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INTRODUCTION

Background

NEPAL IS AN agricultural country where 90 percent of the labor force is still engaged in agriculture. The Eighth Plan (1992-1997) of His Majesty's Government (HMG) of Nepal has accorded top priority for its development with emphasis on agricultural intensification and diversification. In the changed context, with the democratic government in place, the approach of the plan seeks to enhance the participation of the people in the development process. The Eighth Plan envisages the bringing of all accessible areas with irrigation facilities under intensive agriculture with a full provision of agricultural support services. "Participatory Approach" (PA) has been adopted as the *modus operandi* in order to seek full participation of user farmers in irrigation development and management. As a result, in 1992 HMG put out a new irrigation policy which embraces the principle of participatory approach for irrigation development. The policy embodies strong concerns to improve water delivery in irrigation systems both under O&M purview of agency and farmers. For irrigation systems developed and managed by the Department of Irrigation (DOI), the policy emphasizes participatory programs in the form of Joint Management and Turnover Programs with users for improvement of water delivery performance.

In 1993, Joint Management Program was launched in a total area of 33,600 ha covering five irrigation systems: (Kankai Irrigation System in Eastern Terai (8,000 ha), Manusmara Irrigation System in Central Terai (5,200 ha), Khageri Irrigation System (KIS) in inner Terai (3,900 ha), Nepal West Gandak Irrigation System (WGIS) in Western Terai (10,300 ha), and Banganga Irrigation System (BIS) in the Western Terai (6,200 ha). Joint management is a management transfer process whereby responsibility for management is gradually turned over to users. Irrigation Management Division (IMD) of DOI has been the principal implementor of the program. IMD has three branches: System Management Branch (SMB), Human Resources Development and Training Branch (HRDTB), and Research and Technology Development Branch (RTDB) to support all its activities. From 1991, the redesigned Irrigation Management Project (IMP), a joint venture between HMG and United States Agency for International Development (USAID) in Nepal has been providing technical assistance to DOI in order to build up the capacity of agency and farmers for improved irrigation management by directly supporting joint management implementation activities.

Objectives

This paper describes an experience with Irrigation Management Transfer to users in Nepal. It aims to:

1. Present the experience gained so far in launching Joint Management in three principal sites.
2. Provide recommendations related to further promoting Irrigation Management Transfer.

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DEVELOPMENT OF CONCEPT FOR MANAGEMENT TRANSFER IMPLEMENTATION

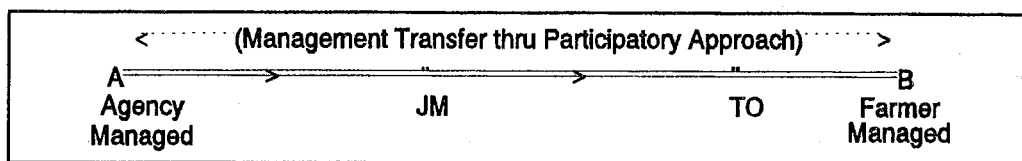
Development of Principles

Before developing guiding principles for actual implementation of the Management Transfer Program (MTP), it was necessary to conceptualize Joint Management (JM) and Turnover (TO) as these two constitute the principal activities under Irrigation Management Transfer Program (IMD 1994).

Management Transfer Program

The management transfer program consists of programs for joint management and turnover. Through management transfer, management of existing agency-managed irrigation systems is to be transferred to water users associations (WUAs). Two activities exist for management transfer: turnover and joint management. The aim of the management transfer program is to create a favorable environment for productive irrigated agriculture by improving the management of irrigation systems.

Management Transfer through Participatory Approach is illustrated below in a diagram (Laitos and Rana 1992).



In the above illustration a management continuum is defined to begin from agency management starting from point A. Joint Management (JM) and Turnover (TO) are defined as points that lie within the continuum with the end point at B where a particular agency-managed system under JM and TO programs can be declared as a fully farmer-managed system.

Depending upon the degree of agency and farmer participation in the physical and non physical improvement and the resulting stages of improvement in O&M and management of irrigation systems under the JM and TO programs, JM and TO can be moving points within the management continuum from A to B. The goal of both JM and TO is to move the points closer to the farmer-managed irrigation systems at point B.

