



INSTITUTIONAL CONDITIONS FOR SUSTAINABLE PIM: CONSTRAINTS AND OPPORTUNITIES

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ABSTRACT

Participatory irrigation management (PIM), in its various forms, has been implemented all over the world for several decades. PIM-related interventions have generally been made, and continue to be made, in form of a set of project activities mostly implemented over a limited period of time with supports external to the irrigation system. Reported results have been encouraging, particularly during and immediately after the project activities, in terms of improvements in: a) irrigated agricultural performance; b) resource mobilization; c) quality of irrigation service; d) maintenance of irrigation infrastructure; and e) farmers' institutional development. Nevertheless, evidences suggest that sustenance of such gains over a long run is often questionable when there are no favorable institutional conditions after the conclusion of short-lived project activities and withdrawal of external supports. Such institutional conditions include continuation of: i) supporting policies and strategies, ii) capacity building, training, and extension; and iii) monitoring and evaluation. The paper identifies various institutional constraints with the view to identify opportunities to timely instigate possible measures that concern three significant and complementing actors: national/provincial governments, irrigation agencies and/or water users associations, and the irrigators. Conclusions and recommendations are based on in-depth case study of Nepal while reflecting on relevant cases elsewhere.

INTRODUCTION: CLARIFYING PIM AND ITS CONTEXT

Participatory Irrigation Management (PIM) generally implies participation of irrigators in the management of the irrigation system and is generally interpreted as "...the involvement of irrigation users in all aspects of irrigation management, and at all levels" (<http://www.worldbank.org/wbi/pimelg/index.htm>). 'All aspects' includes planning, design, construction, operation and maintenance, financing, decision rules and the

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monitoring and evaluation of the irrigation system. 'All levels' means the primary, secondary and tertiary (and subsidiary) levels of water distribution network in the irrigation systems.

Most irrigation systems, both surface and groundwater, by their management mode, can be categorized in three types: (a) agency-managed irrigation systems (AMISs); primarily managed by the state or state-appointed entity (agency) with very little or no involvement of the irrigating farmers, (b) jointly-managed irrigation systems (JMISs); in which irrigators and the agency jointly manage the irrigation system, and (c) farmer-managed irrigation systems (FMISs); wherein most management responsibilities rest with (or have been transferred to) the irrigators. In all three situations, both the irrigators and the agency are involved in the irrigation system management. However, the extent and mode of their involvement varies. In AMIS, the irrigators have little space for their organized and systematic involvement or participation, whereas in farmer-managed (or management-transferred) cases (FMISs), irrigating farmers are the main managers. In the intermediate stage of joint-management, both irrigators and the agency share management responsibilities. Thus, in an encompassing sense, the concept of PIM is evident in all scenarios, nevertheless, in varying degrees; with the exception in completely private irrigation systems owned by individuals or private firms.

The AMIS and FMIS represent two extreme management scenarios which respectively indicate a higher involvement of agency (conversely, lower involvement of irrigators) in AMIS and vice versa (**Figure 1**). These extremes can be conceived in the form of a management continuum in which the extent of agency's involvement decreases as the management mode changes from that of an AMIS to more and more of an FMIS. This continuum represents a domain in which the process of PIM is planned and adopted.

