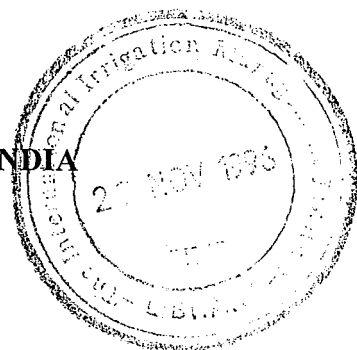


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## TYPES OF IRRIGATION MANAGEMENT TRANSFER IN INDIA

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### 1. CLASSIFYING IRRIGATION MANAGEMENT TRANSFER POLICIES AND ACTIVITIES

#### 1.1 Goals and Organization of this Paper

Irrigation management transfer (IMT) refers to the transfer of management responsibilities for an irrigation system from a government agency to user organizations, local bodies, or non-governmental organizations.

IMT is currently a major concern in a number of countries. In particular it 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 the Philippines (Wijayarathna 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 (García-Betancourt 1994) in Latin America, and others such as New Zealand (Farley 1994) and Turkey (Groenfeldt 1995), have made major efforts towards irrigation management transfer. Many others, including India (MOWR 1995), are now following suit.

These programs differ from each other in many ways. For this reason, we feel that it would be useful to develop a typology of irrigation management transfer policies and activities. This paper discusses the issues involved in developing a typology for the variety of irrigation management policies and activities found in India. The goal is not only to develop a means of classifying IMT policies and activities that will be of use to researchers, policy makers, and irrigation specialists in India, but also to explore the factors that must be considered in the process of classification. This paper is a modest first attempt at a typology that may serve as a model for other attempts in other regions or on a global scale. We have restricted the discussion in this paper to large systems only, although we are also concerned with IMT activities in various kinds of small systems and the basis for classification derived here is relevant to all irrigation systems.

This short introduction is followed by a general discussion of some of the key concepts involved in Section 2. Section 3 describes the background and environment of IMT in India and Section 4 lays out the typology devised for India. Section 5 then draws some general lessons from this attempt.

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## 1.2 Sources of Data for this Paper

This paper is based on a two year study of irrigation management transfer in India, funded by the Ford Foundation, 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 study was to survey policies and activities being carried out in different parts of India.

Because there is great variation among the states of India, the IIMI/IIMA study sampled the variation by focussing on six states:

- Bihar in Eastern India.
- Haryana in Northwest India.
- Gujarat and Maharashtra in Western India.
- Kerala and Tamil Nadu in Southern India.

These states represent the four major cultural regions outside Northeast India and the Himalayan areas where there is little irrigation. The extra two states were added because they had reputedly made good progress in IMT activities.

For the study, the IIMI/IIMA team reviewed the literature on IMT in India and carried out rapid assessments of policies and activities in each state. Each visit lasted about a week and included interviews with government officers in the state capitals, review of state government and other documents, discussions with persons from non governmental organizations (NGOs) working with farmers on IMT, and visits to field sites where some aspect of transfer had been accomplished. In the field, team members spoke with farmers, generally in group interviews, and with field level government officials and others about IMT progress. A second phase of the study involved process documentation research carried out in 20 IMT sites in the three states where transfer appeared most advanced: Gujarat, Maharashtra, and Tamil Nadu. The data quoted in this paper comes primarily from the state assessments (Brewer 1995, Sakthivadivel and Brewer 1995, Kolavalli 1995, Raju 1996, Brewer and Raju 1995, IIMI/IIMA 1996).

## 2. COMPONENTS OF A TYPOLOGY OF IMT POLICIES AND ACTIVITIES

### 2.1 Definitions

***Irrigation Management Activities and Institutions*** An irrigation system is a system of physical structures, such as dams, canals, gates, pumps, and others, that capture water from a natural source and distribute it to farmers to use for watering crop plants. As argued by Uphoff (1986, cf Coward 1980) irrigation management activities are those concerned with:

- Water Distribution: Capturing and distributing water in an irrigation system (also called operations).
- Maintenance: Repairing and maintaining the physical structures of the irrigation system.
- Resource Mobilization: Raising the resources needed for operations and maintenance (O&M).

- **Conflict Resolution**: Resolving conflicts among users and system managers over the above three items above.

Irrigation management institutions include the rules and organizations concerned with these four activities.

***Irrigation Management Policy*** As used in this paper, government policy consists of the way the government wishes to carry out its functions. Government policy exists in several forms, including statements in law, written policy statements, government agency regulations and guidelines, and widespread beliefs among government agency personnel that things should be done in a particular fashion. In any one government area, there may be multiple policies, each held by one or more agencies.

Government irrigation management policy includes those rules and principles that define institutions - rules and organizations - for some or all of the four irrigation management activities. Irrigation management policies thus define:

- **Water Distribution Rules**: The rules defining the proper distribution of irrigation water to legitimate users (sometimes called “allocation rules” or “water rights”).
- **Resource Mobilization Rules**: The processes for mobilization of resources for operations and maintenance of the system, including requirements for the payment of irrigation fees and for contributing labor.
- **Conflict Resolution Rules**: The rules regarding how conflicts are to be settled.
- **System Managers**: The persons or organizations responsible for operations and maintenance (O&M), for resource mobilization, and for conflict resolution.

These items are defined in government policy for all government managed irrigation systems. However, the fact that they are defined in policy does not mean that there is a single document that lists all of these clearly. In many cases, some of the more important policy provisions are simply matters of practice rather than being documented. For example, in Tamil Nadu in India, the law makes the Public Works Department “responsible” for operations and maintenance of all irrigation systems larger than command more than 100 acres (40 hectares). By long held custom, however, the operation and maintenance of all irrigation systems dependent upon “tanks” (small reservoirs), including systems that command up to 5000 hectares, are managed by farmers.