Turnover Program

According to the Irrigation Policy (MOWR 1992) for smaller systems (less than 500 hectares in the hills, and 2,000 hectares in the Terai), the management of operation, maintenance, in addition to physical facilities is to be turned over to users. The turnover program will develop and support self-sustaining water users organizations capable of managing the operation and maintenance of their irrigation system.

Joint Management Program

The joint management program will take place on existing, agency managed systems of size greater than 500 ha in the hills and 2,000 hectares in the Terai. This program will transfer management to the largest extent possible to WUAs. The end result of the joint management program will be self-sustaining irrigation systems, effectively managed by WUAs, with minimum assistance from the agency.

Guiding Principles

Strategies for joint management and turnover were developed by DOI.

Guiding Principles to launch the Management Transfer Program were drawn based upon past experience as the following:

1. Transparency at all levels.
2. Use resources to strengthen WUAs.

3. Make commitment to finish work once started.
4. Make promises that you can keep (don't raise unreasonable expectations).
5. Prime movers are the system managers/field officers and farmers. Role for center is only as of catalyst.

Scope of Management Transfer Program

The overall objective of the management transfer program is to improve irrigation water management, and thereby create a favorable environment where irrigation systems can become more productive, equitable, and sustainable than at present. The major means of accomplishing the goal is to place farmers in charge of management, and allow the agency staff step into the role of service provider of technical assistance. Several other major features of the management transfer program are listed below.

Development of Sustainable WUAs

The most important aspect of the management transfer program is to ensure that there are WUAs capable of managing irrigation water. Typically, in agency-managed systems, effective and sustainable WUAs do not exist at present. The WUA will be the target audience for several development and training activities.

Improved Operation and Maintenance of Irrigation Water Delivery Systems

One of the first activities will be to improve adequacy, reliability, and equity within the main system through improved maintenance and operation practices. Depending upon the size and physio-technical complexity of the system, the main system may consist of a main canal only including the headworks or the branch canals as well. Gradually, the WUA will be trained and encouraged to manage the entire main system with limited agency assistance. There may be special cases, that are highly technical or expensive, where the agency, acting as partners, might take a more active role in management of the main system.

Improved On-Farm Water Management

Providing increased reliability and adequacy at the main system level provides farmers greater opportunities to improve their on-farm water management practices. In order to capture the full benefits of improved main system management, farmers must also improve their on-farm practice. It is within the scope of management transfer to provide assistance and technical advice to farmers on on-farm water management.

Capability Buildup for DOI

DOI is in the gradual process of shifting its role from a construction agency to provider of technical services. Right from the start of management transfer programs, DOI will serve as partners in development with farmers, assisting them to improve their irrigation practices.

Improved Agricultural Services

Working through WUAs, the agency can assist farmers to seek out and obtain more efficient agricultural services. The WUAs will be the initial focus to provide services like agricultural inputs and marketing. In time, separate user organizations can be formed, for example a marketing association for a specific commodity, or the WUA can take up this function.

Development of Implementation Framework

A learning process is adopted for management transfer implementation where both farmers and agency staff will develop field experience together for improved O&M practices (Skogerboe et al. 1993). The process will simultaneously focus on capability building of farmers, and the irrigation agency.

The framework for the management transfer process given in Figure 1 has three phases as described below:

Phase I

Initial Organization. The initial Organization Phase establishes an initial WUA with farmer leaders and representatives with whom the agency can communicate and pursue further activities. The duration is initially expected to last from 3 to 6 months (however, size of the project and complexity will determine the duration).

Baseline Assessment. Initial baseline characteristics of the system are studied before turnover or joint management intervention. The baseline study will point to characteristics of the farming community and the irrigation system that will be important in organizing farmers and achieving success in future.

Formation of Water Users Associations. Water users are organized into multi-level organizations; constitutions are drafted; elections are held; and the association is registered. This phase is started with an introductory workshop where discussions are held with farmers to explain the joint management or turnover activity. Sociologists or other professional organizers work side-by-side with system management staff during this process. Professional organizers from the agency train local farmers to become farmer organizers (FOs). Farmer organizers communicate with farmers and acquire relevant data and information.

Phase II

Joint Agreement. During this phase agreements between the WUA and the agency are formulated stating roles and responsibilities of each party. The nature of joint agreement may be reviewed depending upon the nature of O&M performance improvement in 2-to-3 cropping seasons.