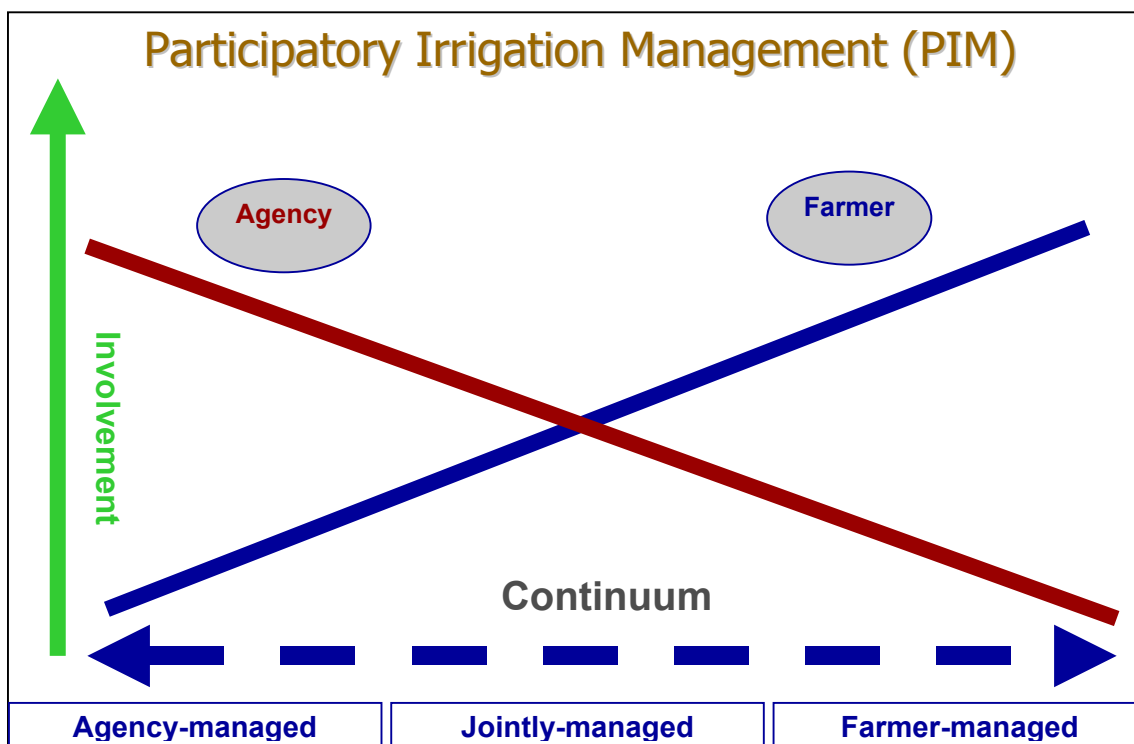


Figure 1. Continuum of Participatory Irrigation Management.

Thus, PIM implies the level, mode, or intensity of user participation that would increase irrigators' responsibility and authority in the management of an irrigation system (<http://www.maff.go.jp/inwepf/documents/inaugural/inpim-note.pdf>). Hence, the process of initiating PIM clearly is conceivable only in those systems where predominantly the agency has been undertaking various irrigation management activities in the past. Typically, such AMISs or JMISs are originally constructed by the agency without or with some involvement and/or contribution from the farmers. Nevertheless, in cases like East Rapti irrigation systems in Nepal, the management was taken over by the agency, mainly for improving the infrastructure, even though they were originally constructed by the local farmers.

Reviews of various cases indicate that the main aim for initiating PIM is to improve the prevailing disappointing performance levels of the system, both in terms of (Vermillion, 1997; Prasad et al., 1998; Groenfeldt and Svendsen, 2000; Prasad et al., 2000):

- Efficiency of the management process in irrigation service delivery and
- Productive efficiency of resources employed in irrigated agriculture.

Additional rationales behind PIM initiatives – some, particularly inspired by many success stories of FMISs - include the following:

- With PIM, management is decentralized to users in a supportive socio-technical context, which increases the farmers' ownership of the irrigation system;
- PIM provides an opportunity to bring together agencies' nomothetic-, and farmers' idiographic knowledge and experiences for improved management of the irrigation system and thus improved delivery of irrigation services;
- A higher financial and a social cost incurs when only government agencies undertake irrigation management functions;
- Irrigators have stronger incentives to manage water productively than does a government bureaucracy;
- Farmers can respond more quickly to problems or changes in the system leading to increased profitability from irrigated agriculture; and so on.

Nevertheless, PIM related undertakings may have various objectives: e.g. to improve the financial and physical sustainability of irrigation systems (Mexico or Chile); to improve water management and agricultural productivity (Andhra Pradesh, India); to cope with constraints on government budgets (Philippines, Nepal); to delegate control over the irrigation system and improve the water service (Columbia Basin, USA, Australia); etc (Peter, 2004; <http://www.fao.org/AG/aGL/aglw/waterinstitutions/default.stm>). In addition, it may also be for strategic restructuring of the irrigation sector/agency (South Australia and South Africa) involving downsizing, adoption of new mandates, redeployment of personnel, and a change from a centrally-financed line agency to a financially autonomous authority or corporation (Philippines). Sometimes, irrigators may even pressurize the state to take over the management of irrigation systems to gain control over the use of irrigation service fees and keep the cost of irrigation from rising as in the Coello and Saldaña systems in Colombia and the Dominican Republic.

KEY FEATURES OF PIM

In general, PIM activities are initiated in AMISs (or intensified in JMISs) either under the initiative of the agency or the farmers. The agency's initiative to instigate or intensify PIM related activities, which is often interpreted as 'supply-driven', largely represent an 'intervention' in the *status quo*. In the other case, irrigating farmers approach the agency seeking various financial and technical supports to address various challenges (or threats) in the irrigation system. The agency, in response, may offer various supports in the form of PIM activities with an understanding that irrigators will collectively, through their associations commonly called Water User Associations, (WUAs), assume larger roles in irrigation management activities. The latter is often termed as 'demand-driven'. Such PIM related initiatives are usually based on one or a combination of various rationales mentioned above. Congruent to the latter approach is the process of Irrigation Management Transfer (IMT), which may be initiated with either supply-driven or a demand-driven approach. The last two decades have observed several countries getting increasingly engaged in IMT both in surface and groundwater systems (<http://www.fao.org/ag/agl/aglw/waterinstitutions/profiles.stm>; Vermillion, 1997; Groenfeldt and Svendsen, 2000). Though generally known as IMT, it is also referred to as: turnover, privatization, post-responsibility system, participatory management, commercialization, self-management, etc in different countries.