While government policy must define these four items, the definitions are more or less vague. There is always room for local interpretations of the government policy.

***Irrigation Management Transfer*** We will define irrigation management transfer (IMT) as *the transfer of responsibility for some or all irrigation management responsibilities for an irrigation system from a government agency to one or more private (or local) persons or organizations*. Management transfer need not be total but could be limited to specific parts of irrigation systems or to specific management functions.

An irrigation management transfer policy then is a government policy mandating irrigation management transfer and specifying key elements of the changes to be accomplished or that accompany transfer. We discuss the specific elements in the next section.

Irrigation management transfer activities are the programs and individual efforts designed to implement IMT policies. However, there have been and continue to be experimental irrigation management transfer activities that *precede* formulation of IMT policy. Experimental activities are very important in that they provide models on which the policies are formulated.

## 2.2 Dimensions for Classifying Irrigation Management Transfer Policies and Activities

The key problem in classifying any set of things is deciding which traits should be used for classification. To decide which items to use, let us begin by considering the implications of the definitions given in the preceding section.

First, the definition of IMT includes transfer of responsibilities from a government agency to private persons or organizations. This suggests that two of the needed traits are:

- Definition of the persons or organizations to whom the responsibilities are to be transferred.
- The responsibilities to be transferred from the government agency to the private person.

Most of the discussion of IMT has been about transfer of responsibilities to water user associations (WUAs) or some form or other. The reasoning is that water users - farmers - have the proper set of motivations to handle irrigation management activities efficiently and effectively (Kloezen and Samad 1995). The first point therefore often is reduced to a discussion of how WUAs should be organized (Vermillion 1995).

These two traits may not be enough to differentiate among policies that have different degrees of success. Some of the literature suggests that the rights and powers (authority) given to the WUAs or other recipients of the responsibilities are equally important. Farmers who have been getting government service up to the present are not likely to agree to take on additional management burdens unless they see a benefit. The key benefit for irrigation systems, in general, is better irrigation service. Farmers cannot provide better irrigation service unless they are given greater authority over irrigation management activities. This argument suggests that the third needed trait is:

- The rights and powers, particularly those over water distribution in the broad sense, to be transferred.

Increased authority over water distribution is not the only possible benefit from IMT, but it is the only one that is directly and permanently connected with the use of the system for irrigation.

Resources have to be mobilized for the operation and maintenance of any irrigation system. A key element in IMT, in addition to the three listed above, is the change brought about in systems for resource mobilization. Since IMT involves two parties, the government agency and the private organizations and persons, there are two issues:

- Changes in systems and requirements for resource mobilization for the government agency.
- Changes in systems and requirements for resource mobilization for the private persons or organization.

These items are particularly important since one of the main motivations for governments to adopt IMT policies is to reduce the contribution from general government revenues to the O&M costs for irrigation systems.

Conflict resolution is also an irrigation management activity. Therefore, changes in conflict resolution systems - identification or creation of new bodies, definition of rules for settling conflicts, etc - could also be a key part of an IMT policy. Therefore there is the added issue:

- Changes in conflict resolution institutions.

IMT is a change. If formulated into government policy, it is a deliberate change. If the policy is translated into activities, there must be means to bring the change about. If, as in most IMT programs, transfer of responsibilities is to be made to WUAs, generally someone has to work with farmers to encourage them to form WUAs. Often incentives need to be offered. At the very least, the policy has to be publicized. Therefore, a key element for classification is:

- The means by which IMT is to be implemented.

To summarize, our reasoning suggests the following seven elements as the key dimensions for the classification of IMT policies and activities:

1. Persons or organizations to whom responsibilities are transferred
2. Responsibilities transferred
3. Rights and powers transferred
4. Changes in agency resource mobilization
5. Changes in resource mobilization for the private persons or organizations
6. Changes in conflict resolution institutions
7. IMT implementation means

As we will see, in any one case of classification, it may not be necessary to make use of all of these dimensions.

## **2.3 Types of Irrigation Systems as a General Framework**

The components of an IMT policy listed in Section 2.2 are make up the dimensions of a typology of IMT policies and activities. However, irrigation systems differ among themselves in many ways, including size (how many hectares and farmers the system serves), source of water (a river, groundwater, etc), and many technical factors. For ease of administration and specificity, government irrigation management policies may and usually do distinguish among categories of irrigation system. In India, for example, many specialists and some laws distinguish among “major” irrigation systems, and “minor” irrigation systems.

For this reason, we suggest that it is generally useful to classify IMT policies and activities by recognized types of irrigation systems. These different types of irrigation systems generally have

different management needs and require different levels of resource mobilization for O&M, including different types and levels of government input. These differences are likely to be reflected in IMT policies.

### **3. THE ENVIRONMENT OF IRRIGATION MANAGEMENT TRANSFER IN INDIA**

#### **3.1 Irrigation in India**

Irrigation is very important to India; irrigated farming produces almost two-thirds of the grains needed to feed India's 900 million people. India has the second largest irrigated area in the world after China and investments in irrigation have been a major means of development.

The Indian constitution separates various subjects into those that are the responsibility of the central government and those that are the responsibility of the 26 states. Water, including irrigation, is a state subject. Virtually every state has a government agency - generally an Irrigation Department - to deal with irrigation matters. State Irrigation Departments operate medium and major surface irrigation systems which accounted for 36 per cent of the net irrigated area in India in 1990 (MOA 1992). The remainder of the irrigated area includes area irrigated by private groundwater irrigation (49%), traditional tank irrigation schemes (7%), and other sources of irrigation (8%).

