

Participatory Irrigation Management: Benefits and Second Generation Problems

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ACRONYMS AND DEFINITIONS

agency	A public-sector organization which develops and/or manages irrigation systems
association	An association of irrigation users
CIAT	Centro Interacional de Agricultura Tropical
CIS	Communal Irrigation System (Philippines)
CNA	Commission Nacional del Agua (National Water Commission) (Mexico)
CO	Community Organizers (Philippines)
DSI	Devlet Su Isleri (National Hydrologic Department) (Turkey)
WBI	World Bank Institute (World Bank)
federation	An apex level body established by a group of irrigation associations to support them and to represent their interests
FIO	Farmer Irrigation Organizer (Philippines)
DGI	Departamento General de Irrigacion
IA	Irrigation Association or association
ID	Irrigation District
IDB	Inter-American Development Bank
IDO	Irrigation District Organizer (Philippines)
IIMI	International Irrigation Management Institute
IMT	Irrigation Management Transfer
IMTA	Instituto Mexicano de Tecnologia del Agua
INAT	Instituto Nacional de Adecuacion de Tierras (National Institute for Land Reclamation) (Colombia)
IO	Institutional Organizer (Philippines)
ISF	Irrigation Service Fee
M&I	Municipal and Industrial
NIA	National Irrigation Agency (Philippines)
NIS	National Irrigation System (Philippines)
O&M	Operation and Maintenance
PIM	Participatory Irrigation Management
WB	World Bank

1. INTRODUCTION

Participation in irrigation management by water users can take a wide variety of forms. Farmers can be involved in various system management functions, including, planning, design, operations, maintenance, rehabilitation, resource mobilization, and conflict resolution. Moreover they can be involved in these functions at various system levels; from the field channel to the entire system.

Almost all irrigation systems have some involvement by water users in system management. When people speak of introducing "Participatory Irrigation Management" (PIM), they are thus usually referring to a change in the level, mode, or intensity of such participation that would increase farmer responsibility and authority in management processes.

Irrigation Management Transfer (IMT) is a more specialized term which refers to a process of shifting a number of basic irrigation management functions from a public agency to a private sector entity, a non-government organization (NGO), a local government, or to a local-level organization with farmers at its base. The most common form of IMT involves the shifting of management responsibility from a centralized government irrigation agency to a financially-autonomous local-level non-profit organization which is either controlled by the water users of the irrigation system or in which water users have a substantial voice in the control process.

The changes in management reported in the five primary case studies on which this paper is based can all be considered forms of IMT. However, there is an important difference between the organizational form of the recipient organization employed in the Philippines, on the one hand, and the form employed in the other four cases (Mexico, Turkey, Colombia, and Argentina). In the Philippines, the primary management unit employed is "community-based" and results from an intensive grass-roots organizational campaign involving hired community organizers. This primary management unit is fairly small (less than 100 hectares), relies primarily on voluntary labor in carrying out its functions, and the most important relationships among members of the unit are social. In the other four cases, the organizational form of the irrigation systems can be termed an Irrigation Districts (ID). Irrigation Districts are typically larger (several thousand hectares), rely principally on paid employees to perform its functions, and link farmer-members together mainly through ties of economic self-interest. This and other key features of the five primary cases are shown in Table 1.

Issues are analyzed in this paper using a set of three basic categories: (1) the processes used to introduce programs of IMT; (2) the impacts of the introduction of a program of IMT; and (3) second generation problems and possible solutions. The remainder of the paper is structured around these three categories.

Table 1. Features of PIM Case Studies

		Mexico	Argentina	Colombia	Philippines
Type of first-level	District	District	District	District	Community-based
Beginning year of program:	1993	1989	1984	1976	1976 ¹
Implementing agency:	DSI	CNA	DGI	INAT and IAs	NIA
Special law on transfer	No	Yes	No	No	Yes
Total area of government	1,467,000	3,300,000	360,000	315,125	
Share of area covered by	61%	90%	100%	64%	90%
Number of levels of local	1	2	3	1	2
Average size of 1 st level local mgt	6,500	7,900	3,000	12,500	
Average size of 2 nd level local	-	107,000	20,000	-	275
Average size of 3 rd level local	-	-	90,000	-	-
Number of staff/100 Ha (IA)	na	0.2	0.19	0.8	1.8 (vol)
Average irrigation service	25	40	70??	52	77

Fee base	Area/crop	Area/crop	Area	Area/crop ³	Area/crop/source
Share of fee assessment	72+%	92%	70% ⁴	76%	58%
Share of O&M cost supported by	most	85%	12%	52%	46%
Facilities ownership	Govt	Govt	Govt	Govt	Govt
Maintenance equipment	No	Yes	Yes	Yes	No
Transition phase of shared	Yes	Yes	Yes	No	Yes
National Association of	No	Yes	No	Yes	No
Farmers can refuse transfer	No	Yes	No	no	Yes

¹ Communal Irrigation Systems

² National Irrigation Systems

³ Fixed plus volumetric fee schedule in pump schemes

⁴ Recovered by DGI

The term "second generation" requires some explanation. Transferring substantial management authority to a locally-based organization is a complicated undertaking and may involve changes in national policy, regulations, and organizational structures; creation of new organizations at the local level; transference of equipment ownership; and changes in personnel, in addition to the shifting of management functions to the new managers. Any undertaking this complex, in addition to solving problems, will almost certainly create new problems which did not exist before or were not previously evident. An example might be inadequate technical capability of new irrigation field personnel. These problems are here termed "second generation problems." In addition, there may be situations, such as low agricultural productivity, which were present prior to the transfer, but which were not acute problems when irrigation fees were low or non-existent. For our purposes, these are also included in the category of second generation problems. Some second generation problems may be a result of faulty processes used to introduce the new management system. Some may be a result of conscious choices during implementation to defer consideration of certain potential problems in the interests of accelerating program coverage. Others may be virtually unavoidable, though the ability to anticipate major problems in advance should allow corrective measures to be put into place earlier than would be otherwise possible.

In this paper, problems are analyzed from several different perspectives -- that of the water user, the irrigation association, the irrigation agency, and the government. In terms of these perspectives, a change, such as increased irrigation service fees, may constitute a problem for water users, but a benefit for the irrigation association and perhaps the government, if it reduces government subsidies.