Most PIM undertakings have at least two principal sets of activities: a) irrigation system rehabilitation¹ and b) institutional development for improved service delivery. The former set involves activities related to making changes in the infrastructural conditions of the irrigation system. The latter set of activities involves institutional development efforts including the development of farmer organization and related rules and regulations; training and skill development of farmers and personnel associated with irrigation management; establishing links with external support agencies, etc.

Rehabilitation of irrigation systems

As an impetus and means to introduce or intensify PIM, irrigation systems are invariably slated for rehabilitation (and/or modernization). The rehabilitation is meant for make suitable changes in the physical condition of the irrigation system so that the system becomes physically and operationally suitable for PIM related activities. In addition, it is expected that the irrigating farmers, upon assuming greater irrigation management responsibilities, will be able to do so without major technical difficulties. Rehabilitation, which to certain extent determines the eventual success or failure of PIM initiatives, is perceived as an indispensable incentive for farmers to gradually take over the management of the system. In addition to providing an opportunity of working together during the rehabilitation itself, it has often played a major role in inducing farmers' involvement in management process. Nevertheless, the strategies, scopes of work, arrangements for cost sharing and implementation of rehabilitation vary greatly from one case to another (IWMI, 2000; Samad and Vermillion, 2000; <http://www.fao.org/ag/agl/aglw/waterinstitutions/profiles.stm>; <http://www.inpim.org/leftlinks/Documents>).

1- Termed differently in different cases (system improvement, modernization, upgrading, revitalization, restoration, etc) depending upon the nature and extent of infrastructure improvement works.

FARMER ORGANIZATION DEVELOPMENT

In parallel to the rehabilitation or even before, formation or strengthening of the WUA as an institution is generally integral to PIM related initiatives. Efforts are made to ensure that the structure of such WUAs matches with the socio-physical hierarchies of canal networks in the irrigation system. An effective WUA (see next section), besides aiding the PIM process, may also determine to a large extent the sustenance of the irrigation system.

With respect to PIM activities, particularly when they are aimed for IMT, devolution of an irrigation management from the agency over to the irrigators represents a form of decentralization. It involves the transfer of authority for decision making for lower-level farmers or groups of farmers in the socio-physical hierarchy of an irrigation system, so that such lower level farmer groups can elect their own councils, raise their own resources, and have independent authority to manage irrigation systems effectively.

Moreover, operationalizing each management activity involves executing three sets of power: legislative, executive and judicial (Agrawal and Ribot, 2000). Each of these three sets of powers involves decision-making. Legislative power allows farmers to form new rules and regulations or modify old ones. Rules to access and use water, distribute to water users, and mobilize/generate resources for system maintenance are important in managing system operation. Executive power allows farmers to implement or enforce the rules as agreed upon, and to monitor whether the rules are actually followed by the users. It also allows farmers to impose sanctions on those who do not follow the rules. Similarly, judicial power allows farmers to adjudicate disputes that arise while enforcing the rules in operating the irrigation system. Thus, empowering WUA as an institution is necessary to promote PIM and devolution of irrigation management authority. Assumption of irrigation management responsibilities only by effective WUAs can result in realization of the PIM objectives. Accordingly, various institutional development and capacity building activities for irrigators and other personnel associated with irrigation management activities are undertaken during PIM initiatives.

What Makes an Effective WUA?

If looked into examples of sustainable and effective WUAs across the world, one may find four key features generally present (Wilkins-Wells and Prasad, 1994; Prasad et al., 2000; Pradhan and Gautam, 2005; Malano and van Hofwegen, 2006). The first is some form of local government for the association, based on the principle of voting and adequate checks and balances in the leadership structure. Such self-governed associations are independent of any local or central government influence other than legal certification and auditing. This is what the autonomy in association governance generally means. The formation of a self-governing leadership structure in the WUA includes the following:

- Defining the hydrological boundary of the command area
- Devising a collectively agreed upon organizational design that fits with the socio-physical hierarchies of canal networks