Unfortunately, the upkeep of public irrigation infrastructure has been inadequate. Field observations by government officials and the World Bank staff reveal that in nearly all states, irrigation and drainage infrastructure is deficient and deteriorating (World Bank 1991). A major reason is lack of resources for O&M. Prior to the 1950s, revenues from water charges levied on farmers exceeded the combined government expenditures for O&M and for imputed interest on the initial investments. By 1989-90, the subsidy of the sector, using the historical cost valuation method, was estimated to be Rs 26 billion, or equivalent to 0.6% of GDP (World Bank 1991). The main reasons for this poor financial performance included a failure to adjust water charges in line with rising costs of O&M, and failure to achieve high collection rates of water charges.

Irrigation management transfer is coming to be seen as a way out of this difficulty. Virtually all states in India, including the six discussed in this paper, have adopted or are considering adoption of irrigation management transfer policies.

#### **3.2 Some Common Features of Irrigation Management in India**

India is a large and diverse country. The states differ markedly in many ways, including history, cultural and legal background, and ecology and natural resources. Not surprising then there is considerable variation in irrigation management practices and policies among the states in India. The next two sections point out some common features and some of the differences that exist. However, there are some common features to irrigation management among all of the states:

- All surface water in India is ultimately under the control of the state governments which, theoretically, manage the surface waters in trust for the people. Distribution of surface water through

irrigation systems has come to be seen primarily as a form of welfare. That is, the irrigation systems are designed to spread water to as many farmers as is practicable. Also, one of the goals of irrigation management in all states is an equity of distribution of water, within practicable limits, to all recognized users.

- Most of the states, including all of those discussed in this paper, have government agencies concerned specifically with irrigation. All originated in British times as engineering agencies that dealt with construction of public works in general and later became specialized for the construction, operation and maintenance of irrigation systems. All are still dominated by civil engineers and all adopted many British traditions and attitudes. All are powerful organizations controlling large amounts of resources.
- All states in India collect revenues designated for the payment of the expenses of the government irrigation agencies, although the mechanisms vary widely. In every state the rates are insufficient to meet O&M costs, to say nothing of construction costs. In addition, most states have great difficulty in actually collecting irrigation service fees no matter how charged.
- No public irrigation management organization in India attempts to deliver water to each farm. Throughout India, public irrigation systems deliver water to *outlets*, each serving more than one farmer. Below each outlet, the farmers are collectively responsible for both water distribution and maintenance of the distribution system. Outlets generally serve areas from 5 to 100 hectares.

These basic features form a general framework for irrigation management in India.

### 3.3 Variation in Irrigation Management Environments among the States

As pointed out in Section 3.1, the states differ widely in many ways that affect IMT policies and activities. It is not the purpose of this paper to describe all of these variations even for our six sample states. An outline of irrigation management in the six sample states is given in the Annex. This section attempts only to clarify the kinds of differences that exist.

Certain recognized irrigation management systems exist. For systems managed by government agencies, these systems 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.

To make the scale of variation clear, we will describe the four systems for the management of surface irrigation systems that are the basic systems in use in our six sample states:

- **Warabandi** The *warabandi* system is used in government agency managed canal systems in Northwestern India and Pakistan (Malhotra 1982). 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 irrespective of crop needs or other concerns. The means of achieving this, is that water is

supposed to be delivered to farmers below each outlet by means of a strict rotation schedule in which the length of each turn in hours and minutes is proportional to the size of each farmer's holding. During his turn, each farmer gets the full flow from the outlet. 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 independently but in proportion to the area of his holding. While there is considerable debate over how well the rules of the *warabandi* system are followed (eg Bandaragoda and Rehman 1995), the basic principles of *warabandi* are well documented and widely understood. The *warabandi* system is used in one of our sample states: Haryana.

- ***Shejpali*** The *shejpali* system is found in Western India. Under *shejpali*, every farmer is supposed to apply for irrigation for a specified area(s) of one or more specified crops every season. The irrigation agency then can choose to approve this application or not. If the application is approved, the farmer is supposed to pay fees based on the area(s) of his crop(s). Once an application is sanctioned, the agency is responsible for delivering water to bring the crop to maturity. From the detailed information on crops and areas, the agency is expected to plan how to deliver water to the outlets. Farmers below each outlet are expected to take water in turns; however, there is no fixed schedule and each farmer takes as much water as he needs before passing the turn to the next farmer. *Shejpali* makes the government concerned not just with irrigation but also with control over crops. It also imposes a very high administrative burden on the farmers and the states. The *shejpali* system is the basic pre-IMT irrigation management system for two of our sample states: Gujarat and Maharashtra.
- ***Land Classes*** In many parts of Southern India, water rights are assigned to land based on its classification. Thus some land is classified as entitled to 2 rice crops per year; other land is entitled to only 1 crop per year. The *localization* system, under which certain parts of the command are identified as places where rice may be grown while other parts of the command are identified as places where "irrigated dry" crops may be grown, is a version of this approach. The irrigation agency is responsible for delivering enough water on an appropriate schedule to bring the permitted crops to maturity. Below each outlet, farmers are expected to work out how they will share the water among themselves. Fees are assessed based on the water rights of the land and are collected as part of the land taxes. Versions of the *land classes* system are used in two of our sample states: Tamil Nadu and Kerala.
- ***Assured Irrigation Area*** Historically, some areas of Eastern India followed the *satta* system. Under this system, farmers had to apply for water each season but there was no need to specify crops; rice was the assumed crop. Enough water was to be delivered to each farmer to bring the crop to maturity. Everyone who submitted an application was to pay fees. In Bihar, one of our sample states, the *satta* system has been modified; 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, every farmer has to pay the irrigation fee whether or not he takes water for irrigation.