Develop a Plan of Action. Action trainings on maintenance, operation, and share system take place at the irrigation system with participants drawn from farmer leaders and agency staff. Maintenance and operation options are identified, and the costs of operation and maintenance estimated. Operation plans are developed taking into consideration the share system, water supply, and water control structures. The share system establishes a basis for water allocation and resource mobilization to cover costs of operation and maintenance.

Agreement on Joint Management Activities. Options for operation, maintenance, share system, responsibilities, and cost sharing are discussed between agency and farmers. Long-term visions for the irrigation system are established. An agreement is drawn that delineates responsibilities of farmers and DOI in managing the system.

Phase III

Implementation of Program. During Phase III, the agreed upon programs are implemented. Full implementation will take between 3 and 5 years with the expected end results as a sustaining, productive irrigation system managed by local users, requiring minimum amounts of outside support for management for increased irrigated agricultural production.

Implement Plan of Action. The plan of action developed during the agreement in Phase II, consisting of programs for operations, deferred and regular maintenance, payment for O&M, and other activities will be implemented. During Phase III, extensive training for water users will take place to strengthen their abilities in areas such as communications, leadership, account and record keeping, agricultural production, improved on-farm practices, and procedures for operation and maintenance.

Monitoring, Evaluation, and Feedback (ME&F). The DOI and WUA will develop and implement procedures for monitoring and evaluating the management transfer programs. Feedback from the evaluation procedure will be provided to the WUA and agency system manager. Based on the findings of ME&F, agreements and programs can be updated and improved.

SITE SELECTION

Three of the five initial joint management sites will be considered in detail for this paper: Khageri, West Gandak, and Banganga. Activities were delayed at Manusmara due to flooding, and Kankai is just now starting an intensive joint management program. Table 1 gives a summary of data about the three joint management systems subject to further discussions.

Figure 1. Framework for joint management and turnover.

