

# FROM STATE TO JOINTLY MANAGED IRRIGATION SYSTEMS

## SOCIAL MOBILIZATION AND MANAGEMENT TRANSFER GUIDELINES FOR LARGE CANAL SYSTEMS

*Zafar Iqbal Mirza  
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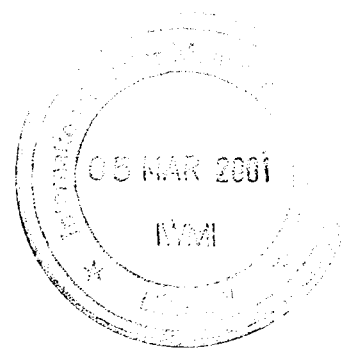
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**International Water Management Institute**

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## FOREWORD

Like many countries, Pakistan is attempting to reform its irrigation and drainage institutions to improve the performance of the systems in a sustainable manner. This requires involvement of the users. Users can perform some tasks and responsibilities better than the agencies at some levels of the system. However, before transferring the responsibilities to farmers, they need to be organized.

Often, the agency staff involved in a transfer program do not view the reform process holistically. Therefore, the emphasis on various tasks is skewed and distorted. Resultantly, some

tasks are performed more efficiently than others, but the outcome is not optimized as some other tasks are completely ignored.

This report puts various tasks related to a transfer program in a developing country with a complex irrigation system together and marks the roadmap for moving from an agency managed to a jointly managed irrigation system. With incorporation of the local experience gained over past few years, the document refines the earlier conceptual framework.

We sincerely hope that those interested in transferring irrigation management systems to users would benefit from this attempt.

S. A. Prathapar  
Director, Pakistan Office  
IWMI

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The process in Pakistan was completed with the cooperation of the farmers of Hakra 4-R Distributary, and a team of social organizers of IWMI. Without their work in the field this piece of work could not have been accomplished. Their cooperation is an important input and inspiration.

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## EXECUTIVE SUMMARY

The performance of the state managed irrigation systems, including the huge integrated Indus Basin Irrigation System of Pakistan, has been on decline, and is an equal cause of concern for policy makers, managers, and the users. One main reason for this decline is lack of involvement of users in the management of the systems. In many countries, the irrigation and drainage sectors are undergoing restructuring and reforms, whereby the farmers will participate in the management, and the Farmer Organizations (FOs) will take over the system management at various levels. The past experience with the farmer institutions, such as water users associations at the tertiary level and problem free water distribution through the institution of warabandi in the Indus Basin, show that farmer's potential so far has not been fully utilized. These guidelines document the lessons learned from the process of organizing farmers at a medium to large-scale distributary in southern Punjab and elsewhere in the world. A tailor-made process of transferring the system to FOs is presented as guidelines, which can be adapted to local conditions.

The proposed process is broken down into five distinct but related phases, and is iterative. Each phase builds on the results of the previous phase. These phases comprise planning and acceptance, collaborative arrangements, initial organization, joint management agreement, and joint management implementation. The phases are divided into sub-phases, and each sub-phase contains a few activities. The countries and regions at various steps of such reform processes can fit into one or more of the phases spelled out, depending on the already achieved progress in sharing management with users.

The Planning and Acceptance Phase starts with a clear policy adoption by the government. The policy decisions should be taken after wide debates and discussions among the stakeholders to involve farmers in the management. The highest

possible level should be involved in chalking out the policy options. The prevalence of a multitude of perceptions and apprehensions among the stakeholders necessitate the need for debates, discussions and information sharing. Mass media can be an important tool to share information and debate the issues. An enabling legal framework should support the policy, reflecting safeguards against all apprehensions. The arrangements required to support the policy of sharing and transferring responsibilities to the users need to be identified and clearly spelled out. The commitment by the government can be assured by seeking a formal approval of sharing responsibilities and users involvement. The implementers of the new management program should be identified and made responsible. In general, working in a changed environment is difficult for the agency staff, so consultants are hired to initiate the process, and the agencies get involved later. Since the tasks involved are many, many institutions, organizations, persons, and communities are required to work together. The role of every one of them needs to be clearly spelled out.