There are many variants of these four systems as well as others.

Each of the major irrigation management systems is supported by government policy, including law. The *warabandi* system has explicit legal sanction in the Northwestern India Irrigation and Drainage Act



of 1873. This law, as amended, is the basic irrigation law for the states of Haryana, Punjab, Rajasthan, and Uttar Pradesh. Similarly, the *shejpali* system has legal support in the Bombay Irrigation Act of 1879. An amended version of this law is still the basic irrigation law for the state of Gujarat. The other major state of Western India - Maharashtra - has produced a new basic law, the Maharashtra Irrigation Act of 1976 that continues to recognize *shejpali* as the basic irrigation management system, although it also authorizes alternatives. Similarly, the *satta* system is based on the Bengal Irrigation Act of 1876. This act, as amended, remains the basic irrigation law for the states of Bihar, West Bengal, and Orissa. There is no comparable law from British times for Southern India.

Some give environmental justifications for the variant irrigation management systems. For example, *warabandi* is said to be appropriate where water is short and where most systems are run-of-the-river systems as in Northwestern India. Similarly, use of *land classes* is said to be adapted to areas with higher rainfall and where rice is the staple crop, as in much of Southern India. In fact, however, the variations seem to more based on cultural and historical variables. For example, much of Gujarat, where *shejpali* is used, is as dry or drier than Northwestern India, where *warabandi* is used.

### 3.4 Types of Irrigation Systems in India

As indicated in Section 2.3, the recognized types of irrigation systems form a general framework for a typology of IMT policies and activities. For India, we have decided to recognize three categories of systems:

- Large Systems
- Small Gravity Systems
- Small Pump Systems; this includes both wells and lift systems.

These classes, although not standard, are widely recognized in India, and seem to provide a good framework for a typology of IMT policies and activities.

The classes are based on two dimensions: system size and whether a pump is used.

- **System Size** All states differentiate between large and small systems. Most irrigation professionals classify irrigation systems into three size categories based on the command area:
  - “Major systems” - those whose commands are more than 10,000 hectares.
  - “Medium systems” - those whose commands are between 10,000 and 2,000 hectares.
  - “Minor systems” - those whose commands are less than 2,000 hectares.

The specific hectarages given here are not used for this distinction in all states. For example, Tamil Nadu classifies all systems up to 5,000 hectares in size as “tank” systems which are treated as if they were equivalent to “minor” systems.

In every state, large systems, including both “major” and “medium” systems, are handled by one agency, while small systems - “minor” - systems are handled by another agency or by a separate wing of the irrigation agency. The major reason given for this distinction is that large systems have

greater need for government control for two reasons: a) they require more centralized control, and b) they often have higher technical knowledge and expertise requirements for managers. Thus these administrative distinctions correspond to differences in the support provided to the different types of systems by the state governments.

- ***Gravity versus Pump Systems*** The distinction between gravity systems and pump systems is not as generally accepted as a basic distinction by irrigation professionals as is the distinction based on size of the system. We make the distinction here because small pump systems are treated differently from small gravity systems by virtually all state government agencies.

There are two kinds of pump systems; those that lift from groundwater (“tubewells” and “ground wells”) and those that lift from rivers, reservoirs, or other surface water bodies (“lift systems”). Management of pump systems differs from management of gravity systems in that all pump systems require operation and maintenance of the pump as well as operation and maintenance of the water conveyance system. This, however, is not as distinctive as it might seem. Many gravity systems, particularly large ones, have motor-driven controls that have similar O&M requirements to pumps.

In large systems, there is little difference in management activities between pump and gravity systems. All states in India assign responsibilities for management of large pump systems to the same agency as that that handles large gravity systems. Also, the decision making processes, etc, are virtually the same. On the other hand, although responsibility for both small pump systems and small gravity systems are assigned to the same agency, they are often treated quite differently by the state governments. The reason is that agencies responsible for small irrigation systems are responsible primarily for supporting farmer management of the systems. They directly manage only a few such systems, such as state tubewells. Support for pump systems is somewhat different from support for gravity systems in that pump O&M becomes a much bigger part of total management than in large systems.

## **4. A TYPOLOGY OF IMT POLICIES AND ACTIVITIES IN LARGE SYSTEMS IN INDIA**

### **4.1 Summary of IMT Progress in Large Systems**

India has, in comparison with other countries, made very little progress in the transfer of irrigation management responsibilities from government agencies to users. However, all six states and most states in India have or are considering irrigation management transfer policies and programs for large systems. The following summarizes progress in the six sample states as of mid to late 1995:

- ***Bihar*** is divided into two very different ecological regions. The largest part of the more than 86 million Biharis (1991) live in the Eastern Gangetic Plains; the rest live in the highland regions of South Bihar. Rainfall is plentiful in most of Bihar - 1000 mm annually or more - but is heavily concentrated in the monsoon season. Irrigation in the plains area is dominated by very large systems (over 500,000 hectares each) that divert water from the rivers that flow to the Ganges. Although Bihar has a long tradition of local irrigation development (Sengupta 1991), large systems are managed by the Water Resources Department. There are also numerous small gravity and pump systems in both the plains and highlands.