The term "impacts" also requires some explanation. In general, impacts can be either positive or negative. When they are positive, they are "benefits," or "positive benefits." When they are negative, they are similar to what are called second generation problems here. In the paper, negative impacts will be noted in the discussion of impacts, but will be discussed in more detail in the following section on second generation problems.

2. PROCESS OF INTRODUCING NEW FORMS OF PIM

BACKGROUND CONDITIONS

Considering the case studies as well as PIM programs in other countries, key background conditions leading to the turnover process include:

- national budgetary crisis

- top level political will to place irrigated agriculture on a sound economic footing
- progressive deterioration of irrigation infrastructure due to deferred maintenance

Only in one case (Colombia) of those reported at the workshop was it the farmers who initiated the process. At the irrigation systems level, another set of conditions that must be taken into consideration include:

- physical condition of hydraulic network;
- the social, political and economic conditions; and
- water availability.

Political will at the highest level of the government was a main component in Mexico's IMT program. In 1989, with a new administration in office, comprehensive water management was recognized as a top priority issue, the National Water Commission (CNA) was created and a national policy on privatization took off. In Colombia it was the National Planning Department who in 1991 submitted the Land Reclamation Program 1991-2000. In Turkey, a budgetary crisis led to a squeeze on financial allocations to the state water resources agency (DSI) provided the initial impetus. In Argentina, a program to modernize the entire economy, which began in 1990 with the privatization of large electricity utilities, led to the turnover of water management to the provinces. In the Philippines the NIA embarked on an ambitious program in 1974 to increase rice production. A provision of this policy was for subsidies for the O&M of systems to be gradually phased out over a five year period at which time NIA would be directly dependent on collections from farmers for its O&M expenses.

The hydraulic infrastructure should be in fair condition and an affordable and reliable water supply should be available most of the time. Being in fair conditions means the hydraulic infrastructure is in operating conditions capable of delivering water to farms in sufficient amount to satisfy crop needs and in a timely manner. Surface drainage of surplus water and salinity should not be limiting factors. If these basic conditions are not satisfied, then a rehabilitation plan should be considered.

In Mexico, although the irrigation districts had suffered considerable deferred maintenance, the IMT program took off quickly because all of the systems were performing satisfactorily at the outset, with water conveyance efficiencies at main and secondary canal levels on the order of 60%.

The readiness of users to assume management responsibilities has to do with political and social factors. For example, it seems clear water users from Saldana and Coello in Colombia were "ready" in 1976 when they asked their government to turn over the administration of their districts to them. Due to its political background and social context it is apparent that Argentinean farmers were also ready for the change. In Turkey, farmers were used to a tradition of strong central government and many, especially the early adopters, were market oriented producers. This made them somewhat receptive to government declarations of the necessity of the transfer of managerial and financial responsibility.

In most districts of Mexico, however, this was not the case. In the first place there was the land tenure issue. After the 1910 Revolution land was divided between two types of small farmers, *ejidatarios*, who worked small plots of land held communally, and small landowners, some of whom belonged to the *hacendados* or landlords' elite. Second, there were numerous voracious, government controlled *ejido* leaders who, when consulted about the coming change, voted against it suspecting that the change would mean a reduction of their present status. Promotional aspects of IMT in Mexico country were vital in order to overcome these difficulties.

NATIONAL POLICIES

National policies for IMT implementation vary both in regard to objectives and scope. Under the Philippines Water Code of 1976, the appropriation of waters by an irrigator association has priority over requests of individuals. The government then helped farmers organize themselves into irrigator associations which enter into various types of contracts with the NIA to handle O&M of the system.

In Turkey the General Directorate of State Hydraulics (DSI) is the main executive agency of the Government for the country's overall water resources planning, execution and operation. It was established in 1954 and is part of the Ministry of Energy and Natural Resources. Since the early 1960s, DSI has had a program to transfer O&M responsibility for secondary and tertiary distribution networks to IAs. Under the program IAs entered into contracts with DSI to take administrative responsibility for tasks such as collecting and submitting farmer water demand application forms to DSI, managing water distribution below the secondary canal, and cleaning and minor repair of canals and other small hydraulic structures. Although existing municipality law appears to be providing a workable initial basis for the formation of IAs, their further development and evolution may require a law specifically for IAs.

In Argentina the country is a federal entity divided into 23 provinces, which are autonomous in all aspects related to water (rights, granting, duration, taxation, etc.). IMT programs began in 1990 as a response to pressure from the national government to reduce bureaucracy and render public administration more efficient.

In Mexico the 1989 presidential decree that created CNA also granted the agency the responsibility to: (a) define the country's water policies and (b) allocate water to users through licenses and permits. The new policy:

- Created autonomous and self-financing and water utilities to provide water services in cities and in irrigation districts,

- Encouraged water re-use and water quality conservation, and
- Promoted a new water culture based on the efficient use of the resource.

In Colombia the policy of IMT is part of a larger shift in Agricultural Policy towards minimizing state subsidies and regulation. However the state continues to play a major role in land reclamation, and rehabilitation and expansion of irrigation areas.

Irrigation Service Fees

In the case of Mexico, the IMT program was part of a series of changes in the economy including reductions in subsidies for agricultural credit and inputs, elimination of guaranteed support prices for the major agricultural crops, and increases in energy and fuel prices. Transfer of O&M responsibility for the irrigation districts, leading to users paying the real cost of irrigation water, was seen as just another step in the liberalization of the economy.

In a similar fashion, in the case of the Philippines, a 1974 Presidential Decree authorized the National Irrigation Agency (NIA) to delegate partial or full management of irrigation systems to duly organized associations. Under this decree, NIA was allowed to keep all irrigation service fees, with government subsidies for O&M expenses gradually phased out over 5-years. Thus, at the end of this period NIA was to be directly dependent on ISF collections from farmers for O&M expenses.

The financial aspects of IMT in Turkey are similar to Mexico in that the policy is designed to shift the burden of O&M costs from the government to the users. However, the government continues to subsidize maintenance, which is not the case in Mexico and the Philippines. Colombia has also shifted the financial burden of O&M to the users, while irrigation schemes in Argentina are under joint management with fee collection by both the government and the IAs.

Water Laws

National water laws that clearly specify the rights of the IAs and the individual users appear to be an important factor in successful management transfer. Without such rights, the IAs are extremely vulnerable to increased demands from other more powerful users, such as industry and municipalities.