The Collaborative Arrangements Phase begins with chalking out the details of the program, where organizational work plans are shared, discussed and agreed among the implementing agencies. To support this and subsequent phases, a high level and high-powered committee supervised by the responsible agency needs to be constituted. Apart from the road map, implementation and review arrangements need to be spelled out shared and agreed at this stage. Other tasks are to select criteria for site and staff selection, estimation of budget and arrangements for training the staff. The implementers in the field should adopt teamwork approach. Best-suited staff for social mobilization would be agriculture, sociology, irrigation or other suitable graduates with a rural background, knowledge about irrigated agriculture, and a flair for community work. The



attitude of the staff towards communities plays a very important role.

Ideally, the process should focus on mobilizing people without much physical or monetary incentives.

The staff training program should be prepared including the subjects of agriculture, irrigation system and its problems, benefits of organized behavior, leadership skills, traditions and values of rural communities, the process of social organization, responsibilities of the stakeholders, and the legal framework. After imparting the training, the team is ready to mobilize farmers.

The Initial Organization Phase requires understanding of the community, its problems, the irrigation system performance, and its impacts on irrigated agriculture. The baseline information not only helps in knowing the community and its environments, but also provides initial indicators to compare the impacts.

The farmers will only organize if they see value in improving their water supply to farms through an organized effort. Community based Social Organization Volunteers (SOVs) are an important way of breaking the ice between the organizers and the community. The SOVs can be very helpful if the right persons are identified, for which a number of criteria can be used. Together with the SOVs, a number of dialogues, or meetings can be arranged for knowing each other, information sharing and discussions, identifying benefits of organized action for water management and structuring the future organization. Each dialogue should build on the results of the previous dialogue and address the issues raised in various dialogues. Through these dialogues, rapport will be built and farmers will start thinking about the forthcoming (s)election meetings to choose leadership. Once leadership is chosen in accordance with the legal framework (usually on hydraulic boundaries), the distributary level Farmers Organizations can meet to consult each other and discuss and agree on the method of choosing the leadership for the irrigation system.

For larger canals, three-tier structure is better than a two tier structure. Likewise, an intermediate organization for a hydraulic unit between two measurement structures would be more suitable than a single level organization. However, the general body of the FO should comprise of all general body members selected from the individual hydraulic units (tertiaries).

At this stage, the FO leadership should visit a farmer managed irrigation system within the country, which will give them an idea of how other farmers are managing their distributaries. The leadership should go through a series of training programs focused on the essential tasks the FO has to perform. Then, the FO should frame its own bylaws. A model bylaw for a similar setup is very useful to start with.

The FO conducts hydraulic surveys of the system and translates findings into a plan of operation during the Joint Management Agreement Phase. The plan of operation classifies maintenance into a prioritized list and specifies operational procedures as well as a monitoring, evaluation and feedback (ME&F) program. Based on the plan of operation and the ME&F program, the agency and FO agree on roles and responsibilities of both parties and sign a Joint Management Agreement. Meanwhile, the FO is trained to discharge various responsibilities. Necessary resources are committed from the responsible agency. The FO selects and trains its staff, and is ready to implement the plan of operation.

Once the agreement is signed and FO recruits its staff, the agreement needs to be implemented during the Joint Management Implementation Phase. FO and agency staff discharge their assigned responsibilities and the plan of operation is revised in accordance with the findings of the ME &F program, seasonally. If the FO feels comfortable, and the agency is satisfied, the irrigation system in part or as a whole can be transferred to the users.

# 1 INTRODUCTION

Water becomes a crucial resource in agrarian economies, such as Pakistan, where an overwhelming majority of the population is directly or indirectly dependent on agriculture as a source of livelihood. Besides, agricultural produce becomes the economic foundation for foreign exchange earnings, making water all the more important.