Bihar is considering a policy to create water user associations (WUAs) at village and distributary channel level (up to 15,000 hectares), to transfer full O&M responsibilities for distributary channels and below to these WUAs, and to have the WUAs collect irrigation fees in return for keeping 70% of the fees collected for O&M expenditures. Bihar is not planning to change its system of allocating water to the “assured irrigation area” within each irrigation system. Bihar’s proposed policy is modelled directly on the experiment begun in 1988 at Paliganj Distributary in the Sone System (Srivastava and Brewer 1994). Bihar has not yet decided how it will implement its policy. The state is planning to complete transfer of O&M responsibilities at Paliganj and then monitor and evaluate the results after three years.

- **Haryana** is located in the Western Gangetic Plains; its 1991 population was only has about 16 million inhabitants. Haryana gets only half the rainfall that Bihar gets and is greatly dependent upon irrigation for its crops. Most irrigation is from large systems that divert water from the great rivers flowing down from the Himalayas. However, groundwater development, both public and private is important. There are no small surface systems. Legal and government irrigation arrangements are based on precedents set by the Moghul emperors and by the British government for Northwest India (Stone 1984). Large systems in the state are managed by the Irrigation Department. There are also about 1000 state tubewells managed by the Minor Irrigation Tubewell Corporation, a state government corporation.

Haryana is considering a policy to create WUAs at outlet level, to transfer full O&M responsibilities below the outlet, including maintenance now done by the state, to the WUAs, and, 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 about 10 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 form and register a WUA below the outlet. In October 1995, Haryana reported the existence of 262 outlet level WUAs in scattered locations.

- **Gujarat** is the westernmost state in India; much of its area is desert and most is quite dry although South Gujarat gets its full share of rainfall. In accordance with its varied ecology, irrigation in the state is quite varied with a wide mixture of groundwater development, small and large scale surface systems, and various types of lift systems. Gujarat’s 41 million people (1991) are known as entrepreneurs. In irrigation management, Gujarat has the reputation of being an innovator. Gujarat is presently undertaking the construction of the immense Sardar Sarovar Project to divert the waters of the Narmada River to a proposed command area of 1.8 million hectares. Large systems are managed by the Water Resources Department; the 3000 state tubewells are managed by the Gujarat Water Resources Development Corporation. Small gravity systems and small river lift systems are left to local organizations.

Gujarat has adopted a policy to create water user associations for 500 hectare blocks, to transfer full O&M responsibilities for minor and smaller channels to the WUAs, and to charge WUAs for water on the basis of the volume of water actually taken. This new system will do away with the *shejpali* requirements that farmers apply for water for particular crops each season. 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.

- **Maharashtra** is also located in Western India. Maharashtra's capital, Bombay (now Mumbai), is the business capital of India and a great deal of India's industry is based in the state. Total 1991 state population was 79 million. Rainfall varies widely with much of the state getting 500 mm or less annually. Irrigation systems are quite varied, including large surface systems, small surface systems, and large and small lift systems managed under a wide variety of arrangements. In Maharashtra, there is a long history of development and management of small private irrigation schemes. Maharashtra is one of few states in India with undeveloped irrigation potential; Maharashtra is still constructing new irrigation systems and expanding existing ones. In Maharashtra, large systems are managed by the Irrigation Department and some small gravity systems by the Minor Irrigation Wing of the Irrigation Department. Other small systems, including all groundwater systems, all small lift systems, and many small surface systems are privately managed.

Maharashtra has adopted a policy to create WUAs at minor canal level (average command of 500 hectares), to transfer O&M responsibilities for the minor and smaller channels to the WUA, to allocate water to the WUAs through 5 year agreements, and to 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 O&M functions to 75 WUAs and another 205 WUAs in the process of formation in major systems. These cover less than 1% of areas of the large systems in the state.

- **Tamil Nadu** is located at the southern tip of India. Most of Tamil Nadu's 56 million inhabitants (1991) live in the coastal plain below the Western Ghat mountains. Rainfall varies from high values in the mountains down to 500 mm or so in the plain. Much of the plain is irrigated from 39,000 tanks (small reservoirs). There is no longer any potential for new irrigation development in Tamil Nadu. Tamil Nadu has a very long history of both private development and government sponsored development of irrigation. Most of the 39,000 tanks were created by local villages, although some were sponsored by local rulers. The larger surface systems built before the mid-nineteenth centuries were all built on the initiative of local rulers. This long history means that there are several aspects of irrigation management controlled by farmers, even in government managed systems. Presently, management of all large irrigation systems (above 5000 hectares) are the responsibility of the Water Resources Organization. Smaller systems are managed by local organizations.

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. O&M responsibilities are to be fully or partially transferred 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 farmers 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 by the WUA. No consideration is being given to changing the system of water allocation by land class nor the system of collecting fees as part of the land taxes. Implementation of this policy has not yet begun. However, in June 1994, the Agricultural Engineering Department reported the formation of 3300 outlet level WUAs and 118 distributary canal level WUAs through an earlier program. However, many of these were not functioning. Also, there are a large number of WUAs spontaneously created by farmers in some large systems. For example, there are over 130 WUAs of various types in the Tambraparani System (Pundarikanthan et al 1992, Sengupta 1991).

