributary in the Sone System (Srivastava and Brewer 1994). The state has not yet decided how it will implement this

policy. At the moment, Bihar is planning to complete transfer of operations and maintenance responsibilities at Paliganj and then monitor the results for three years before taking further steps.

- *Haryana* Irrigation in Haryana depends on canal systems that divert water from the great rivers flowing down from the Himalayas. The canal systems are managed by the Irrigation Department. Haryana is considering a policy to

  - create WUAs at outlet level,
  - transfer full operations and maintenance responsibilities below the outlet, including maintenance now done by the state, to the WUAs,
  - possibly, to have the WUAs collect irrigation fees in return for keeping a commission based on the fees collected.

  Haryana is not considering modifying its warabandi irrigation management system.

  Haryana has not yet decided how to carry out this transfer policy but is planning to carry out ten pilot experiments to gather information for this purpose. In the meantime, the state has decided that it will provide watercourse lining only to farmers who fonn and register a WUA below the outlet. In October 1995, Haryana reported the existence of 262 outlet level WUAs in scattered locations.

- *Gujarat* In accordance with its varied ecology, irrigation in Gujarat is quite varied. Canal systems are managed by the Water Resources Department. Gujarat has adopted a policy to

  - create water user associations for 500 hectare blocks,
  - transfer full operations and maintenance responsibilities for minor and other channels within the blocks to the WUAs,
  - charge WUAs for water on the basis of the volume of water actually taken.

  This new system will do away with shejpali. Gujarat is planning to invite NGOs to carry out most of the work of creating WUAs in cooperation with Water Resource Department personnel. In addition, Gujarat is considering providing incentives to the farmers, including repairs to their channels and rebates of irrigation fees in return for prompt payment of fees. The state has taken up 14 pilot projects to learn how best to accomplish transfer in different parts of the state although several experiments have been carried out there previously.

- *Maharashtra* Irrigation is also varied in Maharashtra. Maharashtra's canal systems are managed by the Irrigation Department. Maharashtra has adopted a policy to

  - create WUAs at minor canal level (average command of 500 hectares),
  - transfer operations and maintenance responsibilities for the minor and smaller channels to the WUA,
  - allocate water to the WUAs through 5 year agreements,
  - charge the WUAs for the water on the basis of the volume of water actually taken.

  This new system will do away with shejpali, Maharashtra is hoping that farmers will organize themselves to demand transfer. To that end, they have undertaken a public relations campaign to inform farmers that transfer is an available option. In addition, they are encouraging both NGOs and Irrigation Department officers to help farmers create WUAs. The state is offering incentives for farmers, including relaxation of crop restrictions and restrictions on conjunctive use of surface and ground water, repair of the channel, reduced rebates for prompt payment of irrigation fees, volumetric fees that are lower than shejpali crop-area fees, and maintenance grants. The Irrigation Department is now monitoring the progress of transfer throughout the state. As of March 1995, the Irrigation Department reported transfer

of *operations* and maintenance functions to 75 WUAs and another *205* WUAs in the process of formation in major systems.

- Tamil *Nadu* Tamil Nadu has a very long history of both private development and government sponsored development of irrigation; this means that several aspects of irrigation management are controlled by farmers, even in government managed systems. Presently, management of all large irrigation systems (above 5000 hectares) is the responsibility of the Water Resources Organization. Tamil Nadu has adopted a policy to

  - create a three-tier system management organization, including WUAs at the outlet and *500* hectare command levels and a joint management committee (a committee including both representatives of the WUAs and of the key government agencies) at project level,
  - transfer operations and maintenance responsibilities fully or partially to these bodies.

  Tamil Nadu is organizing lower level staff of the Water Resources Organization into "Farmer Organization Teams" that will help the farmers to organize themselves. The organization work will be part of rehabilitation work in the systems; thus the organized fanners will help plan and carry out repairs to the system. Incentives are under consideration; one that has been identified is a matching fund to help the WUA set up a bank account whose interest will be used for future maintenance work. No consideration is being given to changing water allocation by land dass nor collecting fees as part of the land taxes. Implementation of this policy has not yet begun.

  From 1988 to 1994, the Tamil Nadu Agricultural Engineering Department carried out efforts to organize fanners into WUAs in five systems. In June 1994, the Department reported the formation of 3300 outlet level WUAs and 118 distributary *canal* level WUAs. However, many of these were not functioning. Also, there are a large number of WUAs spontaneously created by farmers in some *canal* systems. For example, there are over 130 WUAs of various types in the Tambraparani System (Brewer et al 1997).

- *Kerala* Kerala gets a great deal of rainfall. Irrigation has been developed relatively recently to supplement rainfall. Principles for water allocation and collection of irrigation fees have been adopted from Tamil Nadu. Canal systems in the state are managed by the Imgation Department. Kerala adopted an IMT policy in 1986 for system under the Command *Area* Development (CAD) Program. The policy calls for

  - the creation of a three-tier system management organization including outlet level WUAs, canal level joint management committees (JMCs) that include both representatives of the WUAs and irrigation agency officials, and project level JMCs,
  - transfer of operations and maintenance responsibilities fully or partially transferred to these bodies.

  This policy applies only to the 14 CAD schenies and not to the other 14 canal system in the state. The CAD organization in each scheme includes a Cooperative Specialist who is responsible for organizing the fanners. in addition, formation of an outlet level WUA is required to get watercourse lining. Once the WUA is formed, its president automatically sits on the local *canal* committee with Irrigation Department officers; the chairman of each *canal* committee (a farmer) sits on the Project Advisory Committee with state officials. There is no change to the system of charging fees based on land classes or to collecting them as part of the land tax. As part of the *CAD* program, subsidized inputs and other agricultural assistance are channeled through the WUAs. As of July 1995, Kerala Command Area Development Authority reported the existence of 3506 outlet level WUAs out of a projected 4484, together with the existence of 99 *canal* committees and 9 Project Advisory Committees. Many of the WUAs are not functioning. Failure of the WUAs also means that the joint management committees are severely wakened because they lack fanner representatives. Many canal JMCs reportedly do not meet.

Common Features of the Policies and ***Programs*** Two common features are found in these policies:

- All state policies envision transfer of irrigation management responsibilities to water user associations (WUAs) organized ***on*** a hydrological basis.
- All states envision retaining ownership of the large imgation systems. retaining the state irrigation management agency and maintaining its responsibility for operations and maintenance of the upper levels of canal systems.

Other items, including the sizes and structures of the proposed WUAs, responsibilities transferred, etc, all vary.

Variation in State IMT Policies and Activities Section 2.2 gave the following list of items that should be specified by an IMT policy:

1. Organizations or persons to whom responsibilities and rights are transferred.
2. The form and level of the organization to whom responsibilities and rights are transferred
3. Irrigation management responsibilities and rights transferred.
4. Changes in means of mobilizing resources for irrigation management.
5. Changes in conflict resolution institutions, if any
6. IMT implementation means

None of the six states has a stated policy toward conflict resolution; therefore, this item is not considered further. The table given in the Annex succinctly summarizes the remaining six dimensions for the IMT policies in the six states. This table reveals that the ***states*** are taking four distinct approaches to IMT:

- *Contract Approach* Gujarat and Maharashtra are adopting virtually the same policies; ***each*** is proposing to enter into agreements between the imgation agency and the WUAs guaranteeing water supply to the WUA in return for the WUA paying fees for the water actually used. The basic vision here is of a service contract between the WUA and the agency. The differences between the two state policies are matters of emphasis - ***eg*** Gujarat is planning to depend heavily upon NGOs to accomplish the transfer whereas Maharashtra lays less importance ***on*** NGOs - or are matters of detail - eg one of Maharashtra's incentives is freedom from restrictions on the planting of sugarcane whereas Gujarat has no such restrictions.