The existence of a gigantic irrigation system and vast networks of irrigation channels alone, do not necessarily mean that a high level of agricultural productivity is ensured to help poverty alleviation. The higher level of agricultural productivity, which also is environmentally sustainable, has many other important ingredients that need to be considered. Of these, the most important one is the reliable and equitable supply of irrigation water, the lifeblood of plants. Equitable distribution and reliable supply of irrigation water primarily depend on the irrigation system performance. Past research in Pakistan (for instance Bhutta and Vander Velde, 1992, Kijne and Kuper, 1995) shows that low levels of agricultural productivity are associated with low performance and poor management of the irrigation system. The poor system performance results in inequitable and unreliable water supplies and increases environmental problems of soil salinity, soil degradation and waterlogging. Policy makers, donors and researchers clearly emphasize the need for improvement in water distribution and tail shortages (World Bank 1993, Bhutta and Vender Velde, 1992, Kuper and Kijne, 1993). The worldwide experience to date suggests that the users' involvement in the irrigation systems' management is useful to redress these problems (Groenfeldt and Svendsen, 2000).

Often, one of the strategies to improve irrigation system performance is to devolve the management responsibilities to users at various levels of the irrigation systems. However, devolution of responsibilities does not happen

automatically. The policy makers often confront the problem of "how to devolve management responsibilities to the users".

This report suggests some guidelines to improve irrigation system's efficiency by involving users in the system management through a gradual learning process. Improved system efficiency can lead to enhanced agricultural productivity and achieve the ultimate goal of poverty alleviation.

We refer to the state managed systems, where farmers are only beneficiaries, jointly managed systems, where farmers discharge some management responsibilities or manage part of the irrigation system completely, and farmer-managed systems, where farmers manage the complete system. Involving users in the management is broadly conceived as Participatory Irrigation Management (PIM).

Though the focus of this report is Pakistan's irrigation system, nevertheless, it can be applied to all countries having similar irrigation systems managed by government agencies with a similar socio-political milieu.

The guidelines suggested here for joint irrigation management are in fact a combination of the international and national experiences gained during last few years. The conceptual framework is drawn from process developed by Skogerboe, et al; (1993) for converting an agency managed irrigation system to farmers managed or jointly managed irrigation system. Keeping in view local experience reported by Bandaragoda et.al (1997a); Bandaragoda et.al (1997b), socio-economic, socio-political and cultural milieu in Pakistan, necessary modifications have been made to best suit the local conditions.

## 1.1 Rationale For Promotion of User's Participation

The gradual deterioration of irrigation systems throughout the world has exposed serious

organization and its leadership until the organization devolves the capacity to carry out tasks on its own.

Presently, Pakistan's irrigation system is agency managed where system has already been constructed by the government, and is being operated and maintained by the agency. The system is steadily deteriorating and performing far below users expectations; and there is a great mistrust between the agency and users. Some of the causes of ever declining system performance and growing mistrust are:-

- centralized irrigation bureaucracy;
- under-investment;
- neglect in operation and maintenance;
- inequity in water distribution;
- lack of information sharing;
- rent-seeking behavior;
- lack of accountability;
- disregard towards operational rules; and
- high level of political interference.

Pakistan does not have much experience of users participation at secondary level of the irrigation system, but do have almost two decades of experience of participatory irrigation management at the tertiary level under On-Farm Water Management (OFWM) and Command Water Management (CWM) Projects. Several monitoring and evaluation studies (OFWM, 1979 and 1981, WAPDA 1984, Agriculture Department Punjab 1981, P&D division 1984 and PERI, 1985) show that the program had positive impacts on water saving and crop yields. These studies also reflected reduction in waterlogging and salinity, better equity in water distribution between head and tail end farmers and reduction in water related disputes at the watercourse level.