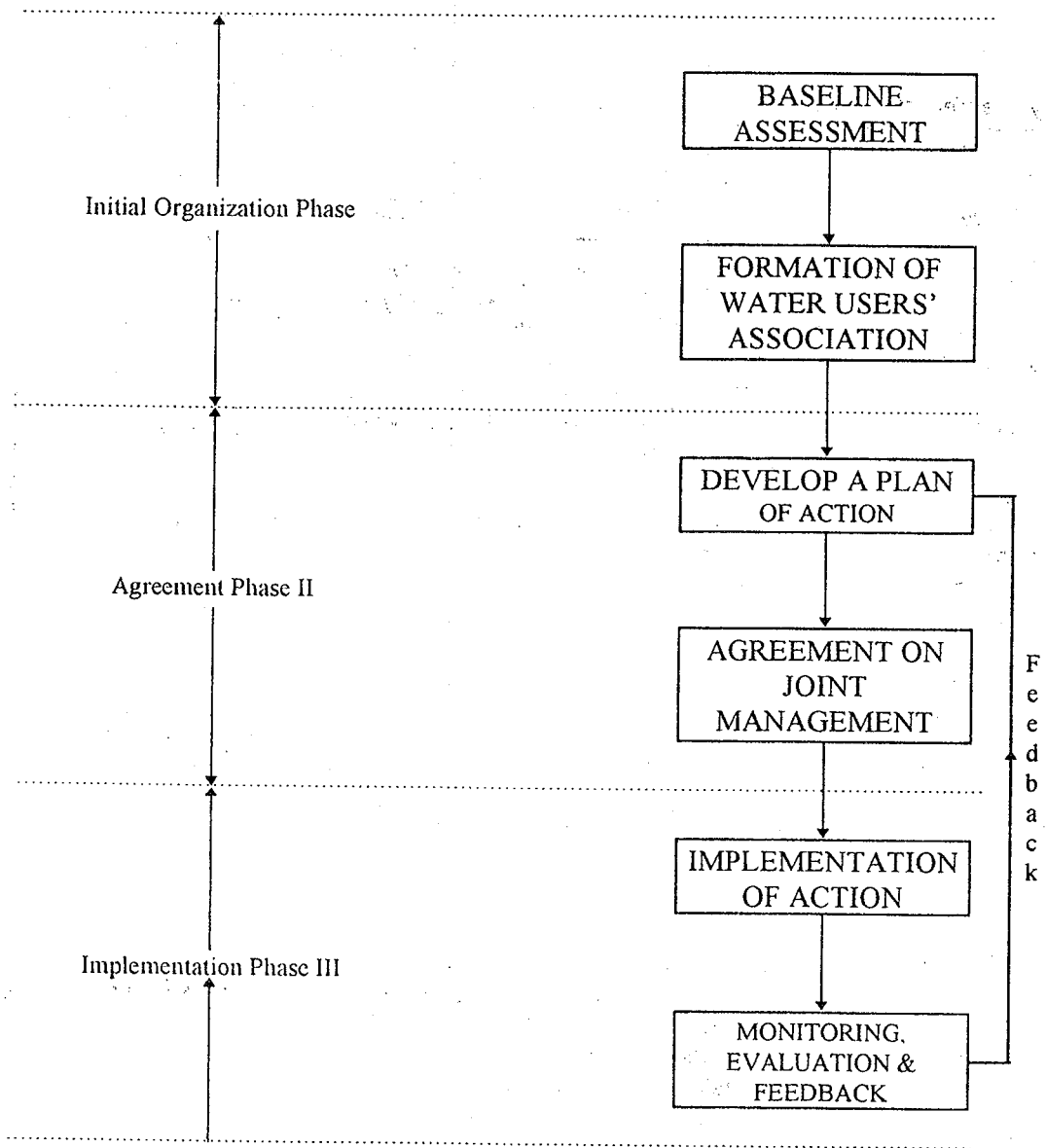


Table 1. Summary overview of systems selected for MTP implementation.

S.N.	Details	System		
		Khageri	West Gandak	Banganga
1.	Source	River Diversion	River Diversion Barrage Type	River Diversion Weir/Reservoir
2.	<u>Physical</u> Age Headworks/intake <u>Canal</u> Main Idle length Branch (8 nos.) Minors (4 nos.) Design 'Q' Command area	26 years Barrage type 22.5 km 9.0 km 40.3 km (total) 13.5 km (Total) 7.14 cumec 3840 ha	18 years Barrage type 32.0 km - 46.07 km 20.43 km 10.3 cumec 10,300 ha	22 years Weir type 20.5 km - 16.85 km 19.00 km 5.67 cumec 6,000 ha
3.	<u>Agricultural</u> Population Farm household Family size Literacy (%) Farming (%) Farm size Cropping patterns (dominant) (For 1992) Average yield of major crops (t/ha) <u>Crop</u> E. Paddy L. Paddy Maize Wheat Oil seed Sugar cane	35,417 5,038 7 80 46.3 1.32 ha Maize-L. Paddy Maize-L. Paddy - Mustard L. Paddy-Fallow Maize-L. Paddy - Wheat <u>System</u> 3.02 2.5 0.79 1.05 0.40 - <u>National</u> - 2.03 1.33 1.43 0.40 -	115614 16237 7.7 40 73 1.9 ha Rice-Wheat-Fallow Sugarcane-Paddy- Mustard-Fallow <u>System</u> - 2.0 - 1.75 0.70 27.0	12640 3263 7 45 87 1.8 ha Paddy-Wheat-Fallow Paddy-Mustard -Fallow Paddy-Legume- Fallow <u>System</u> - 2.0 - 2.00 0.66 -
4.	Users' Association before JM	No system level WUA	No system level WUA	No system level WUA
5.	Affiliation Agency	Under administration of a separate lift scheme	Separate System Office	Under District Irrigation Office
6.	Household income	Rs 35,350 (74% from farm source) US\$1 = NRs 50		

Sources: Rana and Rajbhandari 1993.
SMB 1994.

WUA DEVELOPMENT AND TRAINING

Various institutional development activities are scheduled throughout the phases of the joint management program. As shown below, most of the Phase I activities and some Phase II activities are complete for the three sites.

Various activities implemented in three joint management sites:

<u>Activity</u>	<u>Khageri</u>	<u>Banganga</u>	<u>West Gandak</u>
Phase I			
Introductory workshop	Completed	Completed	Completed
WUA formation	Completed	Completed	Completed
Baseline study	Completed	Completed	Completed
Phase II			
Share system development (Initial)	Completed	Completed	Completed
Share system administration (Initial)	Completed		
Maintenance plan development	Completed	Completed	
Hydraulic operation initial	Completed		
Action plan for <i>tolis</i> and <i>upatolis</i>			
Action plan for system			
MOA signed			
Phase III			
Hydraulic operation [complete]			
Construction methodology			
Quality control			
Financial management/HMG regs. and policy	Completed		
O&M training			
Water management			
Benefit monitoring			Completed
Special Studies			
Water augmentation	Completed		