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- Ascertaining the decision-making process and accountability within the organizational framework
 - Incorporating provisions for adequate checks and balances/sanctions against defaulters
 - Updating the roster of the beneficiaries entitled to receive the irrigation service
 - Fixing the eligibility criteria for representation in the association
 - Setting out a process to elect/select genuine representatives accountable to the farmers
 - Defining the process for modification of organizational set up as and when needed
 - Establishing the process to seek and accept various kinds of support from different line agencies
 - Resolving the water related disputes between systems, zones of a system or individuals

The second feature is some form of association record keeping, no matter how rudimentary, designed to maintain records on labor mobilization, donations and/or fees, water delivery scheduling, association membership, and some rules about how water is to be managed and divided among beneficiaries during normal and unusual water supply conditions. Typically the record keeping activities involve the following:

- Keeping the ledger and accounts of all sorts of resources mobilized internally or externally for the irrigation system
- Comprehensive accounting of payments and various expenses
- Details of previous water delivery schedules and actual distribution at all levels of the irrigation system
- Details of cropping pattern and calendar in the command area
- Details of entitled water shares, including the utilized and the balance amounts, of individual beneficiaries
- Information regarding collected and due irrigation service fees, based on the rate fixed by the WUA in proportion to water shares
- Keeping track of the violations made by defaulters
- Preparing the budgetary details and financial statements

The third key feature is the presence of an association's water delivery workforce, however small, appointed and supervised by the association leadership to oversee the management of water and irrigation service delivery in the command area. This workforce is responsible for allocation of water and collection of irrigation fees by shares, meaning that a beneficiary's water right in the association's collective supply is roughly proportional to the contributions made by that same individual to the cost of operating and maintaining the irrigation system annually, in cash, produce, or labor equivalent. Setting up a water delivery workforce includes the following:

- Appointing a core group of people, accountable to the WUA, and mainly responsible for delivering entitled water shares of individual farmers to their fields according to the agreed upon water distribution schedules
- Assessing the duty of available water at different points in the canal system
- Defining a share of water and associated irrigation service fees per share
- Ascertaining water availability in the source and the water use right
- Assessing water demand schedules and patterns
- Suggesting and adopting operational schedules based on demand and supply conditions inclusive of plans of water distribution in different seasons and in situations of water scarcity
- Ascertaining arrangement to distribute any shrinkage in water supply over water shares
- Controlling the free riders
- Documenting details of actual water delivery to the field, time, dates, conveyance time, losses, etc.

The fourth is the mechanism for ensuring adequate maintenance of the irrigation infrastructure. It includes the following:

- Preparing prioritized inventory of required maintenance works
- Estimating resource requirements
- Scheduling maintenance works
- Allocating labors for the works to be done by internal labor mobilization
- Appointing consultants and contractors for specialized works
- Supervising maintenance activities and controlling quality
- Maintaining acquired vehicles and equipments, if any

Besides, a WUA also needs to plan and act for the long term sustenance and efficient productivity of the common pool resource system like irrigation. Therefore, it is necessary for the WUA to be sensitive toward the issues of environmental degradation, deterioration agricultural resource base including the watershed or aquifer. Also, developing linkages with different line agencies and support institutions is important for WUAs' sustained existence and thereby that of PIM.

ACTORS OF PIM

Main actors associated with PIM related activities can be categorized into two groups: a) Responsible actors and b) Contributing actors (**Figure 2**).

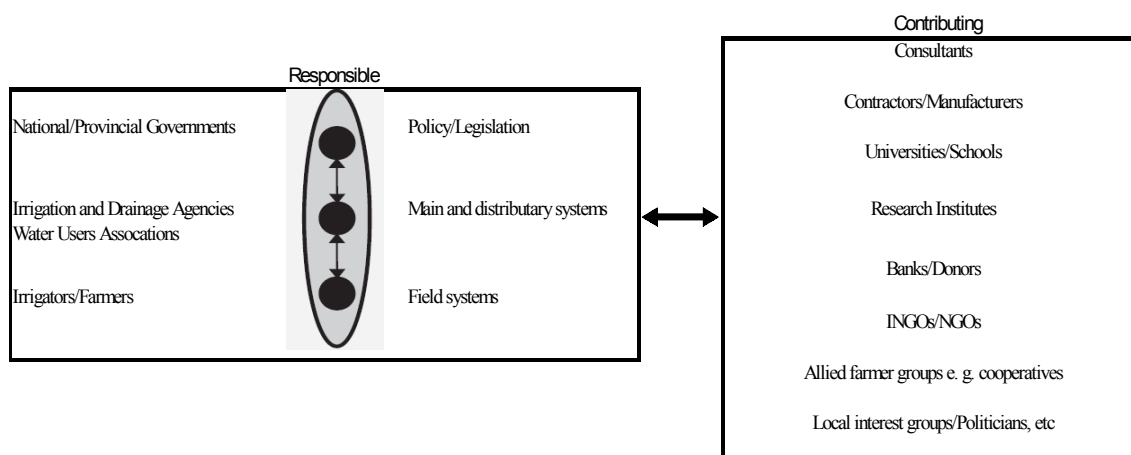


Figure 2. Actors of PIM (adapted from Schultz et al., 2005)