Various other evaluations (Gill 1994, Bashir and Iqbal 1994, Byrnes 1992) indicate that the community participation through Water Users Associations (WUAs) performed a commendable job for irrigation system improvement at tertiary level. Experience of Command Water Management Project (1992) concludes that there is a great potential for building farmers institutions

at secondary level of the irrigation system and farmers are very keen to have, effective and viable institutions. Majority of the experts involved in irrigated agriculture, planners, policy makers and politician, do not believe in participatory irrigation management. They believe that farmers are illiterate and under present socio-cultural milieu, they cannot be organized and involved in participatory irrigation management (Haq, 1997).

## **1.2 Farmers Ability to Manage Irrigated Agriculture**

Agricultural production is a complex process that is also linked to a multitude of agricultural and non-agricultural factors and activities. Low agricultural productivity is generally a consequence of one or more factors on which the farmer has little or no control. Examples of factors that limit agricultural production include: inadequate, inequitable and unreliable water supply; inability to purchase agricultural inputs (seed, fertilizers and pesticides); low market price for agricultural products; lack of marketing, storage and transport facilities; lack of labor and machinery; inadequate training and government policy.

Despite all these limiting factors, farmers and particularly the small farmers (87% of the farming community) have proved efficient managers of the resources available to them. They have survived for centuries, not because they are ignorant or illiterate, but because they are masters of the art of allocating and balancing scarce resources to maximize returns for the benefit of their families. Small farmers are said to be the "risk avoiders", they cannot afford to lose any resource or mismanage it, because their margin of error to survival is slim. This basic tenet needs to be recognized by all the agencies involved in irrigated agriculture, experts, policy makers and governments, if farmers are to be helped to a better life and contribute to the national economy.

### **1.3 Users Participation in Irrigation System O&M: Past Experiences**

Pakistan has more than two decades of experience in formal users participation at tertiary level of the irrigation system under On-Farm Water Management (OFWM) program. OFWM is probably the only program in Pakistan, where contractors are not engaged and civil works are supervised and carried out by the beneficiaries themselves. Since the inception of OFWM, over forty thousand watercourses have been renovated through water users organizations, whereby water users have contributed almost Rs. 8 billion labor, masons and material cost for civil works (Gill, 1996), averaging 0.2 million rupees per watercourse.

Various evaluations of the program have indicated that water users associations have performed a commendable job by undertaking improvements on cost sharing basis, yet viability of these organizations after renovation of the watercourses is questionable.

One major reason for their non-viability is that they were not given any regular post-renovation activity. Similarly, the legal framework for the watercourse level WUAs suffers from a number of limitations. One of the limitations is the power to levy sanctions against the users who do not undertake adequate maintenance of their channel is vested with high level officials who seldom get a chance to visit a watercourse, as their area of jurisdiction comprises thousands of watercourses.

### **1.4 Warabandi as an Institution**

Irrigation in Pakistan is being practiced since the dawn of the history. Originally, the users diverted the water from rivers by construction of dykes and levees during high flows into inundation canals. At that time the irrigation system was solely beneficiary controlled with little or no government interference. The history reveals that the institution of warabandi (water distribution through an irrigation roster) where farmers managed water distribution themselves existed before the colonial period. When the British started constructing

irrigation network, warabandi was adopted from unofficial (Kachi) system of water distribution at watercourse level. However, with the spread of irrigation system, change in socio-political scenario and increase in water related disputes, on the demand of water users, unofficial (Katcha) system of armband was changed into official (Pucca) warabandi. A recent study on Warabandi in Pakistan's Canal Irrigation System (Bandaragoda and Rehman, 1995) reveals that even after the warabandi was officially registered, not a single watercourse in the study sample was strictly adhering to official warabandi in daily water distribution operations. Instead, all watercourses had different schedules modified according to mutual agreement among the water users. These modifications have fair degree of flexibility in their application. However, official warabandi schedules are retained as a formal standard to which the water users can fall back in case of any serious dispute. It shows that informal farmers institutions and behavior of collective action exists at watercourse level and can be exploited at higher level of the irrigation system.