- **Kerala** consists of the narrow strip of land between the Western Ghat mountains and the Arabian Sea on the western side of the southern tip of India. Kerala's 29 million people (1991) are squashed into this narrow strip giving it one of the highest population densities in India. Much of the state is hilly and all of it gets a great deal of rainfall, over 2000 mm for most of the state, mostly during the period from June through December each year. Irrigation has been developed primarily to supplement the rainfall and to provide water during the five months with lesser rains. Because of the high rainfall, irrigation does not have long traditions in Kerala. Irrigation systems include large systems on the major rivers, small gravity systems, and small river lift systems. There is no groundwater development. Kerala has had a relatively short history of irrigation development; irrigation development began only late in the British period. There was no unified government until after independence; the state of Kerala was created by merging seven princely states. The principles for water allocation and collection of irrigation fees have been adopted from Tamil Nadu. Large systems in the state are managed by the Irrigation Department; the 2000 small lift systems are managed by the Minor Irrigation Wing of the Irrigation Department; other systems are generally private systems managed by the farmers themselves.

Kerala adopted an IMT policy in 1986 for systems 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), and project level JMCs. O&M responsibilities are to be fully or partially transferred to these bodies but only in the 14 CAD schemes. The CAD organization in each scheme includes a Cooperative specialist who is responsible for organizing the farmers. 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 together with Irrigation Department Officers and the chairman of each canal committee (a farmer) sits on the Project Advisory Committee together 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. Not all of the WUAs are functioning. For example, in Neyyar project, although 317 WUAs were formed, only 62 reregistered with CADA in 1995 in order to get subsidized inputs. Failure of the WUA also means that the joint management committees are severely weakened because they lack farmer representatives. Many canal JMCs reportedly do not meet.

Gujarat, Maharashtra, Kerala, and Tamil Nadu are the states that have reputedly made the greatest progress in IMT in India. IMT progress in large systems in most of the other states more closely resembles the situation in Bihar or Haryana; that is, the state government is considering a policy but has not yet formulated a clear policy or plans.

While these policies and programs differ significantly in a number of ways, one can identify three common features:

- ***Water User Associations*** All state policies envision transfer of irrigation management responsibilities to water user associations (WUAs) organized on a hydrological basis rather than, say, villages.
- ***Retaining Main System Control*** All states envision retaining ownership of the large irrigation systems, retaining the state irrigation management agency and maintaining its responsibility for operations and maintenance of the upper levels of large systems.
- ***WUAs to Handle Conflict Resolution*** While conflict resolution was an important issue for some of the policies; in every case, it was assumed that the WUA would be able to resolve conflicts among its members and that the WUA would represent its members to the agency.

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

## 4.2 Classifying IMT Policies and Activities for Large Systems in India

In Section 2.2, we derived the following list of seven traits to be possibly used for classifying IMT policies and activities:

1. Persons or organizations to whom responsibilities are transferred
2. Responsibilities transferred
3. Rights and powers transferred
4. Changes in agency resource mobilization
5. Changes in resource mobilization for the private persons or organizations
6. Changes in conflict resolution institutions
7. IMT implementation means

In analysis of the policies of the six sample states, we found that we could drop “Changes in conflict resolution institutions.” As pointed out above, all states assumed that WUAs would handle conflict resolution. Table 1 succinctly summarizes the remaining six dimensions for the IMT policies adopted or under consideration in the six sample states. Inspection of this table reveals that there are four clearly distinct types represented in these six cases:

- ***The Bihar Type*** Bihar’s policy differs significantly in the type and scale of the proposed WUA organization and in system of resource mobilization from any of the others; none of the others are considering WUAs on the scale being considered in Bihar nor are any of the other states considering the direct sharing of state irrigation service fees between the farmers and the state. This proposal

offers a great increase in farmer control over water distribution within the WUA area and in allocation of resources for maintenance. The underlying vision is of a withdrawal of the agency to levels of the irrigation system they have the resources to manage effectively.

- **The Haryana Type** Haryana, unlike the other states, is proposing only an outlet level WUA. This is consistent with the *warabandi* distribution system in which water delivery to each outlet is largely automatic and is carried out on a fixed schedule defined without reference to crop needs. Also, Haryana is proposing very little transfer of responsibilities. O&M responsibilities below the outlet, except for the maintenance of certain lined watercourses, are already the collective responsibility of the farmers. Only where the state has been maintaining lined watercourses is there a change. Haryana is proposing that the outlet level WUAs collect irrigation fees as an agent for the state in return. The basic vision here is of no change in powers and responsibilities. Many officials (and farmers) in Northwest India believe that *warabandi* is a very effective water allocation and distribution system. Such officials see no value in a major change.
- **The Western India Type** Gujarat and Maharashtra are adopting virtually the same policies. A key element in this model is an increase in farmer control over water distribution within the WUA area and in farmer control over supply to the WUA area. The latter is provided by the agreement between the WUA and the agency. 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.
- **The Southern India Type** Tamil Nadu and Kerala both are using or proposing multi-tier WUA models with joint management committees 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 place for negotiation of water allocation and distribution each season and for solving problems as they arise. The vision here is of joint responsibility for management decisions. There are clear differences between the Tamil Nadu and Kerala versions of this model. In particular, the Tamil Nadu version may give more power to the farmers than does the Kerala model because the latter leaves maintenance largely in the hands of the agency. There are also key differences in the means of effecting transfer.

One can see some relations between the proposed WUA structures and the proposed irrigation management systems:

- A hierarchical organization of WUAs and JMCs as in the Southern India type is likely to be associated with water allocation by land classes and seasonal negotiation. JMCs provide a good means of carrying out needed seasonal negotiations.
- Water allocation by long term contracts as in the Western India type is likely to be associated with mid level WUAs, such as minor canal WUAs, rather than with either outlet level WUAs or with WUAs and JMCs. On the one hand, it is more effective to negotiate with fewer WUAs so mid level WUAs are to be preferred to outlet level WUAs. On the other hand, it is felt that having long term contracts obviates the need for regular negotiations over seasonal allocations that are the primary purpose of joint management committees.