- Joint *Management Approach* Tamil Nadu and Kerala are using or proposing multi-tier WUA models with joint management committees (JMCs) at system level, WUAs or JMCs at a middle level, and WUAs at the outlet level. The role of the JMCs is to provide a body for deciding water allocation and distribution *each* season and for solving problems as they arise. The vision here is of joint responsibility for management There are clear differences between the Tamil Nadu and Kerala versions of this model; most importantly, in Tamil Nadu maintenance responsibilities are transferred while in Kerala maintenance above the outlet is left to the agency.

- *WUA as an Arm of* the *State* Bihar is proposing much bigger and more responsible WUAs than are proposed elsewhere. Also only Bihar is considering direct sharing of state irrigation fees between the farmers and the state. The underlying vision is that the state's water allocation and resource mobilization policies will not change but WUAs will replace local units of the Water Resource Department as managers of portions of the irrigation system while the Department restricts its activities to the main systems. Bihar has not yet fully worked out this policy and it may be that over time it will be adjusted to more closely resemble the contract or joint management approach to IMT.

- *Formally* Organized *Warabandi* Haryana is proposing to create outlet level WUAs without changing its basic irrigation management practices. Many officials in Northwest India believe that warabandi is a very effective system and see no value in a major change. There will be very little transfer of responsibilities. Management responsibilities below the outlet, except for the maintenance of lined watercourses, are already farmer responsibilities; only where the state maintains lined watercourses will there be a *change*. In addition, Haryana is considering having the outlet level WUAs collect irrigation fees as an agent for the state. The-basic vision here is of adding support to warabandi through formal organizations.

It is apparent that the IMT approach adopted by *each* state is related to the irrigation management system in place prior to transfer: the contract approach has been adopted to replace shejpali; the joint managenient approach to partly replace land classes; the arm of the state approach to replace assured irrigation area; and formally organized warabandi to support warabandi.

3. FUNCTIONING OF WUAS

3.1 Analysis of WUAs

All the proposed IMT policies are based on the idea of turning irrigation management responsibilities over to water user associations (WUAs). The long term success of these policies are dependent on *the* functioning of the WUAs. The IIMI/IIMA study therefore looked at twelve WUAs in canal systems in Gujarat, Maharashtra, and Tamil Nadu, including most of the well-known cases in these states. These are:

- Mohini Society in Ukai-Kakrapar System, Gujarat (Mohini)
- Anklav Society in Mahi-Kadana System, Gujarat (Anklav)
- Right Bank Canal Association in Pingot *System,* Gujarat (Pingot)
- Left Bank Canal Association in Baldeva System, Gujarat (Baldeva)
- Shri Datta Society on Minor 7 of Mula System, Maharashtra (Datta)
- The three WUAs centered on Ozar village in Waghad Project, Maharashtra (Ozar)
- Shevare Society on Minor 10 of Bhima Project, Maharashtra (Shevare)
- Mettupalayam Distributary Fanner's Council in Lower Bhavani Project, Tanul Nadu (LBP)
- Malayadipalayam Distributary Farmers' Council in Parambikulam-Aliyar Project, Tamil Nadu (PAP)
- Xlth Branch Canal Farmer's Council in Periyar-Vaigai System, Tanul Nadu (PVP)
- Salipperi Society in Cauvery System, Tamil Nadu (Salipperi)
- North Kodaimelelagian Channel Association in Tambraparani System, Tamil Nadu (NK)

Here the performance these twelve sample WUAs are analyzed, including the outcomes of that performance, and the factors that influence that performance, in order to draw conclusions about the likely long run results of the IMT programs in these states. There are some problems with this analysis, including the fact that these WUAs differ greatly among themselves on some critical dimensions, such as age (NK was founded in 1960, Mohini in 1978, and others since 1985), cultural traditions (Tamil Nadu has a much longer history of farmer constructed and managed irrigation systems than do the other two states), range of activities, and other features. Despite these differences, a comparative analysis reveals some key lessons.

32 WUA Management Capabilities[2]

Rules WUAs are created to collectively manage common properties - namely irrigation water and the irrigation infrastructure used to distribute the irrigation water. The effectiveness of WUA management is largely dependent upon their ability to set and enforce - or motivate farmers to follow - rules to ensure good distribution of irrigation water, adequate maintenance of the infrastructure, and adequate mobilization of resources to undertake these activities. Needed rules relate to individual rights to withdraw water, individual responsibilities toward maintenance, and rewards and punishments associated with rule compliance. Conflict resolution is also an essential aspect of rule enforcement. Of course, overall organizational capability is broader than rule making, but to keep the analysis short, the present discussion is restricted to rule making and rule enforcement.

Capability to Devise Appropriate Rules A WUA's rules for managing water distribution, maintenance, etc, are meant to guide the interactions of the farmers with respect to irrigation water and infrastructure. Rules can be more or less appropriate for the circumstances, including the goals of the WUA members and their particularly agricultural, labor, etc, situations. The better adapted the rules are to the local circumstance, the more likely they are to be supported and followed by the WUA members and the more likely that the WUA will be able to achieve its goals. The indicator of WUA capacity to devise appropriate rules used here is changes in rules in response to changing situations. No attempt is made here to measure the absolute appropriateness of each set of rules for its situation. There are several problems will such measures. "Appropriateness" is a subjective measure. Also, many WUAs have received help from outsiders who have influenced their rules, for good or bad; most have not existed long enough to have adjusted their rules to their circumstances.

Six sample WUAs - Datta, Shevare, Ozar, Salipperi, NK, and Pingot - have modified their rules substantially over time to suit their conditions and continue to show dynamism. Datta society has changed water distribution rules several times in response to complaints from farmers. Shevare permits an extra irrigation for sugarcane. Ozar has built checkdams and divert water to them at night as fanners are reluctant to irrigate at night and has introduced a groundwater charge to capture some of the benefits farmers get from well recharge. The other three WUAs have made similar changes in their rules. All have taken on new activities over time.

Five sample WUAs - Anklav, LBP, PAP, PVP, and Baldeva - have made few or no changes from the rules given them by the outsiders who assisted in formation of these WUAs. Nor have these WUAs taken on new activities.

The last WUA - Mohini - was quite dynamic in the beginning but since 1990, it has lost most of its dynamism and cannot respond to present problems of deteriorating soils and infrastructure.

Rule Enforcement As there are always strong incentives for individuals not to observe rules, successful organizations have effective mechanisms to motivate farmers to follow the rules and to identify and punish those who do not follow the rules. The three critical WUA functions are water distribution, maintenance, and collection of irrigation fees. Each will be discussed separately.

- *Water* Distribution The sample WUAs have wide range of rules governing water distribution:
    - LBP has rigid warabandi rules, No WUA staff are appointed to monitor water distribution Most farmers there are aware of their rights which, over the past decade have new come *to* be associated with fields. The rules are thus self-policing.

[2] This and the following section are based on the analyses undertaken by S. Kollavalli and S. Ramanarayan

- Shevare defines a rotational schedule before each issue from the main system. This schedule depends not only on irrigated area but also on crops. Shevare informs the farmers through notes sent individually or posts the information on a bulletin board at a prominent site in the village. No WUA staff monitor water distribution; again the rules are almost self-policing.
- A simple rotation in which the order of withdrawal, but not the timings or duration, is the rule adopted by Mohini, Anklav, Pingot, Baldeva, NK, Salipperi, PVP, and PAP. NK, PVP, and Salipperi have developed norms on how much to irrigate. WUA staff are employed to monitor water distribution by Mohini, Anklav, Pingot, and Baldeva. Staff are employed when water is scarce by NK, PVP, and Salipperi. PAP does not employ staff to monitor water distribution.
- Datta and Ozar have hired full time watermen who are responsible for managing water deliveries with the dual objectives of reducing water losses and meeting the needs in a timely fashion. The watermen take into consideration water availability, the conditions of the crops, and the timing of demand from various users when they determine the order in which water is given.

The rules have been devised to suit local conditions. Most WUAs were initially advised to follow strict delivery schedules, but strict schedules has been adopted only in LBP where water deliveries to the WUA are predictable. Looser rotations and adjustable systems have been adopted where deliveries are less predictable and where crop water requirements vary because of soil conditions. Some WUAs have devised rules for special needs. For example, NK has designated Saturdays and Wednesdays for irrigating higher level fields; they also give priority to irrigating nurseries. In Baldeva, groundnut growers *can* take water first. Nurseries get water first in Salipperi.