### **1.5 Users Participation in the O&M of the Secondary Level Irrigation System**

Learning from the international experience, a number of pilot experiments in Pakistan have been undertaken to test the viability of the users' organizations in managing the secondary level irrigation system. The experience so far suggests that the users enthusiastically participate in such organizations and readily undertake the maintenance activities on self-help basis. The users were found imbued with enthusiasm to manage the distributaries and minors [Bandaragoda and Memon (1997), Bandaragoda et. al. (1997a); Hassan and Memon, (1998), Hassan et.al, (1999)]. Initial findings therefore suggest that there is a great potential for users participation in the O&M of the Irrigation System.

## 2 PROPOSED PROCESS

It is not always feasible to bring a positive change in a society or system through an intervention or a model, which is not home grown. The society or a system, which has been established since many decades and practices traditional approaches, has its own norms and values, which resist change. The reason is the apprehensions and fears of members on introduction of structural changes and their vested interest in the system.

It is, therefore, imperative to test and try such model for change at small scale, develop it, modify it to accommodate local socio-economic, political and cultural conditions and then implement it at large scale. The model must be technically feasible, financially viable and socially acceptable to local community.

The proposed framework for the Joint Irrigation System Management (JISM) process has five distinct but related iterative phases, with each phase building on the results of the earlier phases,

as shown in Figure 1. These phases steps include:

- Phase I: Planning and acceptance
- Phase II: Collaborative arrangements among agencies
- Phase III: Initial organization
- Phase IV: Joint management agreement
- Phase V: Joint management implementation

Each phase has two sub-phases and each sub-phase has various activities and sub-activities to carry out. The successful implementation of the suggested guideline depends on careful planning, adoption of slow and stepwise approach and a high level of commitment by the government, political leadership and the concerned agencies. The process may take 3 to 5 years to bring the desired institutional changes and convert existing irrigation system to a Joint Irrigation System Management (JISM) mode, popularly known as participatory irrigation management, depending upon socio-political environment in the country.

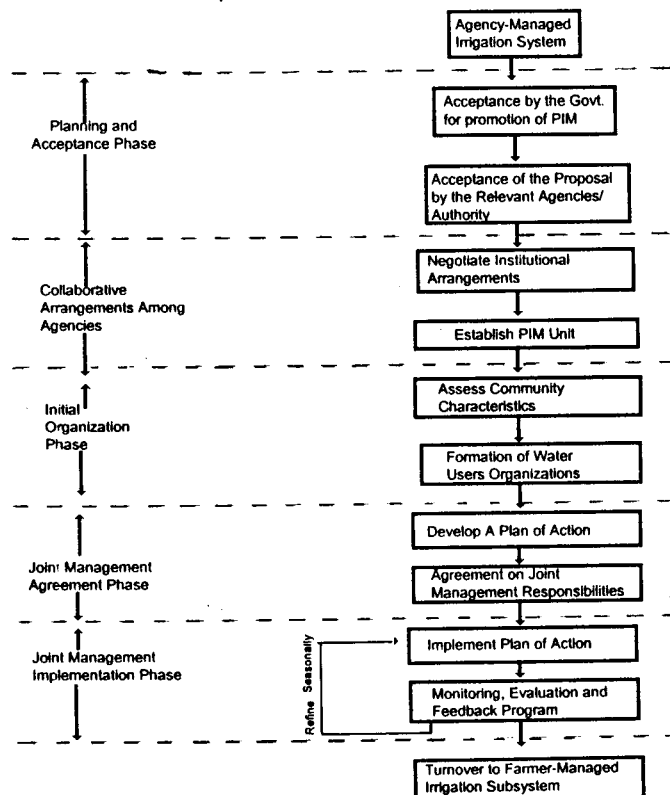


Figure 1. Proposed process for the Joint Irrigation System Management.