- Outlet level WUAs are likely to be associated with water distribution by *warabandi*. A key element of *warabandi* is almost automatic delivery of water to the outlets; therefore most officials believe that there is no need for WUAs above the outlet level.

The other elements listed above appear to be largely independent of each other. Variations within the states are based on other factors.

Most of the explanation for the differences among the states clearly lies in the institutional and cultural background of the states. For example, both Gujarat and Maharashtra want to solve problems that exist with *shejpali* (Ballabh et al 1992); these problems do not exist in the other states since they never adopted *shejpali*. The similarities between the Southern Indian states clearly reflects cultural similarities. Bihar's drastically different proposal reflects both its cultural distance from these other states and its extreme financial straits. Haryana's virtually non-existent IMT plan reflects its general satisfaction with *warabandi*. These differences are shown most clearly in the next section which discusses the motives of state officials for adopting an IMT policy.

### 4.3 Motivations for Adopting IMT Policies for Large Systems

Irrigation management transfer policies are not created in a vacuum. The various interest groups involved are concerned with the benefits and difficulties that irrigation management transfer is likely to bring. We will distinguish four such groups: high level state irrigation officials, middle and lower level state irrigation officials, other state officials and respected persons from non-government organizations (NGOs), and farmers. From discussions with state officials and others, we identified the following benefits expected from IMT for each of the sample states:

- **Bihar** is the poorest state in India; the government has a financial crisis and government departments cannot fund their activities. As a result, Bihar's government managed irrigation systems are in very bad condition and are deteriorating rapidly. Along with raising irrigation fees, state irrigation officials and other officials see IMT as the only way that the systems can be sustained. Farmers have lost faith in the state government's ability to maintain the systems. Those who have been exposed to transfer ideas and plans also feel that IMT is the only answer.
- Irrigation officers in **Haryana** see IMT as potentially helping to solve two problems in large systems. First, the state government will be able to cease maintenance below the outlet which is being done contrary to its own policies. Second, transfer of irrigation fee collection to WUAs is expected to raise the collection rate. However, many irrigation specialists in Haryana are skeptical about the transfer policy. On the one hand, they point out that the policy offers no real incentives to farmers. On the other hand, they are afraid that it will interfere with the present *warabandi* management system which they believe is very effective.
- **Gujarat** has multiple reasons for adopting IMT. State officials concerned with finance see transfer as a way to reduce costs to the state and to raise the rate of recovery of irrigation fees. Water Resources Department officials see a benefit in ending the labor intensive *shejpali* system. Many believe that it will raise the efficiency of water use, particularly important in the water short systems in the drier part of Gujarat. Others see IMT as a way to improve agricultural productivity and raise farmer incomes.



- In *Maharashtra*, irrigation officials assert that the primary concern is to improve water use efficiency, a major concern in Maharashtra where most large systems serve only a fraction of the planned command. Irrigation officials explicitly deny that cost reduction is a goal and point out that industrial taxes cover most of the state's revenue needs. Improved productivity is also mentioned as a benefit as is reduced work because of elimination of *shejjali*. High level officials outside of irrigation show skepticism about the benefits from IMT; one high official denied that there was a transfer program in the state and also claimed that if it existed it would not work. While some middle level irrigation officials showed enthusiasm, discussions with some lower level officers indicated possible opposition to transfer. One man, displaced from his job by IMT, claimed that he lost about Rs 100,000 per year that he used to get from farmers.
- In *Tamil Nadu*, maintenance of irrigation systems in a situation of tight funds is considered the primary problem by high level irrigation officials. The primary benefit expected from IMT is improved maintenance. Discussions with middle and lower level irrigation officials indicated ignorance of transfer concepts or, in some cases, strong opposition. Agricultural officials, including officials in the Agricultural Engineering Department which carried out a large farmer organization program in irrigation systems, stated that improved water distribution within the WUA managed area and consequent improved productivity are the primary expected benefits.
- In *Kerala*, IMT is primarily an outcome of the Command Area Development program of the Government of India (see below) that suggested that IMT would help improve water distribution. At one level this is considered important because Kerala has been strongly criticized for failure to irrigate major portions of constructed commands. On another level, however, officials and some farmers point out that, because of Kerala's high rainfall, irrigation is not as important as in some other states. Today, many irrigation officials see no benefit to IMT.

Discussions revealed that outside forces were at least as important as internal forces. The two major outside forces we found were:

- ***The Government of India Command Area Development Program*** The Government of India CAD Program has been advocating greater farmer involvement in management in large systems since the 1970's. Beginning in the mid 1980's, it began offering explicit recommendations about how to organize farmers to achieve such involvement. At the same time, the program began offering funds to undertake some activities. These funds have been extremely important in some states. Kerala adopted an irrigation management transfer policy specifically and exclusively as a part of its Command Area Development program. Similarly, a large effort was made from 1989 to 1994 by the Agricultural Engineering Department in Tamil Nadu as part of the Command Area Development program. CAD funds have also been used to help the program in Maharashtra.
- ***International Donors*** International donors have exerted pressure on some states to adopt IMT policies and programs as conditions for granting funds for specific projects. The immediate reason that the state governments adopted IMT policies in Haryana and in Tamil Nadu was satisfying the World Bank in order to get funds for the Water Resources Consolidation Projects in those states. Similar responses to donor pressure can be seen in the cases of other types of systems as well. In Tamil Nadu, the current transfer policy for small tanks was created primarily in response to demands from the European Union funded Tank Modernization Project. The USAID funded Maharashtra Minor Irrigation Project

influenced policies on small tank systems in that state. Bihar and Haryana adopted their small lift systems transfer policies partly in response to World Bank advice.