Formation of Water Users Association

Out of the many activities implemented as mentioned above, WUA formation is the most important one. A system-level association of users is formed based on the premise that all offtakes from the main canal are represented in the main committee of WUA. Lowest tier called *upatolis* (quaternary committees) are formed at the level of offtakes called main farm ditches (MFDs) in case of WGIS and BIS. Two or more *upatolis* are combined to form *tolis* (tertiary committee), and similarly, two or more *tolis* are combined to form branch committee. All branch committees and other *upatolis* of direct offtakes from main canal are combined to form main committee of WUA. The general assembly formed of all *upatolis* is the key feature of check and balance in WUA formation and is the main regulatory body to which the WUA Main Committee is accountable. One member of users from each *upatoli* is represented in general assembly. The constitution becomes the binding document in terms of rules and regulations for the functioning of the main committee of WUA, the general assembly, and other committees at lower tiers of WUA. In WGIS four-tier WUA is formed (SMB 1993).

In KIS two-tier WUA is formed consisting only of branch committees. In BIS four-tier WUA formation is in the process of being completed.

In forming WUA, the concept of "farmers organizing farmers" has been used. Initially, prior to formation, farmer organizers (FOs) are recruited from among the users, selecting one FO from an area ranging from 500-700 ha. FOs are trained by sociologists and resource persons in communicating and organizing skills. Effective communication is ensured as FOs are selected from among users within the system.

Training for Institutional Development

A WUA having a constitution registered with the District Administration Office/District Water Resources Committee is the starting point for further institutional development and strengthening activities. The joint management program relies on a field-oriented action training approach. Training activities are designed to develop tools for institutions to use such as rules and regulations; book keeping methods; plans for resource generation; and plans and means for canal operation. Training activities and their outputs are listed below:

Share System Development and Administration. Rules and regulations, resource generation plan, record keeping, organizational checks and balances, definition of water shares, and workforce requirements for O&M.

Maintenance Plan Development. Joint agency-WUA walk-through to identify, record, and prioritize maintenance needs in terms of deferred, emergency, and routine maintenance.

Hydraulic Operation Plan. Calibration of structures, training of O&M workforce to measure water, water delivery scheduling.

Financial Management and HMG Regulations and Policy. Training to WUA on rights and responsibilities, and financial record keeping.

Interaction among System Managers. System managers are allowed to share experience with each other in building better vision and implementation strategy for MTP.

WUA-Agency Negotiations and Agreements

In the original process of joint management, a formal Action Plan and Memorandum of Agreement was perceived, to be signed jointly by the agency and farmers. This would lay out responsibilities of agency and WUA in maintenance, operation, and institution activities.

Agency staff at West Gandak and Banganga have been able to make agreements with the farmers, especially those of branch committees and territories level committees. In these agreements, the agency makes a plan to perform other specified maintenance and improvement works, and the farmers agree to do other specified works. Furthermore, after the work of the agency is carried out, the future responsibility for O&M of the canal that has been jointly maintained is then turned over to the respective canal WUA committee. In case of West Gandak and Banganga agreements with WUAs may be made sooner for system turnover.

INITIAL RESULTS AND DISCUSSIONS

Improvement in Water Delivery and Area Served

A marked improvement in the water delivery of 8.5 cumec in the main canal was possible in West Gandak Irrigation System (WGIS) as a result of desilting built-up silt (mechanically and manually) through joint efforts of users (WUA) and WGIS office. After the Command Area Development Project (CADP) completion, this system was never desilted and carrying capacity of main canal stood at only 2.4 cumec at the time of launching of joint management. In the 2nd year, [from 0+000 to 14+300 chainage,] 12,769m³ of silt was removed mechanically, and 9,237 m³ manually. In the first year, [from 0+000 to 29+800 chainage], 28,834 m³ was removed mechanically, and 55,113 m³ manually. In Khageri the available water reached further down the system, and was more carefully regulated by the WUA. At Banganga water delivery improvements were less perceptible in the first year. In the second year, it is expected that the situation will improve in these two sites as users mobilized by WUA and branch committees are cleaning the main canal and branches. However, system-level water availability constraints remain the same.