Judging from conflicts arising from rule breaking, complaints to management committees and information collected on water distribution, rule enforcement appears to be effective in LBP, PAP, PVP, Salipperi, Datta, NK, Ozar, and Shevare. In the other WUAs, problems were seen. For example, nobody paid attention for several days to breaches in minors in Anklav and Baldeva. Some farmers in the head reaches of Mohini took water twice in a rotation. Water was abundant at most locations in rabi 1994-95 and it may be that WUAs that succeeded in distributing water according to the rules in rabi 1994-95 will face difficulties in less water abundant seasons.

- *Maintenance* In Tamil Nadu, maintenance above the outlet is the responsibility of the agency, as it is for Mohini. In the Maharashtra and Gujarat canal systems, the WUAs, except Mohini, are held responsible for maintenance above the outlets. The responsible WUAs all receive grants from the agencies for maintenance. Based on observed condition of *the* canals and famier complaints, Shevare, Datta, Ozar, Pingot, and Baldeva appear to do a good job of canal maintenance. Anklav members complained about maintenance funds not being used properly.

The maintenance of watercourses and field channels generally remains the responsibility of the farmers under each outlet, as it was before IMT. Datta maintains watercourses on behalf of the members and collects an area based maintenance fee from farmers for the service. Salipperi organizes collective field channel maintenance and the members are expected to work for less than market wages so that maintenance can be completed with interest earned on the maintenance fund. The other WUAs make watercourse and field channel maintenance the responsibility of individual farmers. Some of these WUAs have rules about individual watercourse maintenance. In Shevare, those who do not maintain field channels do not receive irrigation. However, watercourse and field channel maintenance is neglected in many sample WUAs.

- *Collection of Irrigation Fees* WUAs have to collect fees or contributions from members to meet their operation and maintenance and other expenses. In Gujarat and Maharashtra, WUAs also have to collect from farmers to pay government irrigation fees. In Tamil Nadu, government irrigation charges are collected as part of the land tax. However, three sample WUAs in Tamil

Nadu - Salipperi, LBP, and PAP - were required to collect a one time contribution of Rs 100 per acre from the farmers which was then matched by a government contribution to create a maintenance fund.

WUAs' fee collection has varied depending on the ability of the users to pay and the efforts made by WUA staff to collect the charges. Of the sample WUAs from Gujarat and Maharashtra. Shevare, Ozar, and Anklav collect their fees with few defaulters. In Shevare, there were only four defaulters in rabi 1994-95. Datta, Mohini, Pingot, and Baldeva have problems. In Datta, the amount outstanding was nearly Rs 1.5 lakhs. In Mohini, there are some farmers who had not paid since 1985. Some WUAs face difficulty collecting because farmers are unable to pay. Crops failed one year in Pingot. In Baldeva, defaults were so high in one year that there were only a few who were eligible to take water; they revised their rules to give water to those who had paid one half of the changes.

Of the three Tamil Nadu WUAs that had to raise maintenance funds, Salipperi was successful, LBP was only moderately successful, and none of the PAP users paid. Aside from collecting fees for maintenance funds, WUAs in Tanul Nadu depend on contributions, income from village properties, or taxes on export of produce from the village. Some hire watermen to distribute water, but the watermen collect their pay directly from the users.

Most WUAs require fanners to pay their fees at the end of the season. Irrigation is generally given to farmers without arrears. The Maharashtra and Gujarat WUAs that receive a discount for early payment to the state extend the same benefit to the users. Some WUAs impose fines for delayed payment but are rarely able to collect them. Payments were so poor in Mohini that those who had not paid irrigation charges for four seasons were required to pay 50 per cent more. The most effective mechanism appears to be denial of irrigation to those who have not paid. Ever; that threat is often ineffective.

This data shows that the WUAs make real efforts to enforce the rules and have some degree of success, particularly with water distribution rules.

Conflict Resolution Conflicts over water distribution, maintenance obligations, fee payment, and other irrigation related items may arise between individuals or members and between members and the management committee. More effective rule enforcement generally reduces conflicts. Thus conflicts are infrequent in the Tanul Nadu WUAs because rule enforcement is fairly strong. Conflicts are more common in some other WUAs. In Mohini, because the demand for water was high and rule enforcement weak, many members set fire to each others' cane crops. In Anklav, conflicts are low despite poor rule enforcement because most members have access to groundwater for irrigation

Four WUAs - Shevare, Ozar, NK, and Pingot - have made special arrangements and efforts to settle conflicts. In Mohini, Datta, and Baldeva, WUA paid managers or executive committee members generally resolve conflicts. For the remaining societies, the WUAs play relatively little role in conflict resolution.

Overall Evaluation Table 1 presents an overall ranking of management effectiveness for the 12 sample canal WUAs. This comparison suggests that five of the twelve canal WUAs studied are high performers. These include the three canal WUAs in Maharashtra (Shevare, Ozar, and Datta) and two canal WUAs in Tamil Nadu (NK and Salipperi). Two Gujarat WUAs (Mohini and Anklav) and three Tanul Nadu WUAs (PAP, PVP, and LBP) were rated poor. Two Gujarat WUAs (Pingot and Baldeva) were rated average.

Table 1: **Comparison of WUA Management Performance**

WUAs	Devising Rules	Rule Enforcement			Conflict Resolution	Overall Performance
		Water Distribution	Maintenance	Fee Collection		
Mohini	high	low	low	low	low	low
Anklav	low	low	low	low	low	low
Datta	high	high	high	medium	high	high
Shevare	high	high	high	high	high	high
Ozar	high	medium	medium	high	high	high
LBP	low	high	low	low	medium	low
PAP	low	medium	low	low	medium	low
PVP	low	medium	low	low	medium	low
Salipperi	high	medium	high	high	high	high
NK	high	high	medium	high	high	high
Pingot	medium	high	low	medium	medium	medium
Baldeva	medium	low	low	medium	medium	medium

3.3 Success Factors

Consideration of the data from the WUAs studied, suggests that the following four factors are the primary contributors to the management capabilities of the WUAs:

- Benefits
- Rights Transferred
- Leadership
- Outside Assistance

Each of these is discussed separately below.

Benefits The fncremental returns members expect from belonging to the WUA may be tlie most important factor influencing individuals' interest in group effort. The potential benefits from belonging to a WUA depend on the extent of improvements in water availability and control, the opportunities to convert improved water control into higher production or incomes, and availability of alternative sources of irrigation.

Benefits are obviously large where formation of a WUA has resulted in irrigation where there was none before. In Pingot and Baldeva, formation of the WUAs was accompanied by canal repairs that delivered irrigation water for the first time. The benefits are smaller where there was irrigation was supplied but by forming a WUA, fanners could improve reliability and availability for some of the fanners For example, in Shevare, users had access to irrigation but reliable supplies were available only to some. The benefits to those without reliable access to irrigation water are high. In several cases - Ozar, Datta, Shevare, Anklav, Mohini - by forming WUAs, the farmers were able to get larger. total amounts of water with greater certainty from the irrigation agencies. In NK the WUA serves as a means by which the farmers can influence the amount of water available to them.

Incremental benefits also depend on opportunities to switch to higher value crops. In Shevare and Datta, for example, fanners could switch to sugarcane. On the other hand, in Pingot and Baldeva, where coarse cereals are cultivated even with imgation, the incremental benefits are not as high because of lack of markets for higher valued crops.

There are considerable differences between WUAs with regard to the availability of alternative sources of irrigation, particularly groundwater. In Anklav, Ozar, LBP, PAP and PVP, the density of wells is fairly high. Farmers in Datta and Salipperi also have some wells. One of the Ozar WUAs gets sewage water from an air force station nearby; the sewage is preferred by farmers for irrigation. The farmers in the other canal WUAs depend on imgation water provided by the WUAs making the WUA of potentially greater benefit than in those areas with alternative sources of irrigation.