Generally, the responsible actors are: a) national and provincial governments; b) irrigation and drainage agencies or WUAs - which may be appointed by the government, or the irrigators, or jointly; and c) the irrigating farmers. The contributing actors may range from various donors to local politicians and other interest groups. This implies that to achieve productive and sustainable irrigation system management, the roles of these three actors and their activities associated with irrigated agriculture need to be in synergy. Nevertheless, such a synergy must be accomplished within the legal framework of a country where several rules and regulations will be applicable, such as environmental and land use regulations, ownership, etc (ibid, p. 270-271). The three responsible actors essentially reflect three levels of governance, namely; national and/or provincial; irrigation system level and field level. All other actors only contribute to, or facilitate the effort of effective and sustainable irrigation management. They are needed and have specific functions for various reasons, but ultimately, they are not responsible for the management initiatives in an irrigation system.

Case Review

The 7th conference of International Network on Participatory Irrigation Management (INPIM) pointed out that despite encouraging signs in terms of stabilizing food productions and prices, a wide variation existed in the reported gains from PIM across the world (<http://www.maff.go.jp/inwepf/documents/inaugural/inpim-note.pdf>). Such variations can naturally be expected, given the diverse socioeconomic and institutional conditions, including the objectives of PIM, in different cases. Nevertheless, some premises encompassing PIM are general as outlined below (Peter, 2004; <http://www.fao.org/AG/aGL/aglw/waterinstitutions/default.stm>):

- Traditionally, irrigation sector has largely been managed by centralized agencies at the federal/state/province level.
- Most PIM related undertakings have been supported by the major international development banks and many NGOs, often in a time-bound project mode.

- Through PIM, the irrigators are expected to assume larger role in irrigation system management.
- However, irrigation management responsibilities may be shared differently in different cases between and the agency and WUAs. For instance in countries such as France, China, Australia and United States, the regulatory responsibilities rest with the agency while infrastructure control, O&M, service charge collection, etc lie with user-represented companies/boards. In countries such as Thailand, Vietnam, Sri Lanka and Philippines, most of the irrigation management responsibilities lie with the agency but they need to be undertaken with input from the WUA representatives. In Andhra Pradesh (India), Turkey and Albania, these responsibilities are shared between the WUA and the agency with variations in specificities.
- Similarly, organization types that assume greater irrigation management responsibilities through PIM differ. The most common type is WUA, but there are also the irrigation districts which are semi-municipal governments (USA, Mexico and Taiwan). In addition, there are mutual companies where water users own shares in the management company (USA, Mexico and Shandong province in China). WUAs only act as the governing authority and may arrange for contractors to provide water delivery and/or maintenance services (USA and increasingly in China). Self-financing “public” utilities also may take over management from government agencies (Morocco and China).

These premises may significantly define the desirable institutional conditions for PIM on the ground, which may vary from one case to another.

IN-DEPTH CASE STUDY OF NEPAL

Nepal's irrigation policy strongly encourages PIM/IMT in the AMIS and accordingly, the Department of Irrigation (DOI) from 1992 has been engaged in such activities mainly in two forms - joint management and full or partial management transfer to WUAs. The policy embraces both surface and groundwater types of irrigation systems. Irrigation systems irrigating up to 2,000 hectares in the plains and 500 hectares in the hills are to be fully management-transferred to WUAs. Larger schemes would go through a gradual transfer on a priority basis keeping in view the technical requirements of the systems and the institutional capability of the WUAs. Projects such as Second Sector Irrigation Project (SISP, Asian Development Bank supported), Nepal Irrigation Sector Project (NISP, World Bank supported), Irrigation Development Project (IDP, European Union supported), Community Shallow Tube Well Program (World Bank supported), Irrigation Management Transfer Project (IMTP, Asian Development Bank and USAID supported), System Management and Training Program (SMTP) of the DOI itself, and many others such as Marchawar Lift Irrigation Project, Bagmati Irrigation Project, Mahakali Irrigation Project and so on, all emphasize on local management of the irrigation system by the organized irrigators.

By 1998, the DOI had formally transferred the management of three irrigation systems to the respective WUAs: West Gandak (9,000 ha), Panchkanya (406 ha), and Marchawar Lift (2,815 ha) Irrigation Systems. Piparpati and Parsauni minors (1,600 ha) that stand separate from the main West Gandak system, were management-transferred

to the WUAs in early 1990s assisted by USAID-supported Irrigation Management Project (IMP). In Kankai Irrigation System, the management of some tertiary canals has been transferred. Similarly, the management of about sixty deep tube wells under Bhairahwa Lumbini Ground Water Project (BLGWP) has also been transferred. All these systems were previously being managed by the DOI and now respective WUAs manage them.