Marked increase in irrigated area expansion occurred in WGIS (41% in summer and 17% in winter) with the cleaning of main canal, branches, and minors by joint effort of users and WGIS office. This did not quite happen in the case of BIS and KIS in the first year as a working rapport could not be struck between WUA and agency office. In the second year, with change in system management leadership in BIS and some start of positive orientation on the part of agency in KIS, the main canal in KIS and branches in BIS are being cleaned by users, and as a result it is expected that the water delivery service will improve and will help expand irrigated area.

Improvement in Agricultural Yields (tons/ha)

Crop cutting surveys and interviews are the tools to estimate increase/decrease in crop yields. In case of WGIS System, the management undertook a crop cutting survey for rice (Ave. 4 t/ha) covering 33 samples in irrigation networks. Similarly, wheat yield (Ave. 3 t/ha) was estimated by covering 160 samples by survey method. However, in the case of KIS and BIS, survey methods for estimating yield have not been established yet. Hence, yields reported are not included (Rajbhandari et al. 1994).

Improvement in Resource Mobilization by WUA

In the Khageri Irrigation System resources such as cash, kind and labor mobilized by WUA stands at a very nominal level (Singh 1994). True user participation has yet to be elicited by the agency in KIS. In case of WGIS, in the first year about 2,200 ha of the system was turned over to users and in the process about Rs 675,000 was mobilized by the users (Mishra 1994). Agency delineated portions of the works to be done by the users while the remaining works related to structural improvement excluding earthwork in most of the cases were done by the agency. In case of BIS, resource mobilization stood at zero in the first year. However, in the second year about Rs 53,299.29 has so far been mobilized by users. System manager's innovative approach led to the turned-around resource mobilization phenomenon in the second year (Bharati 1994).

Increase or Decrease in O&M Costs per Hectare

In the initial years (3-5 years) of joint management implementation, depending upon resource availability, O&M cost is expected to increase from the present levels in proportion to system improvement needs. However, since DOI has taken a stand to critically reduce the O&M budget allocation, a reduction by about half (Rs 600/ha to Rs 300/ha) in O&M cost can be observed in case of WGIS and BIS.

Area Turnover to Users Committees within the System

In the first year, WGIS was able to turnover about 2,200 ha. However, this did not quite happen in case of BIS and KIS. In the second year, WGIS has planned to turnover about 6,100 ha and BIS about 1,200 ha. Change in leadership in system management in BIS triggered the turn-around phenomenon in BIS. In BIS, innovativeness and ability to properly interpret existing financial provisions on the part of system management led to convincing users to mobilize their resources and take up responsibility for O&M and management of networks cleaned and maintained by users. In KIS, users are demanding augmentation of water supply into their system. Farmers have not demanded for turnover as they feel the need to solve the water problem first.

EXPERIENCE TO DATE

Empowerment of Water Users Association

The joint management activity has had very good success at the initial formation and activating of WUAs. At Khageri and West Gandak, multi-tiered organizations were formed and have been very active in meetings and developing plans for their organizations. At both Khageri and West Gandak, the WUA have hired a small staff to begin WUA administration. Water [cess] collection has been initiated at lower tiers of WUA in both systems.

At Banganga, the initial organization was not so successful, and the WUA Main Committee members appeared to be making decisions based on their own personal interests. Conflict and friction between the agency and WUA was high and very little resource mobilization was done. Fortunately, a check and balance system existed and the General Assembly was able to ask the shareholders of the main committee to step down. And a new WUA has been formed by users recently. The WUA is now much more active and is working well with agency staff to perform maintenance and operation work.

Resource Mobilization

All of the WUAs have made initial resource mobilization plans. At this point in time, resource mobilization is required for two purposes: to take care of deferred maintenance (usually silt build-up), and to perform routine O&M. To take care of deferred maintenance, WUAs perform work as agreed on with agency staff. To perform routine O&M, the WUA must collect fees in terms of cash or kind to recover O&M costs that the WUA must incur.

At West Gandak, Rs 675,000 has been mobilized by the users over a period of one year to help clear a massive sediment build-up in the canals. At Banganga, resource mobilization was nil the first year because of the institutional difficulties but picked up to Rs 53,000 the second year due to WUA restructuring and improved agency-WUA interactions. At Khageri, the WUA has not been able to mobilize resource for deferred maintenance.