These observations suggest that outside finance has been very important. It is not clear how important outside advice has been. For example, in Tamil Nadu, there are numerous examples of spontaneously created farmer organizations playing an important part in the management of large systems; also, the Agricultural Engineering Department organized a very large number of farmer organizations for participatory management in large irrigation systems between 1989 and 1994. Yet until the World Bank demanded adoption of IMT as a condition for a loan, the Tamil Nadu Public Works Department did not seriously consider adopting irrigation management transfer. Similarly, in Kerala, although transfer policies were adopted for Command Area Development schemes when the program began in 1986, they have never been adopted for other schemes.

#### **4.4 Applicability of the Typology to Other State Policies and Programs in India**

Although the IIMI/IIMA team did not carry out the study in states other than the six sample states; there is some published information about present IMT policies for other states, including Andhra Pradesh, Madhya Pradesh, and Orissa (MOWR 1995). The same source has information on experiments in Goa, Karnataka, Rajasthan, and West Bengal. Of these, neither Karnataka nor Rajasthan has as yet formulated a policy. West Bengal has a policy and program on state tubewells but not for large systems, and the information on Goa does not make it clear whether there is a state policy.

This information is far less rich than the information for the six sample states; however, it is worth trying to use the typology to classify the policies for the Andhra Pradesh, Madhya Pradesh, and Orissa. The information is summarized in Table 2.

Inspection of this table suggests that the Andhra Pradesh and Madhya Pradesh policies are versions of the Western India Type. Both base their WUAs at the minor canal level and have no higher level WUAs.

They differ from Maharashtra and Gujarat in that they do not propose volumetric fees. Both the similarities and differences should not be surprising. Both Andhra Pradesh and Madhya Pradesh border on Maharashtra and Madhya Pradesh also borders on Gujarat. However, neither adopted *shejpal* as their irrigation management system so they do not feel the immediate need to switch basic irrigation management systems.

The Orissa case is a variant of the Southern India Type. It has a three tier hierarchy with a system level joint management committee at the top like both Kerala and Tamil Nadu. Like those states, irrigation in Orissa is largely used for rice cultivation for which seasonal negotiation is a useful practice. The surprising thing is that Orissa's policy is not more similar to that proposed in neighboring Bihar. This is perhaps due to the fact that Orissa does not face the financial problems of Bihar and because in Orissa, as in Tamil Nadu, IMT is associated with a World Bank funded Water Resources Consolidation Project.

#### **5. CONCLUSION**

The approach taken to classification of IMT policies and activities taken here provides a basis for differentiating among state IMT policies for large systems in India. Although we have not tried to

demonstrate it here, the same approach works for small gravity systems and small pump systems in India as well. We feel that the resulting typology captures the key elements of variation in IMT policies in India. Certainly the Western India and Southern India types are clearly recognizable types. Some may argue that the Haryana Type should not be considered an IMT policy because it proposes so little change. Also, the Bihar Type has not yet been fully tried, even in one site.

Whether the resulting typology is adequate depends, of course, on the purpose to which it is put. However, we suggest the findings that the types are clearly related to certain cultural and historical factors in the states shows that the types themselves are of use in analyzing Indian policies.

We suggest that the approach taken here can be extended to IMT policies in other and far different places. The reasoning that led to the identification of seven basic dimensions is general and applies to all IMT policies and activities anywhere. The resulting typologies may not look very similar to that we developed for large systems in India, but they should be equally useful as shorthand descriptions of the policies and activities.

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Table 1: IMT Policies for Large Systems in the Six 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 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 <i>warabandi</i> )	- 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 <i>shejpali</i> ) 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 <i>shejpali</i> ) 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 one-time matching funds WUAs may demand labor from farmers	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 land 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 WUAs - Canal lining below outlet provided through WUAs - Cooperative Officer to organize WUAs

Source: IIMI/IIMA study.

Table 2: IMT Policies for Large Systems in Other States

State	WUA Organization	Transferred Responsibilities	Changes in Rights and Powers	WUA Resource Mobilization	Changes in Agency Resource Mobilization	Transfer Means
Andhra Pradesh	Minor level WUAs (400-750 ha units)	- O&M within the WUA area	Farmers gain power over distribution within WUA area.	WUAs may collect fees and demand labor from farmers	NOT SPECIFIED	NOT FULLY SPECIFIED - System repairs provided in cooperation with WUAs
Madhya Pradesh	Minor canal (up to 15 cusecs) level WUA	- O&M within WUA area - Collection of govt irrigation fee	Farmers gain power over distribution and maintenance expenditures within WUA area	- Administrative fee for govt fees collection and commission on fees collected to be given to WUA - WUA may raise own funds - Normal maintenance funds to be spent through WUA	NOT SPECIFIED	NOT SPECIFIED
Orissa	Three tiers: outlet WUA, WUA at the minor level (300-600 ha unit), and system level JMC	- O&M within the WUA area - Advise on system level operations through JMC - Collection of govt irrigation fee	Farmers may gain voice through an agreement between WUA and the agency; and through the JMC	- WUAs may collect fees and demand labor from farmers - State to help set up WUA O&M fund	NOT SPECIFIED	- Agency officers to organize - System repairs provided in cooperation with WUAs

Source: MOWR 1995