Like most other cases elsewhere, the process of PIM/IMT in Nepal generally incorporates two components: (i) establishment of sustainable and effective WUAs and (ii) rehabilitation and improvement of irrigation and drainage facilities. Establishment of sustainable and effective WUAs also includes the objective strengthening them through various training and capacity building activities so that organized irrigators can successfully assume the irrigation management responsibilities of the physically improved system after the management-transfer. Rehabilitation is generally aimed at upgrading of physical condition of the system to a level that can be managed by the WUAs without technical difficulty and a minimal O&M cost is required after the transfer.

GAINS ACCRUED

Relevant research findings on performance and process of PIM/IMT in Nepal are summarized below (IWMI, 2000). The elaborations are primarily based on 3-year research activities undertaken in Nepal by International Water Management Institute (IWMI) in collaboration with various local partners.

a. Irrigated Agricultural Performance: Agricultural productivity generally showed an increasing trend at PIM/IMT sites. In some schemes, gains in yields are exceptionally higher soon after management transfer. This is likely due to rehabilitation and improved management brought about by PIM/IMT.

b. Resource Mobilization: A comparative performance assessment of resource mobilization practices suggested that the costs of O&M born by farmers are increasing in PIM sites while government allocations for O&M are at low levels following management-transfer. The collections of irrigation services in all PIM sites have improved but the amounts are less than the required regular O&M costs (Sijapati et al., 1998). In general, three kinds of resource mobilization practices are prevalent:

- Labor mobilization for canal maintenance works;
- Cash generation through collection of ISF and other sources; and
- Mobilization of necessary tools and equipment needed for O&M activities.

These resources are mobilized from among the beneficiaries of the system, i.e. internal to the system. The other source of the resources is from outside the system, or external resource mobilization. External resource mobilization might be a contribution from the government or other agencies including non-governmental organizations in the form of a monetary grant for a specific purpose, a regular government contribution for O&M, or a material contribution by the government such as supplying gabion crate boxes or cement for repairing the physical infrastructure.

The resources that each beneficiary must contribute are usually in proportion to the farmer's irrigated area and/or water allocation. The amount of cash or labor per unit of water, which is generally measured in terms of irrigated land, is determined by the general assembly of the irrigators at their annual meetings. Once the contribution rate is agreed upon and approved, the WUA enforces it strictly.

c. Quality of Irrigation Service: Farmer surveys conducted in various irrigation systems indicated that a majority of the irrigators perceived that the adequacy of irrigation water improved with management transfer. Similarly, the timeliness of water delivery became better and water distribution was fairer. In addition, farmers of transferred units faced less difficulty in arranging for irrigation water and felt it easier to get assistance of the WUAs.

c. Maintenance of Irrigation Infrastructure: Surveys indicated that the physical conditions of the irrigation facilities were better after management transfer. Partly this is due to the rehabilitation that preceded the management transfer. The positive perception was more pronounced in the transferred systems than in the non-transferred systems.

The mechanisms of contracting the construction works to farmer representatives had helped WUAs to become more effective but only where the contractor-farmers were accountable to the WUA and full transparency was maintained. Also, WUA's involvement in design aspects was useful in improving the satisfaction level of the irrigators.

d. Farmers' Institution Development: The WUAs formed in course of PIM/IMT are indeed alive, although they vary in effectiveness. Farmers have assumed several irrigation management tasks, either partly or fully. In many places elections are effective in changing leadership when needed. There is evidence that WUAs are learning and improving. However, the WUAs' capacity to enforce their own regulations is questionable in some cases.

Despite these encouraging findings, there remains inconclusive evidence whether the gains can be sustained afterwards (IWMI, 2000). In few cases, other support agencies (contributing actors) in the area were not integrated into the PIM efforts. In addition, some marginal stakeholders such as landless tenants and women were excluded from the institutional development process that took place in the irrigation systems as part of PIM/IMT. Among the key factors to success were found to be the timing of and the importance given to institutional development in the PIM process. Wherever institutional development preceded the rehabilitation, the functional status of WUAs was found reasonably well.