Beginning in 1976, the Philippines, attempted to develop a water rights register of all water rights in the country, including specifying in volumetric form the water rights of the national and communal irrigation systems. As part of the registration process all IAs must register their water rights. Once legally registered, water rights cannot be withdrawn except for failure to use them as stipulated in the law.

This system can be contrasted to that of Mexico where the IAs are given a limited concession to use the irrigation infrastructure and the associated water supply, but do not have a clearly specified legal right to a volumetric supply. With domestic supply having priority, the IAs are not ensured a constant water supply over time. The concessions are also for a fixed time frame (20-30 years) after which they can theoretically be reassigned to another user. Since none of the concessions have expired to date, it is unclear exactly what process will be used to determine granting of a second concession.

The country where IAs appear to be most vulnerable to changing water demands is Turkey, where water is controlled by DSI and the individual associations have no water rights. This system works in areas where there is little competition for water but leaves the associations extremely vulnerable in areas where municipal & industrial use is expanding rapidly. Colombia is somewhere in between these two situations but still is highly dependent upon the national irrigation agency, as the country has yet to establish a legal water rights system.

THE MODE OF IMPLEMENTING PIM

The process of implementing a change to a more participatory type management system varies widely from the bottom-up approach used in the Philippines to the more top-down approach used in Turkey and Mexico.

In promoting the PIM process, Colombia has invested much less time and effort than the other countries. As a consequence, the process of transfer was very quick but there have been second generation problems. Users have been less well informed and have been uncertain about their rights with respect to ownership and changes in management practices. As a number of the irrigation systems in Colombia are based on river pumping, some of the more recent cases of transfer have involved additional negotiations with respect to energy subsidies.

Argentina has used information meetings and word-of-mouth to make a rapid transition to PIM, while Mexico and Turkey have used more structured informational meetings with users. These two countries also invested heavily in training their own staff. In Mexico, audio-visual materials prepared by IMTA and outside firms were used to persuade users that IMT was a positive change.

The Philippines has used the slowest process with intensive use of institutional development officers and farmer organizers (FOs) to serve as catalysts. These organizers lived in the villages and organized exchanges between NIA and the users. However, NIA has now realized that too much dependence upon FOs has slowed the process and has now reduced significantly the number of FOs.

In terms of transferring responsibility, most of the Colombia IAs appear to have had very little say in the process. However, this has changed somewhat as more recently the IAs have been negotiating energy subsidies and insisting upon rehabilitation prior to transfer. In the Philippines there has been more dialogue through the organizers but given that only limited transfer of responsibility has taken place, this approach has not achieved rapid transfer of responsibility to the users. In contrast, both in Turkey and in Mexico there have been very active negotiations concerning transfer terms. As a result the IAs have been able to exert some power and develop a

partnership with the agency based on a meeting of equals. In a number of cases they have also been able to ensure that critical investments were made prior to transfer.

As a key stage of the transfer process, Mexico, Colombia and Turkey have adopted a phase of shared management between the agency and the IAs during the transition. The duration of this shared management phase varies by country and by district but is usually between 6-12 months. In contrast, in Argentina the systems were transferred much more quickly, while in the Philippines there has been a very gradual shift in responsibility, in some cases over a period of many years.

TYPE/NATURE OF IA

The type and nature of the IAs are directly related to the structure of the economy as well as the type of irrigation found in the countries. In Mexico, Japan, Taiwan, Turkey, Argentina and Colombia, the IAs are larger (2,000-50,000 ha) and are organized more along the lines of commercial entities, reflecting the more commercial nature of the irrigated sector. Agriculture is developed on a cash basis and many of the staff are hired professionals paid in cash from the ISF. Given their large size, the IAs can afford to purchase and maintain their own transport and maintenance equipment.

In contrast, IAs in the Philippines are very small (100-300 ha) and are often organized based on the village structure. Most of the labor is voluntary labor provided by the users, and very few, if any, of the irrigation staff are hired professionals. Given the small size of the IAs there are diseconomies of scale and hence the organizations cannot afford to own specialized maintenance equipment. In the Philippines, irrigation service fees are usually paid in grain and therefore are very awkward to store and transport and typically result in 10-15% losses due to damage during storage and transport.

In Argentina, IAs are public NGOs with full legal authority, including the power to tax. The IAs in the other countries have a limited power to establish and collect ISFs but do not have any other local taxation powers and therefore the majority of their income is from ISFs.

3. IMPACTS AND BENEFITS OF TRANSFER

Implementing a program of management transfer is a complicated undertaking which involves incurring costs and affecting the lives and livelihoods of many people. It is thus not desirable to enter into such a program unless the benefits of the changes are positive and significant. Impacts, of course, may be either positive or negative, and they can be either qualitative or quantitative. And because the change in management patterns will usually occur simultaneously with other changes in physical, economic, and social conditions, it may be difficult to separate the effects caused by management changes from those caused by other factors.

As a starting point, a number of potential positive and negative impacts of a program of irrigation management transfer (IMT) are shown in Table 2. Generally only some of these will be present in a given case. Note that some impacts are shown in both positive and negative columns, indicating that an overall evaluation is far from simple.

The nature of the impacts which occur will be shaped by the social, political, and economic characteristics of the countries involved. Impacts are also conditioned by the perspective from which they are viewed. Important perspectives in this case include those of water users, the associations they have already created, the irrigation agency and the national or state government under whose overall control these systems operate. What is positive from one perspective might be negative for another. Judgment is thus required in evaluating the overall impact of a program, and the tradeoffs in positive and negative benefits among the various groups affected.

The following sections discusses impacts in terms of legal and organizational factors and operational procedures.

LEGAL AND ORGANIZATIONAL IMPACTS

Some of the countries first build on a new national water Law before moving into a transfer program (Mexico, the Philippines and Colombia). Others move into transfer supported only by old national laws (Turkey) or local laws (Argentina). There has been a lot of discussion on the issue of water rights from the perspective of ownership versus concession. In most of the countries, all water belongs to the governments, either at federal or provincial levels. Irrigation Districts were usually created based on constitutional mandates that clearly defined the system's physical limits and thus the water right implicit to it. In some countries such as Argentina, however, the right of individual appropriation takes legal precedence.