### **3 PHASE I: PLANNING AND ACCEPTANCE**

#### **3.1 Planning**

Every society, organization or institution generally has some set rules, traditions, customs and social or cultural values. Any physical intervention or introduction of a change in such an environment, where the society, organizations or institutions are practicing their own values, a sudden introduction of new rules, and norms is initially resisted. In the context of Pakistan, reasons for resistance could be the hierarchy of authority and prestige feelings prevailing in the bureaucratic setup, rules adopted from the British regime, mistrust among the institutions, government agencies and end users and socio-cultural and religious values of the society. It is only possible when all actors involved are ready to accept the change.

This can be attained through proper planning (Figure 2) with active participation of all stakeholders. Participatory irrigation management calls for inter-disciplinary approach whereas Pakistan's system is built on the mono-discipline and hierarchical authority. Therefore it is inappropriate that the agencies alone prepare a proposal or a plan. Suggested approach is the preparation of plan by some experienced institutional consultant as a resource organization with interactive participation of the stakeholders in the process. The consultant should prepare proposal/plan in consultation with all relevant agencies/actors considering their fears and apprehensions about the forthcoming changes.

#### **3.2 Acceptance**

There is no doubt that approval of the plan and the commitment of the relevant authorities to implement the plan is another important ingredient for a positive change. For consensus and commitment, arrange workshops at regional and/or provincial headquarters, involve people from all levels i.e. policy level (Ministers and Secretaries, Bureaucrats) and executives from the relevant

agencies, experts, scientists, end-users and discuss the proposal. Review the draft proposal; incorporate the suggestions and present at a national seminar to the federal authorities, relevant stakeholders, experts and farmers representatives for securing their suggestions and approval. Also media dialogues through television, radio, and newspapers should be used to reach a wider audience. Refine the plan in the light of discussions held in the national seminar and suggestions made by the participants. This will complete the consensus building process. Submit refined Proposal to the government for final approval and implementation. Role, rules and responsibilities of different actors involved should precisely be defined at this stage.

#### **3.3 Support Mobilization**

Participatory Irrigation Management requires a new vision of people. The farmers or beneficiaries become the managers at tertiary and secondary level of the irrigation systems, and the agencies of the government are the service providers, with a strong say of farmers at the policy level. Farmers organize themselves into associations / organizations and operate and maintain the irrigation system through hired technical staff. The government has the responsibility of providing a supportive legal framework, enacting policies, and a range of technical and financial services to help the farmer organizations in this new management role.

To make PIM happen as a reality on ground, two steps are important. The first and the most important is that the government adopts a policy that clearly supports PIM, followed by the provision of legal framework. Second important step is the identification of various stakeholders of the irrigation system and addressing their issues and apprehensions to gain requisite support for implementation. Those with a "stake" in the irrigation sector are not confined to agency staff

and farmers, but include other agencies, NGOs, politicians, researchers, donors, journalists and general public whose taxes must eventually pay for the government subsidies to the irrigation sector. All stakeholders, therefore, need to be made aware of the issues and the logic of PIM to make them supportive of PIM policies. After the planning and acceptance, intensive use of mass

communication media, radio, television, newspapers and education programs are suggested to gain support of all stakeholders and general public, otherwise all effort could go in vain. A recent effort of Pakistan's agricultural extension used a role-play at TV; such efforts can be used for mobilizing community support for participatory irrigation management