Institutional conditions: opportunities and constraints, Nepal

Moving on the evolutionary path of improving governance in the water sector including irrigation, Nepal has come a long way in decentralizing the related tasks and responsibilities (Neupane and Neupane, 1997; Sijapati and Prasad, 2005). Particularly, after the re-advent of multi-party representation in the government structure in 1990, the process of various stakeholders' involvement in water sector governance (facilitated by institutional changes both in terms of rules and tools) has gained a faster pace. Currently, the organizational structure of water administration in Nepal has three levels:

coordination and policy; implementation and operational; and regulatory. At the level of coordination and policy, the organizations in place are: a) National Development Council; b) National Planning Commission; c) National Water Resources Development Council; d) Water and Energy Commission; and e) Environment Protection Council. Similarly, at the ministry level, six relevant ministries and the Water and Energy Commission Secretariat is involved.

At the implementation and operational level, seven government departments and semi government organizations like Nepal Electricity Authority and Nepal Water Supply Corporation are involved. The local government bodies such as District Development Committees (DDCs), Village Development Committees (VDCs) and Municipalities as well as NGOs like WUAs are also in place at the operational level. The prevalent policy and regulations have entrusted the governance of water at the local level to the WUAs formed by the representatives of the beneficiary. This institution of local organizations with a federation at the central level (e.g. National Federation of WUA, Nepal) is playing an instrumental role at the operational level.

CONCLUSIONS

Recalling back the previously discussed framework of actors PIM, it is evident that at national and regional government level, Nepal has promulgated various laws, policies and organizational structures that are amenable to pursue the policy of PIM/IMT in the AMIS. Similarly, favorable institutional conditions exist both at irrigation system level at which both irrigation agencies and WUAs are actively engaged in PIM/IMT-related activities. Farmers at the field level also are increasingly assuming larger roles in irrigation management tasks. Thus, the institutional linkages among the three governance levels of responsible actors are evident. Nevertheless, their linkages and relationships with the contributing actors with regard to productive and sustainable management of the irrigation systems remain largely obscure and unclear. The experiences so far indicate that the experience of transferring management to farmers has been a giant experiment in Nepal. Overall, the process has been positive, but more needs to be done to achieve the desired objectives in a way that assures sustainability of the gains accrued.

An important element in PIM/IMT process is the farmers' resource mobilization to contribute to recurrent O&M expenses. In the past several attempts have been made to introduce a system to collect water fees from the farmers but without much success or long lasting. Less than 2% of the total O&M expense in the AMIS comes from farmers' contributions and 98% is born by the government. In PIM and IMT sites fee collection rates are better but far from the targeted amount (Sijapati et al., 1998). Therefore, whether gains in irrigated agricultural performance in PIM/IMT sites can be sustained is questionable. In the past, due to insufficient resource allocation for regular maintenance, irrigation systems fell into disrepair soon after rehabilitation and needed to be rehabilitated within a few years. Whether it will be possible to break the cycle of rehabilitation-decline-rehabilitation through sustainable PIM initiatives remains to be seen.

With regard to effective functioning of the WUAs, one difficulty is to locate strong leadership in the community and create an enabling environment for its emergence by

creating favorable linkages with contributing actors. This is particularly relevant to the cases in which various supports are extended in the name of supporting PIM/ IMT initiatives through short-lived donor-supported projects such as Irrigation Sector Project, Irrigation Development Project, Community Shallow Tube Well Program, etc. It is also recognized that the WUAs are not “formed” just for the purpose of meeting the condition for implementing rehabilitation without giving much consideration to their long term effectiveness and sustenance.

RECOMMENDATIONS

Refine Goals and Objectives of PIM/IMT: Broadly speaking PIM/IMT in Nepal foresees improvement in agricultural performance and reduction in government expenditure. Though the state has been adopting the policy of PIM/IMT for last several years, clear and measurable objectives are not yet laid out. Instead, transferring the irrigation system over to WUAs in itself is perceived as one of the objectives in contrast to defining the impacts and results that are expected from the management transfer. Defining clearer objectives of management transfer would give a clearer focus to the PIM/IMT effort.

Ensure Sustainability of Gains Accrued through PIM/IMT: Positive impacts of PIM/IMT in Nepal include greater farmer participation in water supply and system management; increased contribution of farmers’ resources to operate and maintain the systems; higher agricultural production; and a more positive farmer perception towards water delivery services. And possibly this all is feasible at reduced recurrent O&M costs born by the state. However, the main threat to these gains is lack of sustainability. To ensure a durable positive impact the state needs to give much more attention towards issues such as:

- Sufficient resource allocation for O&M (be it from farmer contributions or government subsidies).
- Ways to locate good leadership in the community and create an enabling environment for its emergence.
- Focus on institutional development of WUA before rehabilitation. Development milestones, such as WUA registration, certain percentage of service fee collection, etc. as preconditions before starting technical works.
- Post transfer support: DOI should broaden its role of ‘irrigation system manager’ towards ‘support service provider’ – responsible to contributing actor. Such services include providing training to WUA in essential O&M tasks, facilitating access to other services (credit, agricultural extension), and ensuring appropriate legal framework for WUAs to function smoothly.
- More (human and financial) resources allocated to ensure a functional monitoring and evaluation (M&E) system to monitor impacts of PIM/IMT.