After turnover, irrigation associations (IAs) in some countries receive the concessions which give them access to collective water rights. This does not change the existing system of water rights and priorities. In other countries, systems of water rights allocation and protection are virtually non-existent, which can lead to serious second-generation problems. In most of the case study countries, agricultural uses are subordinate to municipal uses, which include domestic and industrial use.

Table 2. Potential impacts of IMT

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Positive Impacts	Negative Impacts
Sense of ownership	Higher costs
Increased transparency of processes	More time and effort required to manage
Greater accessibility to system personnel	Less disaster assistance
Improved maintenance	No assured rehabilitation assistance
Improved irrigation service	Less secure water right
Reduced conflicts among users	Decreased agricultural productivity
Increased agricultural productivity	

Positive Impacts	Negative Impacts
Reduced costs to government	Less direct control over cropping patterns
Greater farmer satisfaction	Need to reduce staff levels, sometimes over union opposition
Reduced civil service staffing levels	Reduced ability to implement new agricultural policies through the irrigation agency
Reduced costs to the economy (greater economic efficiency)	

Positive Impacts	Negative Impacts
Fewer conflicts to deal with	Reduced bureaucratic and political influence
Reduced operational involvement	Uncertainty over agency role

New responsibilities	Reduced opportunity for rent seeking
Reduced opportunity for rent seeking	Reduced control over water resources
Reduced political interference	

SENSE OF OWNERSHIP

The formation of IAs generally creates a stronger sense of ownership of the system on the part of users. In Japan, the Philippines, Colombia, and Argentina (Mendoza) this has been the case for many years. In Mexico and Turkey this change has taken place more recently and has been an exhilarating sense of pride for some users. Even though actual ownership of system facilities remains with the government. In Colombia some consideration is being given to transferring actual facilities ownership to IAs, an idea supported by some INAT staff and IA officers. This idea has also been discussed in the Philippines. There are a number of problems with this step, including loss of the right of eminent domain which is held by governments only and allows land condemnation for system expansion, and increased exposure to liability for accident and injury on the part of the IAs. Such a move may also weaken an IA's claim on public assistance for rehabilitation and emergency repairs.

A sense of ownership is also enhanced because users now have a greater voice in selecting the governance of their system, normally by electing boards of directors through the IA general assembly. With leaders elected in a democratic manner, needs can be expressed more readily. The opposite situation is presently occurring in Taiwan, where the users are turning systems back to the government. This is a result of the declining importance of agriculture in the Taiwanese economy and the high costs of system O&M which cannot be sustained by many IAs.

Transparency

All of the countries report that their transferred irrigation districts are now managed with more transparency, meaning by this that major decisions are exposed to the association's members or their representatives through board of directors and general assembly meetings. In Mexico, a representative assembly, formed by delegates selected by the general assembly takes routine decisions without summoning the general assembly, which may be composed of hundreds or even thousands of users. In Turkey a similar body made up of 30 to 70 local government officials and farmers also serves as a general assembly.

Transparency may be even more important in financial accounting than in organizational politics. Before transfer, the government collected fees and was generally supposed to invest the fees back into the system where they had been collected. However, due to bureaucratic procedures collected fees were not necessarily applied in the same systems where they originated. This resulted in complaints by users, and the agency was seldom forthcoming with information on financial accounts relative to particular systems. With associations collecting and managing funds, and with accounting done on the basis of the unit managed by the IA, users can get a better understanding of how their money is being used. However, strict supervision and auditing of water fee collection and expenditures by an outside party is still necessary to counter the possibility of money being diverted for unauthorized purposes.

Where the transferred units do not include an entire hydrologic unit, it may be more difficult for users to develop a sense of the disposition of the fees collected from them due to sub-division of responsibilities among a number of IAs. In this case, accounts should separate out the portion of fee collections that are earmarked for O&M within the IA unit, and the portion allocated to higher level O&M. An alternative might be for the IAs to merge into a larger unit. However there a number of other factors to consider before advocating such a step.

Water fees increase

Usually one of the immediate effects of IMT is an increase in water fees at the irrigation district level. In some countries the increase can be very dramatic, on the order of 100% to 200% or more (Mexico, Turkey). However to make a valid comparison, fee rates must be put in constant value terms before being compared. Irrigation service costs are generally considered appropriate if they constitute 5% to 8% of total production costs. In most countries, even after transfer, they tend to fall into this range. In the case of small holding sizes and lower value crops, however, the gross margin retained by farm households is also a relevant factor, and where this is already small, a doubling or tripling of ISF can create hardships for small farmers and their households.

A proposed increment in ISF may also have a negative psychological impact on water users that have come to expect heavily subsidized irrigation service. This kind of attitude may be gradually changed with promotion activities before transfer takes place and, of course, with efficient financial management and better service once the association is formed.

As can be seen in Table 1, ISF collection rates are above 50% in all five countries currently implementing IMT activities, and are above 70% in four of the five. However, in looking at the share of O&M costs covered by ISF collections, the picture is a bit different. For example, before transfer in Mexico, the ISF collection rate was

around 100%, but this amount covered only 25% of O&M costs. After transfer, the ISF collection rate is still 100% in transferred districts, but fees now cover close to 90% of O&M expenses. In order for transferred schemes to be financially self-reliant, they must achieve high rates of fee collection as well as having an ISF that covers O&M costs.

Subsidies

From the government's perspective, an increase in O&M cost recovery normally means a reduction of subsidies. By subsidy we define here any kind of costs associated with the provision of irrigation services that the farmers should be paying instead of the government. Expenditures within an ID are usually related to:

- O&M costs plus overheads,
- acquisition of premises,
- purchasing machinery and equipment,
- rehabilitation and/or modernization,
- technical assistance and training, and
- emergencies

O&M plus overheads refer to expenses related to the daily administration of the system from the headworks down through the tertiaries. These expenses have to be paid in full, either by the government, the users, or a combination of both if a system is to be sustainable. The sharing of costs between the government and IAs ranges from 40/60 to nearly 0/100, as is the case with Mexico.

Acquisition of premises refers to the land and buildings IAs use as they provide service to farmers. In Mexico CNA initially provided premises to IAs as part of the concessions. After six years of turnover though, some associations have purchased their own offices, which they often refer to with pride.