At Khageri, the agency contracts maintenance works to the WUA at a discounted rate from the estimated value. The WUA along with the agency have done a remarkable job in canal reshaping given the budget involved. The WUA has been able to generate resources from this contracting mechanism. Unfortunately, this is not sustainable as the WUA needs to generate resources from its own users in the long run. The contracting has lessened the need for the WUA to generate funds from their own resources.

Transfer of Management

Using the informal approach of negotiation and agreements with farmers, secondary and tertiary canals covering an area of 7,300 ha have been turned over to farmers in WGIS. The system manager and WUA have plans to turn over the main canal next year. At Banganga, using the same approach, 1,200 ha have been turned over. The Khageri farmers are not yet demanding to take over the system, claiming that the agency needs to supplement their water supply before they can manage the system.

Reorientation of System Managers

One of the challenges in Nepal is the reorientation of DOI staff away from construction to system management. We have found that the institutional development of the WUA is tightly linked to performance of the system manager. Some system managers are experienced with dealing with farmers, and success has rapidly been shown like at West Gandak. At Banganga, the situation improved after the system manager was changed. [Progress at Khageri, while encouraging is slower.] There is ample opportunity for agency staff and users to develop better working rapport.

Improvements in Irrigation Performance

A benefit monitoring program is now being established to monitor the impacts of joint management (Shaner and Baskota 1993). Limited data are available to show the impacts. At West Gandak, the situation dramatically improved after the introduction of joint management. A joint sediment removal program allowed the monsoon discharge to increase from 2.4 cumecs to the design capacity of 8.5 cumecs. This resulted in a 41 percent expansion in command area in summer, and 17 percent expansion in winter. Crop yields for rice were reported at 4 tons/hectare compared to 2 tons/hectare the previous year, and wheat yields were at 3 tons/hectare. This marked improvement in performance has definitely sparked the interest of the users in management transfer.

Costs of Management Transfer

Resources mobilized by agency for O&M budget, institutional development including the resources mobilized by WUA are the major components of the cost that need to be tracked by system managers. Final breakdowns of the costs incurred in category for turned over and not turned over areas are yet to be received.

CONCLUSIONS AND RECOMMENDATIONS

With the development of strategies for Joint Management and Turnover in early 1992, actual implementation was begun with the formation of the first WUA in Khageri and later in West Gandak, and Banganga from early 1993. With very encouraging results obtained in the field it can be said firmly that there stands ample opportunity for joint management implementation activity in Nepal to succeed achieving set objectives of the program. As we are still at its early stage of implementation, it will be too premature to draw final conclusions about the MTP in Nepal. However, it can be said now that DOI has taken a full turn from construction orientation to management orientation. Weaknesses of the past construction approach have been evident to agency staff and users in all three sites where joint management was implemented. Realization has been that the key to achieving success in joint management is to work towards successful marriage of engineering skills needed to maintain irrigation water supply and the skills needed to make best use of it and it would require participation of both agency and users as "partners" in the management of irrigation systems.

The following recommendations are suggested to further promote management transfer in Nepal.

1. Strategies developed for joint management should be adhered to strictly. There is always a danger that construction activity may supersede institutional development while actually implementing the program. If at all, construction has to take place, institutional imperatives *must* drive the construction schedule, not the other way round. No joint management activities can succeed where physical improvements have the primacy over all other system activities.
2. Guidelines for implementation should be issued by the center. Implementation of the joint management activity should not be dependent upon centralized managerial decisions only. Individual system managers should be encouraged to take the full lead to develop decision making ability and innovativeness which provide sustainability. There should also be control from the center on system managers who do not perform as per the guidelines/norms set by the center.
3. Sufficient programs must be developed to further orient and train agency staff and WUA to cope with the emerging situation in the fields. Due incentives must be provided to agency staff who perform to further promote MTP.
4. Adequate provision of financial supports for institutional development should be part and parcel of the programs provided to system managers.
5. In order to reap the long-term full benefit of MTP, with increase in agricultural production, the government must work with determination to resolve issues related to agriculture sector viz., land reform, inputs supply, credits and markets, etc.
6. Until now, the approach of implementing MTP in Nepal can be called a *low-profile, low investment, and result-oriented* approach. With the implementation of joint management in West Gandak and Banganga in just two years, significant portions of the system have been handed over to users committees for O&M and management. The joint management process may need continual refinement and fine tuning. Any deviations from the present approach warrant dangers of running into pitfalls [of the approaches that were tried in the past.]

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