More generally, IMT should not be taken as PIM. It is more plausible to see IMT as one of many means for fostering PIM in the management continuum (**Fig 2.**) aimed at improving their performances.

An important area which is sometimes overlooked in the design of IMT programs is the support system for WUAs and irrigated agriculture during and after management transfer. Clear roles of responsible and contributing actors at state/national, provincial are often obscure. Planners need to consult with water users about what support services are most needed by the farming community in order to assume the new responsibilities and tasks as well to overcome constraints and to explore new income opportunities. Support services during and after management transfer may include advisory services about institutional arrangements for the WUA, establishment of organizational and financial procedures and skills, credit facilities, legal advice, marketing and construction procedures. Training and extension will be an important tool to develop the knowledge and skills of farmers and enable WUA officials to undertake management responsibilities and ensure more profitable irrigated agriculture.

REFERENCES

- 1- Agrawal, A and J.C. Ribot. 2000. "Analyzing Decentralization: A Framework with South Asian and West African Environmental Cases." Working Paper. World Resource Institute.
- 2- Groenfeldt, D and Mark Svendsen (eds). 2000, Case studies in participatory irrigation management. WBI Learning Resources Series: TC812.C37. The World Bank Institute, Washington DC.
- 3- IWMI, 2000. Evaluation of Management Transfer Performance and Process, Nepal. Project Completion Report. (September 1996 – April 2000). May 2000. International Water Management Institute, P. O. Box 2075, Colombo, Sri Lanka.
- 4- Malano, H. and P. van Hofwegen, 2006. Management of Irrigation and Drainage Systems: A Service Approach. IHE Monograph 3. UNESCO-IHE, Delft, Netherlands.
- 5- Neupane, I. and Neupane, B. 1997. Institutional Framework to Support Management Transfer. In workshop proceedings: Evaluation of Irrigation Management Transfer Process and Performance - Workshop held in Kathmandu, 5-6 October 1997. Neupane, I.; Prasad, K. C. (Eds.) 1997. Proceedings of workshop jointly organized by Research and Technology Development Branch (RTDB) and IIMI. 139p. + annexes.
- 6- Peter, Raymond J., 2004. Participatory Irrigation Management. INWEPF/SY/2004(06). Pp 13.
<http://www.maff.go.jp/inwepf/documents/iaugural/inpim-note.pdf>.
- 7- Pradhan P. and U. Gautam, 2005. Farmer Managed Irrigation Systems and Governance Alternatives. Proceedings of the Third International Seminar, 9-10 Sep 2004, Kathmandu, Nepal. FMIS Promotion Trust, Nepal.
- 8- Prasad, K., Thoreson, Bryan P., and David J. Molden. June 2000. Tracing the History of the Development and Management of Two Irrigation Systems in the Terai of Nepal. In proceedings of the International Conference on "The Challenges Facing Irrigation and Drainage in the New Millennium", June 20-24, 2000. Fort Collins, Colorado, USA.

- 9- Prasad, Krishna C., Sijapati, S., Pradhan, P., Sharma, K. R. and Nicola Riddell, 1998. Irrigation Service Fees in Nepal. IIMI and Research and Technology development Branch/DoI, Kathmandu, Nepal.
- 10- Schultz, B; Thatte, C. D.; and V. K. Labhsetwar; 2005. Irrigation and Drainage: Main Contributors to Global Food Production. *Irrigation and Drainage* 54: 263–278 (2005). Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/ird.170.
- 11- Sijapati, S., Prasad, K. C., and W. R. Laitos, 1998. Resource Mobilization for Participatory Irrigation Management. In proceedings of the INPIM Seminar held during 10-14 Nov 1998, IAAS, Chitwan, Nepal.
- 12- Sijapati, S. and Krishna C. Prasad, 2005. Improving governance in Nepal's water resources sector through institutional changes. In proceedings of Third International Conference of USCID, March 29-April 2, 2005, San Diego, USA. Pp. 141-151.
- 13- Wilkins Wells, John and Krishna C. Prasad, September 1994. The Role of Rural Credit Institutions in Irrigation Management Transfer. In proceedings of the "International Conference on Irrigation Management Transfer", September 20-24, 1994, Wuhan, P. R. China.
- 14- Vermillion, D. L. 1997. Impacts of irrigation management transfer: A review of the evidence. Research Report 11. Colombo, Sri Lanka: International Irrigation Management Institute.