Providing machinery and equipment to IAs has been a key component of transfer programs in Colombia and Mexico. In other countries, like Turkey and the Philippines, machines are still under the control of the irrigation agency. In Mexico equipment provision was heavily subsidized by the government to encourage farmers to participate in the IMT program. Many of the machines given in concession to IAs were old and the government had to subsidize repairs. Other machines were purchased under a World Bank loan. As lowering of maintenance costs was a concern for both government and users, emphasis was put on the purchase of light machines to substitute for the heavy construction equipment which had traditionally been used in the ID by CNA.

Rehabilitation and/or modernization of hydraulic infrastructure is also a key issue for all countries involved in IMT programs. Although farmers usually ask for investments of this kind to be made before turnover takes place, governments are often unwilling to supply the necessary resources to fulfill these requests. Turkey is an exception to this rule, where rehabilitation was not an integral part of the IMT program. In some cases countries use international loan funds for this purpose, enabling the government to negotiate with farmers the amount of needed investment and/or the financial share that users will need to contribute. Costs are often shared between the government and IAs on a 50/50 basis (e. g., Mexico).

Support for technical assistance and training may also be subsidized through IMT programs. In Mexico, technical training for both IAs and government irrigation district staff, has been provided by CNA with assistance from the Mexican Institute for Water Technology (IMTA). More recently, starting in 1995, some IAs have signed private agreements with IMTA in which technical assistance is being provided on specific projects with a limited subsidy from the CNA. In the Philippines, promotional and technical support to farmers is regularly provided by the government through various types of community organizers. In Turkey, extensive training for agency field staff and farmer leaders was provided by the irrigation agency. Yet, in all countries the training needs for PIM programs by far exceeds current investments in training.

Subsidies are also normally available in the case of emergencies situations. Although little specific information on this is available, all of the countries recognize the need of governmental intervention when such cases do arise, e. g., hurricanes in Mexico or typhoons in the Philippines. Water scarcity also creates emergency situations for transferred IDs. For example, during the 1995-96 irrigation season, an extraordinary drought took place in northern Mexico. Due to the lack of water, IAs did not have water to deliver to farmers; consequently, and collection of fees dropped nearly to zero. For many of the IAs the government had to step in with 100% subsidy programs to avoid a collapse of the associations. A few IAs that were only partially affected by the drought tackled the problem by hastily imposing a compensation fee on their farmers to implement a water reuse program.

IMPACTS ON OPERATIONAL PROCEDURES

It is expected that a shift to participatory local management will improve the effectiveness and efficiency of water delivery as well as the quality of maintenance. The case studies provided some details to document these impacts but there is still a need to obtain better information about the operational impacts of IMT.

Improved maintenance programs

One of the immediate consequences of IMT programs is that irrigation systems have improved maintenance programs. (Colombia, as recently reported, seems to be an exception). A recent study carried out in 1994 in

Mexico by the Colegio de Post-Graduados reported that 84% of the sample users believed maintenance had improved substantially since IAs have been in charge of O&M. In some areas not only have IAs completely eliminated the problem of deferred maintenance, but are also now putting surplus money from O&M activities into programs for the modernization of hydraulic infrastructure.

Improved services

Although few specific studies on quality of services after IMT exist, the general impression is that, after turnover, services have substantially improved in regard to timeliness, reliability, and equity of water distribution. There are many reasons to believe this. In the first place, after turnover users usually have better access to the irrigation service provider. Compared with the relationship with the agency that existed before, the farmer-association relationship is much better in terms of distance, personal contact and feedback on complaints. Water conflicts among farmers also tend to be minimized because farmers usually search for solutions to their problems at the IA level which is physically closer to them. There is also a degree of self-control prevalent, as the users know each other very well and are therefore able to regulate behavior among themselves.

In a 1994 study of IAs in Mexico, 84% of the users indicated that water distribution had improved since turnover, 79% said they were receiving enough water, 79% were also receiving water in time, and 64% indicated water was being allocated in the appropriate amount. However, water conflicts do arise between the IDs and IAs, especially when water is scarce. Recent lessons from the Mexican drought indicate that, under extreme competition for water, IAs were overwhelmed by operational problems. This required prompt government intervention to keep the conflicts from getting out of control and becoming an explosive political issue.

Agency re-organization

IMT programs can have a significant impact on agency organization. A sharp reduction in field personnel and O&M staff usually takes place. A change in the role of the agency with regard to water management in the systems follows.

Staffing: Once the government's employees perceive the possibility of losing their jobs as a consequence of IMT implementation, they may attempt to block the turnover process. Clear legal arrangements between the parties are needed in order to overcome difficulties. Unfortunately, as the number of people involved in the process may be quite large. In Mexico, 5,000 out of 7,000 government personnel were to be released from the IDs because of turnover, while the Philippines has reduced government agency staff from 19,353 to 10,368.

Changing the role of the government irrigation agency is a natural outgrowth of IMT. The change requires not only willingness from the part of high-level officials but also training for them on specific issues. One is simply convincing governments officials that there have been substantial changes in the way the irrigation sector is structured. For instance, in some countries the agency keeps asking from IAs the same types of information as if management had never been transferred. In Mexico, after six years of turnover, changes in the governmental sector are still incomplete.

Once the turnover thoroughly takes place in a system, the agency's new role should be more oriented towards supervision, guidance, monitoring and regulation of water rights, plus selected technical assistance support to IAs. Management responsibilities of the system should be in the hands of the users, with the possible exception of headworks which when considered of strategic importance or technically sophisticated, should remain under agency's direct control and administration.

4. SECOND GENERATION PROBLEMS AND SOLUTIONS

As noted in the introduction, problems and solutions in a particular location will differ, depending on the perspective of the observer. The discussion below addresses problems from the perspectives of (a) the irrigation association, (b) farmers, (c) the irrigation agency, and (d) the government. Solving these problems can involve a variety of steps including revision of laws or implementing regulations and changes in organizational structure, organizational rules and processes, and funding mechanisms.

In addition, associations will require supporting services. Support services are services which come from outside the association itself but which are necessary for it to carry out its mission. They include such things as financing for equipment purchases, legal advice, computer programming assistance, and financial auditing services. Such services may be difficult for an association to generate internally (e.g., financing for heavy equipment) or be used only infrequently, (e.g., specialized maintenance equipment) and hence be too expensive for an association to maintain on a full-time basis.