Benefits are estimated to be high for Datta, Shevare, Ozar, Pingot, Baldeva, and NK. The benefits are substantial in the three canal WUAs in Maharashtra - Datta, Shevare, and Ozar - as they are permitted to cultivate sugarcane to a greater extent than before. Benefits are also substantial for Pingot and Baldeva, who got irrigation water they did not have previously, and Ozar where the amount of water available went up greatly. For NK, the WUA guarantees water availability for high value crops like bananas.

Benefits are estimated to be medium for Salipperi and PVP. Although farmers in both have been able to select higher value crops, they have less control over water availability than in the WUAs listed above.

As shown in Table 2, benefits are estimated to be low for Anklav, Mohini, LBP, and PAP. Farmers in Anklav were already growing high value crops before formation of the WUA and have a number of wells in the command to serve as an alternative source of irrigation. Mohini members feel that they do not get any benefit from belonging to the society as sugarcane is grown extensively throughout the system in which Mohini is located. In both LBP and PAP, the number of wells has increased significantly, so many farmers do not even bother to use canal water. Also, in PAP, canal water is available only once every two years.

Table 2: Potential Benefits

WUA	Dependence on WUA	Improved Water Control	Increases in Income	Overall Benefits
Mohini	high	medium	low	low[3]
Anklav	low	medium	low	low
Datta	medium	high	high	high
Shevare	high	low	high	high
Ozar	medium	high	high	high
LBP	low	low	low	low
PAP	low	low	low	low
PVP	low	high	high	medium
Salipperi	medium	medium	high	medium
NK	medium	high	high	high
Pingot	high	high	high	high
Baldeva	high	high	high	high

Rights Transferred The bundle of rights transferred by the government to the WUA is a strong determinant of the benefits. More extensive rights are likely to offer more certain and potentially higher returns. They also bring about a sense of ownership among the users thereby attracting long term investments in the upkeep of the infrastructure. The key rights that can affect expected benefits include:

[3] Denotes the current situation rather than what prevailed when the society began

- certainty of rights to take irrigation water,
- management control over water, including freedom to
  - allocate water across seasons,
  - determine appropriate distribution criteria,
  - use water for crops of the farmers' choice,
  - set charges and deny access to those who fail to meet the group norms,
- rights to complementary resources which augment community's revenues and subsidize irrigation where required.

Each of these is discussed separately below.

- *Rights to Water* Within the bounds of natural availability, the amount of water that a WUA can expect to receive is influenced by how its rights are defined:

  - Anklav, Mohini, Datta, Ozar, and Shevare in have rights to quantities of water defined in their agreements with the irrigation agencies. Because they are within large canal systems, there is some uncertainly associated with actual deliveries: But as these are experiments, the agencies have an interest in meeting their needs.
  - PVP, LBP, PAP, NK, and Salipperi in Tamil Nadu have water rights defined by number of rotations set each season and have expectations of quantities of water based on historical usage. The number of rotations seems far more certain in LBP, PAP and Salipperi than for PVP and NK. Since the joint management system is not well established, the WUAs have little opportunity to influence the numbers and timing of rotations.
  - Pingot and Baldeva in Gujarat are smaller systems than the others, each WUA covers one of the two main channels flowing from the reservoir. The farmers in the whole system have rights to all the water which becomes naturally available. These WUAs, because they cover half of each system, have a strong influence on the water releases. Thus, the share of water each WUA receives is more certain than in the larger systems.

  In the Gujarat and Maharashtra sites, the agencies have been keen to honor the agreements they have with the WUAs since the agencies have been interested in these experiments succeeding. Agency staff are not always willing to consult the users on a schedule for delivery. However, well-known WUAs can take advantage of their celebrity status to obtain water.

  In Tamil Nadu, there are no formal agreements defining rights nor have the joint management systems come fully into effect. Thus users cannot take their rights for granted. WUAs need to constantly put pressure on the agency staff to receive their legitimate shares. Although they niay receive water on schedule, the quantity delivered may have to be negotiated.

- *Management Control* The greater the degree of management control possessed by the WUA, the greater the flexibility they have in making use of the water. Flexibility allows users to put the water to uses that bring them the highest returns. Also, WUAs that have the right to determine irrigation charges and to deny water to those who break rules have more opportunities to create incentives for proper use of water. Management control is affected by terms of contract for contract LMT and the rules under which the JMCs operate for joint management IMT.

  Management rights vary across the sample WUAs. All WUAs have the right to use the water to irrigate the crops of their choice. WUAs in Maharashtra have been freed from limits on sugarcane cultivation and crop restrictions in LBP and PAP are not effectively enforced. In Maharashtra, WUAs have also been freed from restrictions on using both canal water and groundwater on the same crop. In Maharashtra and Gujarat, but not in Tanul Nadu, the WUAs have the right to use water saved in one season to irrigate in another.

Rights to determine charges and exclude non-contributors are not universal. Gujarat and Maharashtra canal WUAs have the freedom to set their water charges. However, Anklav and Mohini are limited to setting their charges no higher than state defined crop-area charges. The Gujarat and Maharashtra WUAs, but not Anklav and Mohini, are permitted to charge 30 per cent more to non-members of the WUA and to deny water to those who fail to pay. Some also deny water to those who break the rules. In Tamil Nadu, however, the WUAs do not charge farmers for water nor do they have the right to deny water to individual farmers.

Maintenance responsibilities give the societies an additional stake in the system, because they give rights to decide on where to invest maintenance resources. Maharashtra and Gujarat WUAs, except Mohini, Pingot, and Baldeva, are responsible for maintenance of all canals within their areas. These WUAs also receive grants to maintain the minors and distributaries. The other WUAs neither have the responsibilities nor receive grants. Under the Tamil Nadu policy, WUAs are supposed to take on maintenance responsibilities but had not yet done so by mid-1995.

Table 3: **Transferred Rights**

WUA	Definition of Rights	Rule Enforcement	Use of Water	Management Control	Overall Rights
Mohini	clear	high	high	medium	less
Anklav	clear	high	high	medium	less
Datta	clear	high	high	high	most
Shevare	clear	high	high	high	most
Ozar	clear	high	high	high	most
LBP	clear	high	medium	low	less
PAP	clear	high	medium	low	less
PVP	less clear	medium	high	low	least
Salipperi	clear	high	medium	low	least
NK	less clear	medium	high	low	least
Pingot	clear	high	high	high	most
Baldeva	clear	high	high	high	most

- *Rights to Complementary Resources* Complementary resources include resources other than irrigation water that can be derived from the irrigation infrastructure. These are such things as trees growing or tank or canal bunds and fish in tanks. Vesting communities with the rights to resources can encourage them to make long-term investments in upkeep of the infrastructure.

  In the sample canal systems, rights to complementary resources have been transferred to the WUA in only one case: Salipperi WUA has been given help to create a village pond and has used the income from fish raising in the pond to clean the drains in their village. Datta WUA has requested the right to plant trees along the bunds of their minor canal for the use of the WUA but the request has been denied by the Maharashtra Irrigation Department.

Overall, as shown in Table 3, the rights transferred are most extensive for the WUAs in Maharashtra Rights for the Gujarat canal WUAs are almost as extensive but differ among the WUAs. Rights transferred are least extensive in the Tamil Nadu WUAs.

Leadership Effective leadership is needed for the success of WUAs. Leaders carry out many of the tasks needed to make a WUA run, such as organizing meetings and other activities, making key decisions when needed, etc. This reduces the burden on the other members of a WUA thus making

them more likely to support the WUA. The WUAs that are doing well generally have active and respected leaders.

Lack of effective leadership is harmful. In Mohini, which is not performing well, farmers are disappointed with the present chairman; they would like to a more responsive man. Datta members too are disappointed with the chairman because he pays little attention to WUA matters, but Datta WUA still functions well because the person who initially provided the leadership devotes considerable time to the WUA.

For some WUAs, paid staff such as secretaries assume leadership. A part-time clerk for NK who has worked for the society for nearly 15 years plays an important role. One of the Datta watennen is very experienced and influential. The secretary of the Shevare society is a well-respected school teacher.