Support services can be procured by associations from a variety of sources--private firms, public agencies, universities and institutes, non-government organizations, and regional or national federations of associations. In the past, it has usually been assumed that any such services must come from government agencies. Today it is recognized that higher quality and less expensive services may often be obtained from other sources, and that the government should generally serve as only one of several alternatives, rather than the sole source.

IRRIGATION ASSOCIATIONS

Insecurity of water rights was identified as the most serious second generation problem affecting irrigation associations in the five case study countries. Water rights which are often absent, poorly-defined, or insecure, can (a) inhibit investment in new system facilities or rehabilitation, (b) encourage short-term thinking and behavior on

the part of association managers and farmers, (c) result in heavy expenditures in legal costs to defend a poorly-defined water right, and, ultimately, (d) lead to a reduction in water supply and even system collapse.

An effective water right should provide security to the association, but must, at the same time, be adaptable so that water can be diverted to other more productive or higher priority uses as economic and demographic conditions change. In this event, there must be a provision for appropriate compensation to those who are giving up the water right by those who gain it. In Mexico, for example, an association's irrigation water right is always subservient to present **and future** municipal demands. This creates considerable insecurity for associations which share water sources with growing municipalities and violates both the principles of security and that of just compensation.

An effective water right should be specified in both quantitative and qualitative terms. Water quality degradation by upstream effluent discharges, as from a factory or an inadequate municipal sewage treatment plant, can render the water unusable by downstream irrigators. It can also make the water suitable only for lower value crops, since biologically or chemically contaminated water may not be permitted for production of higher value fresh fruits and vegetables. This will become an increasingly serious problem as water reuse increases in response to growing demand from all sectors.

Establishing a water rights system where it is lacking, as in Turkey, or clarifying water rights where they are weak, ineffective, or inequitable, as in Mexico, will usually require action from the national legislative body or from top level executive leadership, or both. It is thus extremely important for water user associations to have adequate representation of their interests when these issues are taken up.

Two different types of support services are identified as being crucial for associations in attempting to establish or clarify their water rights. The first of these is legal advice and representation when the association faces challenges to its rights. Such representation is best secured from private law firms, if available, since services secured from government sources may be of lower quality, and may be subject to political pressures which would compromise their objectivity. Legal representation is also important during the formative stage of an association, when negotiations with the government irrigation agency will establish the contract or concession which will control the relationship of the association and the government. Unfortunately, associations which are just forming may be unaware of the importance of high quality legal advice at this stage or may be unable to afford it. A national federation of associations can play a valuable role as a source of legal advice and assistance to newly forming associations.

The other type of support service required by associations is lobbying on their behalf in government policy making councils. Since other interests, such as municipalities and industrial water users, are usually larger than individual associations and likely to be more powerful politically, it is important for associations to establish regional or national federations representing many associations and a large number of farmers. This will give them political influence with which to counter the lower of competing interests. A federation would also be to represent irrigation associations on the board of directors of the national irrigation agency as is currently the case in Colombia.

Financial shortfalls comprise another high priority second generation problem affecting associations. A central feature of the PIM programs undertaken in all of the case study countries is financial autonomy. Financial autonomy is the condition where an organization generates all of the revenue it needs to support itself and to perform its primary functions. It implies that the association is not directly subsidized by the government, or that if it is subsidized, that the subsidy is a fixed amount which does not vary according to the condition of the association's balance sheet. The principal source of revenue for most associations is irrigation service fee (ISF) collections. Financial shortfalls affect a number of associations in Colombia and Argentina have been a concern in Mexico since the 1995 economic crisis.

Financial shortfalls are a function of several factors, including ISF rates, ISF collection effectiveness, the contribution of other sources of revenue, and expenditure patterns. One important factor is the structure of the ISF. Fees can be levied on flat rate or volumetric bases. A recommended structure for fees is a two-part one comprising both fixed and volumetric components. The flat portion would constitute a "connection charge", a charge for simply being within the boundaries of the system's service area whether or not water was actually taken from the system. This would reimburse the association for expenses incurred in maintaining the physical and administrative capacity to deliver water to the farm. The absence of this component in the fee structure of Mexican associations has created severe problems during years when drought greatly reduced the available water supply to the system's water users. The other portion of the fee would be based on the volume of water actually delivered during a cropping season, or some proxy for this amount, such as area irrigated and number of irrigations given. This would cover the costs incurred by the association which are related to the amount of water given, and would serve to limit excessive demand for water.

Revenue from ISF is also dependent on the percentage of the fees assessed which are actually collected, though associations in many countries do a reasonably good job in this regard. An exception is the Philippines where low collection rates have been a persistent problem for NIA.

Solving problems of revenue shortfalls that relate to fee levels and collection efficiency is largely an internal association responsibility. Outside assistance may be useful, in some cases, in estimating farmers ability to pay particular ISF levels, and in analyzing management systems set up for collecting revenue. This is discussed further in a following section.

Underlying difficulties in generating sufficient ISF revenue to sustain system operations, in many cases, is the low productivity of irrigated agriculture in system command areas. Low productivity can result from a large number of factors, but is often associated with small farm size, a subsistence orientation, production of low value crops such

as grains, inappropriate agricultural policies, a poor natural resource base, and inadequate agricultural support services. In such cases, a solution to the association's financial problems may be possible only if the underlying problems in the agricultural sector are addressed. If these problems cannot be solved, then the options are for the government (a) to have other agencies provide technical assistance to increase production, or (b) provide the association with special subsidies. As a last resort, the government may have to consider taking back the responsibility of system management and financing. However, as irrigation service fees typically constitute only 3 to 10 percent of total production costs, reducing them will generally not solve underlying problems of high agricultural production costs and low productivity.

Rehabilitation is identified as a third important second-generation problem for irrigation associations. All irrigated systems require periodic rehabilitation and modernization. While usually less expensive, in real terms, than the original construction, rehabilitation is a costly undertaking, and is usually beyond the financial and technical means of an association to undertake. Seldom is there a clear and consistent government policy on responsibility for rehabilitation. In the absence of such a policy, the tendency is for associations to defer needed rehabilitation in the hope that the government will step in and take responsibility for it. In this case, IAs usually underinvest in system improvements between rehabilitations. This tendency is reinforced by the government retaining ownership of system physical facilities, while transferring to associations only the use rights of the facilities. Associations may thus regard the responsibility to rehabilitate those facilities as belonging to the government unless a different policy is clearly stated in the agreement between the government and the association.