In addition to handling the work of the WUA, leaders generally provide the source of authority to resolve conflicts and enforce rules. In most WUAs, the organizations themselves are too new to have any authority of their own. Hence the source of authority is generally a traditional leader or someone who already wields considerable influence in the community for other reasons. In most WUAs, leadership is assumed by those with influence, generally the socio-economically powerful. In some cases, the leaders have links with local power bases. For example, the president of PAP is the brother of an MLA and the secretary owns a finance company. The president, secretary and the vice president of PVP are also well connected; the vice president is a lawyer. The chairman of Anklav used to be a sarpanch. These persons have the authority or respect to be able to enforce rules. On the other hand, the chairman of Baldeva is not an influential member of the community. No farmers paid up when the chairman imposed fines on them for taking water out of turn. Baldeva WUA members obey rules only out of respect for the community organizer from AKRSP who works with the society.

Table 4 shows the evaluation of leadership from different sources in the sample WUAs.

Table 4: Leadership

WUA	Source	Chairman	Exec Committee	Others	Staff	Overall Leaderstup
Mohini	tradition	low	mediuni	low	high	medium
Anklav	tradition	low	low	low	low	low
Dana	tradition	low	medium	high	high	high
Shevare	tradition	high	high	low	high	high
Ozar	tradition	high	high	high	medium	high
LBP	tradition	low	low	low	low	low
PAP	tradition	low	low	low	low	low
PVP	tradition	high	low	low	low	medium
Salippen	trad/youth	high	high	medium	low	high
NK	trad/youth	high	high	low	low	high
Pingot	new	high	high	low	low	high
Baldeva	trad/new	high	medium	high	low	high

Support from External Agents External agents are persons from outside the group of local farmers who give organizational, technical and political support to WUAs. External agents generally have come froni NGOs or from the irrigation agencies themselves. All the sample WUAs have had external assistance but the amounts and kinds have varied.

External agents have put considerable effort into building consensus and organizing the associations. All the sample WUAs except NK came into existence largely because of the efforts of external agents.

Pingot and Baldeva WUAs were catalyzed from community organizers from Aga Khan Rural Support Program (AKRSP). The Tamil Nadu Agricultural Engineering Department placed community organizers in PVP, LBP and PAP for long periods. The Tamil Nadu Irrigation Managenient and Training Institute worked with Salipperi villagers for years. Similarly, the Gujarat Water and Land Management Institute worked with Anklav farmers for a number of years. NGO (SOPPECOM and SPK) personnel worked with extensively with Datta and Ozar. Mohini and Shevare had assistance from irrigation agency personnel.

WUAs have received organizational support, including help in enforcing rules, resolving conflicts and taking care of the day to day affairs. The AKRSP community organizer, for example, has helped Pingot in organizing meetings, writing minutes, keeping books and enforcing rules. External agents have also provided considerable technical support. For example, SOPPECOM guided the Ozar WUAs in the technical basis for introducing well recharge fees and for conjunctive management of ground and surface water. NGOs also help WUAs in getting recognition from the government, particularly during the formation stage. For example, although the initial idea of organizing users in Pingot came from a senior engineer, AKRSP's role in representing farniers' interests was critical in the formation of the WUA. Anna University provided assistance to NK to *get* formal recognition from the irrigation agency.

External support has thus been very important. Table 5 shows the types of help received.

Table 5: **External Support**

WUA	Source	Technical Support	Admin Support	Political Support	Extent of Support
Mohini	Agency	yes	no	no	low
Anklav	WALMI	yes	yes	yes	high
Datta	SOPPECOM	yes	yes	yes	high
Shevare	Agency	yes	yes	no	high
Ozar	SPK/SOPP.	yes	yes	yes	high
LBP	AED	yes	no	no	low
PAP	AED	yes	no	no	low
PVP	AED	yes	yes	no	medium
Salipperi	IMTI	yes	yes	no	high
NK	Anna U.	no	yes	yes	low
Pingot	AKRSP	yes	yes	yes	high
Baldeva	AKRSP	yes	yes	yes	high

Contribution of Factors to Management Capabilities Table 6 shows the relationship of the four factors to the management performance of the sample WUAs. This table shows clearly that greater expected benefits, greater rights, better leadership, and larger aniounts of external assistance are all associated with better management performance. In addition, the table shows clearly that more extensive rights transfer is directly associated with greater benefits.

Of these four factors, leadership and external assistance may be most important in the short run. Good leadership and help from external agencies are particularly important in the early stages of the functioning of the WUA when rules and procedures need to be devised and adapted to local needs; ie, while the WUA is still learning how to function successfully. They are also particularly important when establishing recognition of the WUA by government agencies and others.

Over the longer run, however, greater benefits and greater rights are the keys to success. Once the rules have been devised and management systems put in place, leadership and outside assistance are likely *to*

be less important. If the benefits are large enough, as made possible by the rights conferred by IMT, then the WUA members will take a continuing interest in the WUA.

Table 6 shows that the three WUAs that have had the most complete rights transferred - Datta, Shevare, and Ozar - show high levels of management performance. Pingot and Baldeva also have had relatively complete rights transferred and have high benefits, but their performance appears to be hampered by learning needs. Irrigated agriculture is new to the Pingot and Baldeva farmers; and the leaders are inexperienced.

Although they have had considerable external effort, the management performance of Mohini, Anklav, LBP, PVP, and PAP appears to be poor primarily because the benefits are not substantial. In LBP, PVP, and PAP the low benefits are partly caused by the fact that few rights have been transferred. The benefits from Anklav WUA appear to be so low that the WUA probably would never have come into existence without extraordinary efforts made by external agents. Similar erosion of incentives has occurred in Mohini.

The most surprising finding is that two of the Tamil Nadu WUAs - Salipperi and NK - show high performance levels despite low levels of rights transferred. In the case of NK, benefits are high because there is relatively little involvement of the agency in management of the channel and tank that NK controls. That is, NK has de facto power despite incomplete rights transfer. Salipperi's success is to be explained by the high levels of help from the external agents and good leadership. Also, both of these WUAs deal with other community issues quite successfully. These two cases, particularly that of NK, suggest that the poorly performing Tamil Nadu WUAs have latent capabilities that are likely to become more apparent when there is more substantial transfer of rights.

Table 6: Factors and Management Performance

WUA	Benefits	Rights	Leadership	External Support	Management Performance
Mohini	low	less	medium	low	low
	low	less	low	high	low
	high	most	high	high	high
Shevare	high	most	high	high	high
Ozar	high	most	high	high	high
LBP	low	less	low	low	low
	low	less	low	low	low
	medium	least	medium	medium	low
Sali eri	medium	least	high	high	high
	high	least	high	low	high
Pingot	high	most	high	high	medium
Baldeva	high	most	high	high	medium

3.4 Sustainability of the WUAs'

The fact that some WUAs are functioning successfully at the moment does not prove that they will continue to do so. It is thus important to address the issue of sustainability of the WUAs over an appreciable length of time. Unfortunately, this study gives little observational evidence because only two of the WUAs are more than 10 years old. Of these, NK seems to show continued vitality while Mohini appears to be retreating from earlier high levels of performance.

[1] The discussion of financial viability is based on analyses undertaken jointly by A.H. Kalro and G. Naik.

There are two key issues in sustainability of the WUAs:

- Continued financial viability.
- Continued benefits for farniers.

Each is taken up separately below.

Financial Viability Financial viability is central to WUA management functions. Unless WUAs can keep themselves afloat as organizations, they *cannot* carry out their water management and other functions. The financial viability of WUAs depends on the following:

- Ability to generate income in excess of expenditure.
- Ability to manage cash flows over time.
- Ability to manage risk associated with cash flows.

WUAs derive tlieir incomes from water charges and additional charges collected from fanners, interest earnings, penalty charges, grants and subsidies from the state, fishing and usufruct rights, works undertaken on behalf of the irrigation agency, other services and miscellaneous charges. Expenditures incurred by the WUAs consist of payment of water charges to the state government and expenditures on maintenance, salaries and wages, administration, providing special services and other miscellaneous items.

There is a need to maintain liquidity and therefore the WUAs must ensure timely collection of their dues and payments. Similarly, W A S must maintain control over expenditures and revise their charges when needed to ensure that expenditures are met.

The income and expenditure statements of seven sample WUAs were examined to evaluate their financial viability. These included Mohini, Datta, Shevare, Salipperi, and the three Ozar WUAs. Other than Salipperi, the Tamil Nadu WUAs undertook very few financial transactions, leaving little to analyze. No audited accounts were available for Anklav, Pingot, and Baldeva.

For the analysis, four types of expenditures were distinguished: transaction expenditures, maintenance, water charges paid to the state, and total expenditures. Transaction expenditures include expenditure on all items except depreciation, interest on loans, maintenance, and water cliarges paid to the state. Total expenditures represent the sum of transaction expenditures, maintenance expenditures, depreciation, interest on loans, and water charges paid to the state.

Table 7 shows the financial perfoniiance of the WUAs. All except Mohini were able to make a profit in at least half of the years analyzed. Except for Salipperi, water charges collected froiii fanners made up more than 60% of WUA incomes. Salipperi collects no water charges because the state collects them directly as part of the land tax. All WUAs except Mohini and Salipperi received management subsidies as well as repair and maintenance grants during the periods studied; these were also important sources of income.

Table 7 shows that all WUAs except Salipperi charge their farmers more for water than the state charges the WUAs. This does not mean that the WUAs actually collect all of the fees. Collection rates varied between 100% for Shevare and 80% for Datta over last three years. The ratio of water charges paid to the state to the water charges assessed by the WUAs from their members is the margin that should be available for meeting other costs. This margin was highest in Datta and lowest in Mohini and Shevare.

Table 7 also shows the components of expenditures. For Mohini and Shevare, water charges paid to the state made up more than half their expenditures. Maintenance expenditures varied among the societies. However, in every case, maintenance costs were higher than the maintenance grants provided by the states. Transaction expenditures varied with those in Mohini being distinctively higher than in other WUAs. In Datta, Shevare and Banganga, transaction expenditures were higher than the management subsidies they received, but it was the reverse for Jay Yogeshwar and Mahatma Phule. Transaction expenditures were nil in Salipperi because these expenditures were met by the members and office bearers from their personal resources. Although total expenditures varied greatly, in every WUA total expenditures make up less than 5 per cent of the net incomes from high value crops cultivated in the WUA commands. Mohini's total expenditures were much higher than the others due to the high amount spent on salaries and wages.

	UAs						
	Mohini	Datta	Shevare	Banganga (Ozar)	Jay-Yogeshwar (Ozar)	M. Phule (Ozar)	Salipperi
# of Years Analyzed	5 (90-91 to 91-95)	5 (90-91 to 94-95)	3 (92-93 to 94-95)	2 (93-94 to 94-95)	3 (92-93 to 94-95)	3 (92-93 to 94-95)	5 (90-91 to 94-95)
				1	2	2	3
Mean sliare of WC* in total income (%)				82	67	63	NA
Mean state WC* to WC* charged to members (%)	69	36	71	59	62	54	NA
Mean share of state WC* in total exp (%)	63	45	66	36	41	29	NA
Mean maintenance exp/ha (Rs)	56.3	57.0	35.1	97.0	40.3	36.7	77.1
Mean transaction exp/ha (Rs)	256.0	170.2	151.7	134.0	75.7	89.3	
Mean total exp/ha (Rs)	856.2	107.5	536.4	355.0	198.7	177.3	77.4

*

Table 8 shows the assessment of WUA performance on the three criteria given earlier as well as an assessment of their financial viability. All the analyzed WUAs except Mohini are presently financially viable However, the three Ozar WUAs would probably not be financially viable without their subsidies and grants. The Maharashtra canal WUAs generally perform better than others.

Changes in conditions might change these assessments. The most dramatic case is that of Mohini. The major problem with Mohini is that fanners are no longer finding it profitable to grow sugarcane. In the past. Mohini was valued by the fanners because it assured water for the highly profitable sugarcane. Now, sugar yields have dropped (possibly because of constant cropping with sugar), water control has deteriorated (because of poor maintenance by the irrigation agency), and charges to fanners by the

WUA are high. In this situation the water charge collection rate has dropped precipitously. All of this, except possibly the problem with sugar yields, would not be difficult to change. Improving the situations of the WUAs that are not presently viable without subsidies should also be possible.

Table 8: **Financial Viability of WUAs**

WUA	Ability to Generate Sufficient Income	Ability to Manage Cash Flows	Ability to Manage Risk	Financial Viability	
				With Subsidy	Without Subsidy
Mohini	Low	Low	Low	No	No
Datta	High	High	High	Yes	Yes
Shevare	High	High	High	Yes	Yes
Banganga	Medium	Medium	High	Yes	No
Jay-Yogeshwar	Medium	Medium	High	Yes	No
M. Phule	Medium	Medium	High	Yes	No
Salipperi	Medium	High	High	Yes	Yes

Continuation of Benefits for Farmers Benefits from WUAs depend upon several factors. These factors include:

- Continued dependence by the farmers on canal irrigation.
- Rights to water and of control over water held by the **WUA.**
- Continued ability and willingness of governnient irrigation agencies to deliver water to the WUAs as agreed.
- Continued willingness of the governnient agencies to support **WUA** decisions and actions within their rights.
- Continued profitability of irrigated agriculture.

The first two points are repetitions of points made earlier. If wells become more widespread, and the wells are not dependent on the canals for recharge, the less likely that a WUA will be viable in the long run. Similarly, tlie more complete tlie riglits transferred to WUAs, the greater tlie benefits of the WUA to the fanners. If the transferred riglits are not sufficient to make a **WUA** beneficial, farmers are not likely to continue to support it even if external support is provided.

The third and fourth points refer to the WUA's institutional environment; specifically its interactions with government agencies. While some WUAs exist without support from govemnient agencies (NK is an exaniple), few can survive if government agencies act in ways that make the **WUAs less** valuable **to** the fanners. **A** key requirement is that the irrigation agency deliver water to the **WUAs** as **agreed.** Other government agencies niust also avoid acting in ways detrimental to the **WUAs. If,** for example, a farmer appeals to the courts or a govemnient agency against **a** decision of his **WUA,** the relevant agency must recognize the legitimacy of the **WUA** and its riglits. At present, **most** sample **WUAs** face a relatively supportive institutional environment; most have been given favored treatment by tlie Irrigation agencies and have had help from NGOs tc negotiate tenns from other government agencies. This situation may not continue **as** the number of WUAs **grows.**

Finally, no efforts to help WUAs mean anything **if** irrigated agriculture ceases to be profitable for farmers.

3.5 Outcomes of IMT[5]

IMT has consequences for both the farmers and the government agencies involved. The consequences include both costs and benefits. For this study, no attempt to do a full comparative evaluation of the costs and benefits was made. However, the costs and benefits reported by the farmers and agencies were identified.

Costs and Benefits of IMT for Farmers Farmers in the sample WUAs identified the main costs as:

- Payments to the WUAs other than for government irrigation fees
- Costs of operations and maintenance above the outlets
- Time spent on meetings, WUA work, etc

Fanners identified the following benefits of IMT:

- The availability of more water
- hiiproved reliability of water supply
- Increase in area irrigated
- Changes in cropping pattern
- Saving time and hassle to pay water charges
- Improved ability to deal with the agency
- Reduced conflicts
- Equity in water distribution

Overall, benefits appear numerous and probably greater than the costs. Possibly the most important is the improved availability of water. This improved availability is due either to the interests of the agency in making the WUAs work, or to the improved ability of the WUAs to deal with agencies.