A related problem is that of cost sharing between the government and the association for rehabilitation. Because irrigated agriculture benefits people beyond the ranks of system irrigators, and because full coverage of rehabilitation costs is usually beyond the means of the irrigators themselves, a sharing of costs is appropriate. Responsibility for even a share of the costs involved will tend to counteract the tendency of an association to defer maintenance, as noted above.

To cover its share of future rehabilitation costs, associations usually need to accumulate a capital replacement fund over a number of years and there needs to be a legal basis for establishing such a fund. There should also be incentives for establishing and contributing to such a fund. Unfortunately, fiscal and monetary policies in many countries such as Turkey and Mexico, have led to high rates of inflation and low or negative real interest rates on savings, which acts as a powerful deterrent to fund accumulation. Governments may need to create special investment opportunities for associations which allow them to earn reasonable rates of return on accumulated funds. Likewise, there should be incentives for associations to make improvements in physical infrastructure. One way to do this is to establish a trust fund, perhaps with donor financing, from which associations could request funds to complement their own investment funds. The matching ratio for such a funding facility should be established and made known in advance.

A number of support services are required specifically to support system rehabilitation. These include (1) assessments of system facilities, (2) credit, and (3) design and construction assistance. Regular assessments of the condition of system facilities can be done jointly by the association and the government agency, as in Turkey, or may be contracted out to an engineering consulting firm acceptable to both the association and the agency. Such assessments can be used as a basis for annual maintenance planning, to suggest the need for selective improvements in system facilities, and for planning whole-system rehabilitation.

If an association is unable to accumulate its share of rehabilitation cost prior to rehabilitation and does not have the ability to assess a special charge on the members, it will need a source of credit. Credit can come from private banks, government banks or other lending facilities, or from insurance pools in the case of rehabilitation induced by natural disasters such as floods, typhoons, or volcanic eruptions. Such a credit facility could also be used as a source of financing for capital equipment needed for system maintenance.

Rehabilitation will also require external technical services for design and construction. Because of the sharing of costs, both the association and the government should be involved in decisionmaking relating to the selection of consultants and contractors and monitoring their performance. Advice and guidance to the association on handling these tasks might usefully be given by a federation of associations, since rehabilitation occurs only infrequently in any one association.

Lack of financial and administrative management expertise is the final topic identified as a high-priority second generation problem by workshop participants. There are several possible responses to this problem. One would be skill enhancement through staff training programs. Skills can also be enhanced by replacing less skilled people with more capable ones. Contracting out for specialized services is another important way of addressing management deficiencies in associations.

One extremely important step in improving the quality of association management is to increase the transparency of management processes. This has a number of positive effects. It can (a) reduce the potential for misappropriation of funds, (b) help insure that salary levels and benefits are realistic, (c) help insure that maintenance allocations are appropriately targeted, (d) reduce favoritism in making personnel appointments, and (e) improve responsiveness of association staff to users.

A number of steps can be taken to increase transparency in association management. These include:

- regular external audits of financial accounts,
- use of standardized budgeting and accounting frameworks,

- wide dissemination of simplified budgets, plans, and financial statements,
- active involvement of the board of directors in forward planning, budgeting, and auditing, and
- broad representation from among users on the association board of directors.

There is broad scope for employing external support services to improve management of the association. Services that may be required include:

- advice on establishing and revising management systems and procedures,
- advice on establishing financial budgeting and accounting systems, including software,
- establishment of standard budgeting and accounting formats,
- standards and requirements for regular external audits, and
- management training.

These services can be obtained by the association from a variety of sources, including private firms, a national or regional federation of associations, NGOs, government agencies, and universities and training institutes. The government is the logical party to establish mandatory standards and requirements for external audits, but the audits themselves, could be done by a private firm of chartered accountants. Other services, such as management and accounting system advice could come from a variety of sources, with private sources being generally preferred.

One argument in favor of the provision of these services by government agencies will often be that they can be obtained at no or low cost. What makes this lower cost provision possible, however, will generally be implicit government subsidies to the service providers. A preferred alternative would be to provide the funds supporting these subsidies instead to the associations as grants to be used for obtaining management support services. This would allow the associations to contract for these services among alternative providers. The demand-driven competition thus induced would be a very healthy force acting to hold down service prices and improve quality of services delivered. Provision of such grants during the transition phase from government agency to association management could be a very useful institution-strengthening activity.

IRRIGATION AGENCIES

Dislocation of staff is the most prominent problem experienced by agencies following irrigation management transfer to users. This problem is typically dealt with in several ways. First, O&M staff levels are reduced by attrition. When positions become vacant due to retirement or resignation, they are left vacant or filled by internal transfers rather than new hiring. Second, financial incentives are often provided for early retirement of older staff. Third, existing staff are transferred to other positions which become vacant rather than filling them from outside the agency. In some countries such as China, where it is difficult to lay off staff, sideline enterprises have been created which can generate income for the irrigation district and cover the salary costs of the involved personnel. In the Philippines, this has taken the form of an irrigation consulting company, NIA Consult, which was created as a subsidiary of the National Irrigation Administration to provide irrigation advisory and design services within the Philippines and abroad. In some cases, redundant agency staff may also be re-employed by the newly created associations which take up management responsibility for the schemes. Such employment should be at the discretion of the association.

Loss of technical capacity in the national irrigation agency is a common problem faced by agencies which transfer management significant irrigated areas to associations and experience loss of technical staff. To address this problem, agencies can

- obtain specialized expertise from outside consulting firms as needed,
- increase salaries to attract and retain high-quality staff,
- provide in-service training opportunities for staff, and
- revise job descriptions to bring in new staff with the desired qualifications.

Defining a new role for the agency is another important challenge. With their operational responsibilities transferred to associations, the agencies need to design a new role to address emerging problems. Doing this requires discussion among staff within the agency and also at higher levels of the government, with broad participation by all involved parties. The aim should be to build broad consensus and political commitment for the new role. In some cases, changes in legislation may be required to enable the assumption of new responsibilities.