Costs and Benefits for the Irrigation Agencies The reported major costs of IMT incurred by the irrigation agencies included:

- Additional investment in main system/minor channels
- Additional water for the WUAs
- Providing management subsidy ahd maintenance grants
- Discounts in water charges
- Training
- Time spent by officials

The primary benefits reported by agency officials included:

- Increase in recovery of water charges
- Improvement in water usage
- Reduction in time to collect water charges
- Reduction in time for water distribution
- Reduction in time to resolve conflicts

For agency officials in Gujarat and Maharashtra, the most significant benefits of IMT were the increase in rates of collection of water charges and reduction in time and hassle of collecting the fees. However, there was no evidence that agency operations and maintenance expenditures have declined significantly.

[5] This section is based on analyses undertaken jointly by G. Naik and A.H. Kalro.

Outcomes versus the Major Objectives of IMT The primary government objectives in transferring management functions to users are:

- reducing state expenditures on operation and maintenance,
- improving maintenance and system sustainability,
- improving agricultural production by improving water distribution.

There are not likely to be significant reductions in state expenditures until management functions have been transferred to a large number of WUAs and the agencies have had time to modify their procedures and staffing. ***Also,*** in most cases, agencies have increased expenditures for IMT, at least for a short period. Similarly, although the WUAs appear to do adequate maintenance, there is no clear evidence that sustainability is improved. There is some slight evidence that agricultural production is being increased because of the reported increases in areas irrigated in some WUAs and in the changes in cropping patterns, largely to more profitable crops.

Users' objectives are:

- improving water availability,
- improving water distribution,
- reducing costs of irrigation.

Water availability seems to have improved, largely as the result of repairs to the main system and allocation of larger amounts of water to the WUAs. Water distribution, too, has improved for most WUAs, disproving the contention that turning management authority over to farmers is likely to increase inequities. No analysis of the costs of irrigation was carried out since the detailed data needed for sucli an analysis was not collected. However, if improved sustainability and reduced government costs are to be attained. then farmers' costs will have to increase.

While it is too early to tell, it appears that some of the objectives of IMT *can* be achieved.

4. POLICIES AND THE EFFECTIVENESS OF WIT

4.1 Evaluation of the Policies in the Sample States

Section 3 suggests that IMT may lead to the desired outcomes, but it clearly will not do so unless transfer of irrigation management responsibilities from the government occurs to effective WUAs. The discussion in Section 3 suggests the requirements for success of WUAs include:

- Transfer of adequate rights and responsibilities to WAS, including full rights to manage water and finances within the WUA area plus guaranteed access to specific quantities of water.
- Outside support for the WUAs during their initial periods while the leaders and members learn how to manage water and finances.
- A supporting institutional environment in which the irrigation agency and other government agencies recognize the rights and powers granted to the WUAs and do not act in ways that will undermine the value of the WUAs to the fanners.

Section 2 described the major features of the present and proposed irrigation management transfer policies in the six sample states. These policies do not provide these key requirements equally.

- Maharashtra's policy clearly provides the most complete transfer of rights to WUAs and the state has encouraged NGOs and others to provide support to WUAs. These factors explain the relative success of the sample WUAs from Maharashtra (Datta, Ozar, and Shevare).

- Although Gujarat's proposed policy is very similar to Maharashtra's, the sample WUAs from Gujarat are experimental and have been granted different rights. It is thus expected that the WUAs (Mohini, Anklav, Pingot, and Baldeva) vary in their degree of success.

- Tamil Nadu's proposed policy has not been implemented. Rights given to existing WUAs have been few and the institutional environment in Tamil Nadu has not been supportive for the experimental WUAs studied. All the sample WUAs have been largely ignored by the Water Resources Organization, perhaps because they were formed without WRO participation. These factors explain the relatively poor performance of the sample Tamil Nadu WAS.

- Kerala's CAD policy gives relatively complete rights to the WUAs and the joint management committees (JMCs) over water distribution. However, the lack of responsibility for maintenance is a significant omission. The biggest problem in Kerala has been the lack of a supportive institutional environment, thus explaining the poor average performance of the WUAs and JMCs.

- Although several features of Bihar's proposed policy remain to be worked out, the proposed policy gives the WUAs relatively complete rights; the biggest missing element is assurance about the amount of water to be delivered to each WUA. The nature and extent of initial support to be provided to WUAs and the nature of the institutional environment remain to be seen.

- As in Bihar, several features of Hatyana's policy remain to be worked out. The proposed policy gives WUAs no additional rights over water distribution and, for most, no greater responsibilities for maintenance. Since there is little change, it is hard to see what benefits the farmers will receive from forming WAS. Also, the institutional environment remains to be seen.

As this analysis implies, the policy and programs adopted in Maharashtra seem to offer the best chance of success at the present time.

4.2 Possible Future Problems

Three problems are likely to arise when implementing IMT more widely:

- excessive water allocations in agreements with WUAs,
- subsidies for WUAs,
- growth of opposition to IMT in agencies.

In several sample WUAs (Anklav, Mohini, Datta, Ozar, Shevare), the irrigation agencies have increased the WUAs' allocations of water in an attempt to make them function well. While this can be done for isolated experiments like these, it is obvious that this practice cannot be followed when most farmers within a canal system are organized into WUAs. Once most farmers have been organized, the irrigation agencies are going to face new operational problems as the WUAs try to exert power to influence water deliveries to themselves,

Various subsidies are being offered to WUAs. Financial analysis of sample WUAs indicates that some are not financially viable without the subsidies. If, however, the state continues to provide subsidies at the same level, it may not be able to achieve one of the desired goals, namely reduction of state

expenditure on irrigation management. Clearly, then, there will be pressure to reduce the subsides in the future which may affect the viability of some WUAs.

Finally, if IMT is successful, the number of personnel and the responsibilities of the irrigation agencies will be reduced. This change will adversely affect some state employees. Some may lose their jobs and others will lose influence over farmers and control over state financial resources. The basic functions of the irrigation agencies will have to change. It is likely that opposition to IMT will grow within these agencies. Such opposition may successfully sabotage IMT programs or delay their completion.

4.3 Policy Requirements for Successful IMT

Section 2 pointed out that IMT policies and programs in the six states surveyed are based on four distinct approaches to IMT, namely:

- the contract approach (Maharashtra and Gujarat),
- joint management (Tamil Nadu and Keraia),
- arm of the state (Bihar),
- formally organized warabandi (Haryana).

It is likely that both the contract approach and joint management can be made to work successfully in the appropriate circumstances. Both are more or less successful elsewhere in the world. The arm of the state and formally organized warabandi approaches have not yet been tested and details have not yet been worked out, hence no discussion of those approaches is offered here.

To make the contract approach work well, the analysis here suggests that the following conditions must be fulfilled:,

- State law on irrigation inust recognize WUAs and grant them powers to a) make agreements with the state, b) manage water distribution and maintenance within their areas, c) manage their own finances, and d) punish offenders against their internal rules, preferably by withholding water.

- The agreement between the WUA and the state inust clearly specify the quantity of water to be supplied by the state to the WUA and any other items to be provided by the state to the WWA, and must clearly specify the items owed by the WUA to the state.

- Personnel of the state irrigation agencies and other relevant state agencies must respect and work in cooperation with the WUAs.

To make the joint management approach work well, the present analysis suggests:

- State law on irrigation must recognize WUAs and grant them powers to manage water distribution and maintenance within their areas, to manage their own finances, and to punish offenders against their internal rules, preferably by withholding water.

- State law on irrigation must recognize joint management committees and grant them powers to make seasonal allocation decisions within agreements or state rules specifying distribution of water among irrigation systems, to make decisions concerning use of state supplied maintenance funds, and to resolve disputes among WUAs.

- Personnel of the state irrigation agencies and other relevant state agencies must respect and work in cooperation with the WUAs; also they must be made accountable to the joint management committees within each system.

In addition, for both approaches, it may be necessary to provide external assistance while the WUAs are being organized.

5. CONCLUSION

Irrigation management transfer has not proceeded very far in India. Even in those states that have formulated a clear policy, such as Maharashtra, there has been little progress of actual transfer to groups of famiers.

Although state officials reported a series of hoped for outcomes and *impacts* of IMT, the two major ones are:

- Improved long term sustainability of the systems at lower *cost* to the government.
- Improved productivity of the systems.