The new mandate should contain a clear definition of roles and responsibilities and should define skill requirements to carry out the new responsibilities. It should also contain a timetable for accomplishing the shift to the new mandate. Support services which could be useful in this process include:

- comprehensive diagnosis of the agency/association relationship and the associations' support needs,
- professional assistance with the agency's strategic planning process, and
- consulting services to design new management information systems for the agency.

In Colombia, the national agency, INAT, is employing professional consultants to help them define a new role for themselves under an Inter-American Development Bank credit.

FARMERS

Second generation problems experienced by individual farmers relate mainly to the need to increase farm productivity to pay higher irrigation fees and to take advantage of possible improvements in irrigation service quality. Support services required may include:

- production credit,
- extension advice,
- new technologies,
- markets and market information,
- access to inputs, and
- post-harvest services.

Although government agencies are the traditional source of many of these services, in many countries, private or other organizations are playing an expanding role in supplying some or all of the services listed above. There is also the question of the potential role of the association itself in providing other agricultural services, in addition to irrigation service. As a general rule, the association should demonstrate competence in its core activity of irrigation management before considering such ancillary activities as providing other agricultural inputs.

GOVERNMENT

The principal second-generation problem for government, beyond those already identified for the irrigation agency, is the reduced control which it will have over irrigation activities at the system level, and a diminished ability to use irrigation as a tool to implement other national policies and priorities. An example might be the government's wish to promote cultivation of upland crops rather than rice during a particular season. In the past it could work through the national irrigation agency to adjust water delivery schedules and volumes to try to achieve this end. Following transfer, this becomes more difficult. There are other tools, such as support prices and subsidies, to achieve the same ends, however, so that losing control of irrigation system management should not pose a significant problem for agricultural policymakers.

5. SUMMARY AND CONCLUSIONS

Experience is now available from a number of developing countries which have recently implemented Participatory Irrigation Management (PIM) programs and there is additional evidence from developed countries which transferred irrigation management functions to locally-based organizations many years ago. In the case of the developing countries, while the overall benefits of PIM have been positive, in some cases second generation problems have manifested themselves and, consequently, have tended to reduce the magnitude of the potential benefits.

In the process of introducing PIM programs, political will at the highest level is a critical background condition for a rapid and sustained transfer program. A second important element is that the irrigation infrastructure be in fair condition so that it could deliver irrigation water as required. A suitable legal framework is also necessary for the sustainable functioning of the transferred systems. Lack of clear water rights has led to second generation problems including conflicts with municipal and industrial users as well as other irrigation organizations.

PIM is designed to shift the financial burden for irrigation service from the agency to the users. This aspect has to be made very clear when the process of transfer is introduced. Failure to address the financial side of system management is a primary cause of second generation problems. In general, the countries that have a clear policy on irrigation service fee rates and collection practices have sustainable water user associations.

The type and nature of the associations are very dependent on the structure of the broader economy as well as the type of irrigation and the tradition of management prevailing in the country. Where economies are more developed and diversified and irrigation systems are large, associations have tended to evolve successfully. These associations are generally large and can hire their own staff and own specialized irrigation equipment. In contrast,

in countries where economies are less developed, agriculture is more subsistence oriented, and irrigation systems are small, the associations tend to be small and more problematic in terms of management.

These changes in management structures and processes have had important impacts both positive and negative on four important target groups: farmers, the irrigation association, the irrigation agency, and the government. For example, while increased service fees have reduced the financial burden on the government and increase the sustainability of the IAs, they have added to the costs of production for the users. On the other hand, from the perspective of the farmers, transfer has resulted in a sense of ownership, reduction in conflict and improved maintenance.

Transfer has reduced the O&M staff of the irrigation agencies, and consequently the overall number of civil servants working in the irrigated agriculture sector. However, in a number of cases, this has also reduced governments' control over cropping patterns and over water resources more generally. This reduced government control has generally led to greater farmer satisfaction, more transparency in decisionmaking, and greater overall economic efficiency.

Changes in management responsibility have led to second generation problems in most countries, some of which are already affecting the involved parties while others loom as potential future problems. Insecurity of water rights was identified as the most serious second generation problem affecting transferred systems. The primary solution is to establish a secure legal right that has both quantitative and qualitative dimensions. Federations of associations can provide assistance and legal representation.

Financial shortfalls comprise another second generation problem. The principle source of revenue for the association is the irrigation service fee. A two-part fee consisting of a fixed connection charge and a volumetric charge can provide greater financial stability. Increasing the productivity of irrigated agriculture is also an important element in improving the financial health of associations. Outside assistance may be useful in analyzing and improving management systems set up to assess and collect service fees.

Rehabilitation poses a number of second generation problems. In the absence of a clear and consistent policy on rehabilitation, maintenance is often deferred. There is a valid argument for developing a cost sharing formula where the government pays a share and the users pay the remaining share. If possible, the IAs should have a sinking fund for accumulating funds to cover their share of future rehabilitation costs. When this is insufficient, it is important to have an outside source of affordable credit. Other needed supporting services include assistance with maintenance assessment practices and technical design and construction services.

Effective financial and administrative management of the associations requires specialized staff training and increased transparency. Support services such as external audits, and standardized accounting packages can also contribute to better management of the associations.

Irrigation agencies also suffer from a number of second generation problems. Dislocation of staff, loss of technical capability, and the need to define a new role for the agency are all problems found in countries that are instituting PIM programs. In particular, the problem of what to do with excess staff is a difficulty faced by almost all agencies. Solutions include attrition, retirement incentives, creation of specialized consulting units, retraining and assistance with job placement, and transfer to other units. Along with the problem of staff displacement, agencies also face the problem of the loss of specialized skills. These may be replaced by outside private consultants but may also require the agency to provide specialized training for existing staff.

Second generation problems of farmers are related to the need to increase agricultural productivity, including the need to shift to higher value crops. Services such as credit, agricultural extension, market access, technical inputs and post-harvest assistance are all needed. In some cases these services will come from the government but increasingly from the private sector as well. Federations of IAs can also play an important role in the provision of such services.

A shift from public agency control to local participatory management is unlikely to happen without some second generation problems. Rapid institutional change will almost always require corrective measures to address unexpected problems. Countries with flexible policies and procedures will be able to address these problems, as they arise. This report has summarized a number of solutions countries have employed to address second generation problems associated with the shift to participatory irrigation management.