There is as yet no clear-cut evidence to prove that IMT and will achieve these goals. However, the indications are that IMT *can* achieve these goals in whole or in part. To do *so,* IMT policies and programs must be designed to provide clear benefits to farmers as well as to the state and the policies and programs must actually be implemented as designed.

Section 4 points out some of the requirements for a successful IMT policy and program. While these details will differ depending upon the basic approach taken to IMT, these requirements include:

- legal recognition of WUAs and JMCs if any and of their rights and responsibilities,
- formally granting these bodies full rights to management of water distribution. maintenance, and their internal affairs,
- providing resources for external assistance to new WUAs,
- ensuring that state agency personnel act in supportive ways,
- avoiding the problems of allocating too much water to early WUAs, giving non-supportable subsidies continuously, and growth of opposition within the irrigation agencies.

A key point is that achieving effective IMT will require investment before the potential sustainability and financial benefits *can* be adiieved. The benefits of IMT are not free. While the immediate gains from IMT are likely to be small, the long term sustainability gains *that* nuy occur will multiply *these* gains over time. Thus there is good reason to invest in IMT.

6. REFERENCES

Brewer. J.D., R. Sakthivadivel, and K. V. Raju

1997 Water Distribution Rules and Water Distribution Performance: A Case Study of Tambraparani System, IIMI Research Report, forthcoming, International Irrigation Management Institute, Colombo.

Bruns, Bryan, and Sudar Dwi Atmanto

1995 How to Turn Over Irrigation Systems to Farmers? Questions and Decisions in Indonesia, pp 267-234 in Johnson et al, eds, 1995.

Chen, Xueren, and Renbao Ji
1995 **Overview** of Irrigation Management Transfer in China, pp **103-116** in Johnson **et** al, **eds 1995.**

Devlet su Isleri, Economic Development Institute of the World **Bank,** International Irrigation Management Institute
1996 **Assessment** of IMT in Turkey, paper presented for the International Seminar **on** Participatory Irrigation Management, Antalya, Turkey, **10-17** April **1996.**

Farley, Peter J
1994 ***Privatization of Irrigation Schemes in New Zealand,*** Short Report Series on Locally Management Irrigation No. **2,** International lmgation Management Institute, Colombo.

García-Betancourt, Gilberto
1994 ***The Emergence of Federriego: The Colombian Federation of Irrigation Districts***, Short Report Series on Locally Management Irrigation No. 8, International Irrigation Management Institute, Colombo.

Geijer, Joost CMA, M Svendsen, and DL Vermillion
1996 ***Transferring Irrigation Managentent Responsibility in Asia: Results of a*** Workshop, Short Report Series on Locally Managed Irrigation No. **13,** International Irrigation Management Institute, Colombo.

Gorriz, Cecilia M, Ashok Subramanian, and Jose Simas
1995 Irrigation Management Transfer in Mexico: Process and Progress, paper presented at the International Seminar on Participatory Irrigation Management, Mexico, 8-15 February 1995.

Groenfeldt, David
1995 Irrigation Management Transfer in Turkey, pp **151-152** in **MOWR 1995.**

IIMI/ARTI
1995 **Draft Final** Report, Monitoring and Evaluation of Participatory Irrigation System Management, International Irrigation Management Institute and Hector Kobbekaduwa Agrarian Research and **Training** Institute, Colombo.

Johnson, SH, DL Vermillion, and JA Sagardoy, eds
1995 *Irrigation Management Transfer*, Water Reports No **5,** Food and Agricultural Organization of the United Nations, Rome.

Kloezen, Wim, and M Samad
1995 ***Synthesis of Issues Discussed at the International Conference on Irrigation Management Transfer***, Wuhan, China, 20-24 **September** 1994, Short Report Series on Locally Management Irrigation No 12, International Irrigation Management Institute, Colombo

MOWR
1995 *Proceedings of the National Conference on Participatory Irrigation Management*, Vigyan Bhawan, New Delhi, 19-23 June 1995, Ministry of Water Resources Government of **India,** Delhi

Srivastava, L.P., and J.D. Brewer
1994 *Irrigation Management Transfer at Paliganj, Bihar, India*, Short Report Series on Locally Managed Irrigation No. 7, International Irrigation Management Institute, Colombo.

Svendsen, Mark
1992 *Assessing Effects of Policy Change on Philippine Irrigation Performance,* Working Papers on Irrigation Performance 2, International Food Policy Research Institute, Washington.

Vermillion, Douglas L.
1991 *The Turnover and Self Management of Irrigation Institutions in Developing Countries,* International Imgation Management Institute, Colombo.

Wijayaratna, CM, and Douglas L Vermillion
1994 *Irrigation Management Turnover in the Philippines: Strategy of the National Irrigation Administration,* Short Report Series on Locally Managed Irrigation No. 4, International Irrigation Management Institute, Colombo.

Annex: **IMT Policies for Large Systems in the Sample States**

State	WUA Organization	Transferred Responsibilities	Changes in Rights and Powers	WUA Resource Mobilization	Changes in Agency Resource Mobilization	Transfer Means
Bihar	Two tiers: village (outlet) WUA. WUA for distributary channel command of over 10,000 ha	- Distribution to outlets on the distributary - Maintenance of the distributary - Collection of govt irrigation fee	Water allocation to remain by "assured irrigation area" but farmers get power over distribution on distributary and over use of maintenance resources	- Distributary WUA to get 70% of collected govt fees - WUAs may raise own fees and demand labor from farmers	30% of government fees go to treasury; agency gets treasury allocations	Not decided
Haryana	Outlet level WUAs	- O&M below the outlet - Collection of govt irrigation fee	NO CHANGE (Water distribution by *warabandi*)	- Commission given from govt fee collection - WUA may demand labor from farmers	Fees minus WUA commissions go to treasury; agency gets treasury allocations	- Not decided - Canal lining below outlets and other assistance provided only through WUAs
Gujarat	Cooperative WUA for 500 ha block	- O&M within the WUA area - Payment of volumetric fee to the agency	Farmers *gain* voice in allocation through agreement between WUA and agency (replacing *shejpali*) and by WUA taking O&M responsibility	- WUAs may collect crop-*area* fees and other charges and may demand labor from farmers - WUAs may enter businesses - State contributions to WUAs given as incentives	**NO CHANGE** (Fees go to treasury; agency gets treasury allocations)	- Incentives offered to farmers to organize - NGOs expected to work with farmers - Agency officers to work with farmers
Maharashtra	Cooperative WUA for minor canal - about 500 ha	- O&M with the WUA area - Payment of volumetric fee to the agency	Farmers *gain* voice in allocation through agreement between WUA and agency (replacing *shejpali*) and by WUA taking O&M responsibility; also restrictions *on* crops and conjunctive use removed	- WUAs may collect crop-area fees and other *charges* and may demand labor from farmers - WUAs may enter businesses - State contributions to WUAs given as incentives	NO CHANGE (*Fees* go to treasury; agency gets treasury allocations)	- Incentives offered to farmers to organize - Farmers to organize spontaneously; publicity put out to convince them - NGOs expected to work with farmers
Tamil Nadu	Three tiers: outlet WUA. WUA at 500 ha level. system level JMC	- Maintenance within the WUA area - Advise on operations at all levels through WUAs and JMCs	Basic rule of water allocation by land class remains but farmers get more power through JMCs	- WUAs may collect fees and demand labor from farmers - State *to* contribute *me*-time matching funds	NO **CHANGE** (Fees go *to* treasury; agency gets treasury allocations)	- Agency officers to organize - System repairs provided in cooperation with WUAs
Kerala	Three tiers: outlet WUA. branch canal JMC. system level JMC	Advise on operations at all levels through JMCs	Basic rule of water allocation by laud class remains but farmers get more power through JMCs	WUAs may demand labor from farmers	**NO** CHANGE (Fees go to treasury; agency gets treasury allocations)	- Subsidized inputs provided through WAS - Canal lining below outlet provided through WUAs - Cooperative Officer to organize WUAs