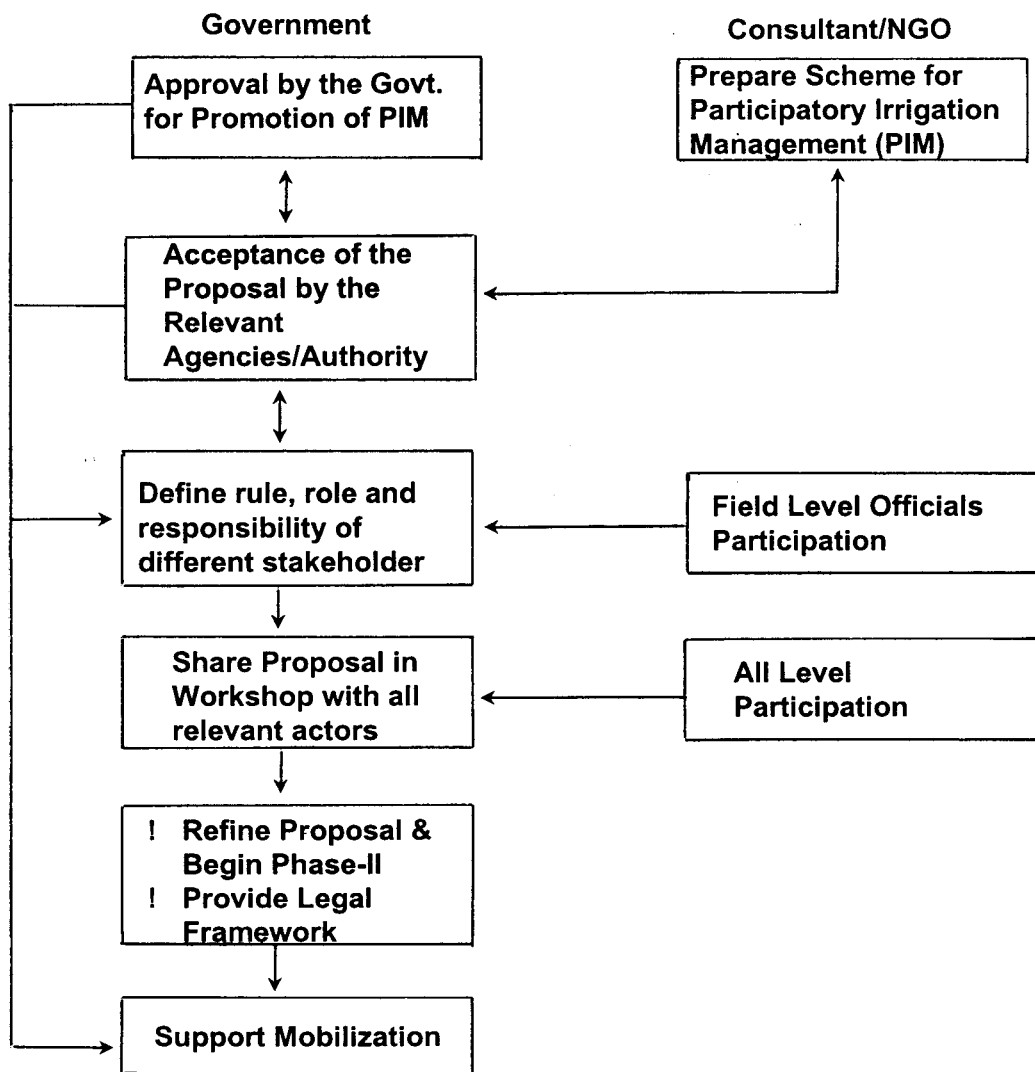


Figure 2. Phase1: Project planning and acceptance.

### **3 PHASE I: PLANNING AND ACCEPTANCE**

#### **3.1 Planning**

Every society, organization or institution generally has some set rules, traditions, customs and social or cultural values. Any physical intervention or introduction of a change in such an environment, where the society, organizations or institutions are practicing their own values, a sudden introduction of new rules, and norms is initially resisted. In the context of Pakistan, reasons for resistance could be the hierarchy of authority and prestige feelings prevailing in the bureaucratic setup, rules adopted from the British regime, mistrust among the institutions, government agencies and end users and socio-cultural and religious values of the society. It is only possible when all actors involved are ready to accept the change.

This can be attained through proper planning (Figure 2) with active participation of all stakeholders. Participatory irrigation management calls for inter-disciplinary approach whereas Pakistan's system is built on the mono-discipline and hierarchical authority. Therefore it is inappropriate that the agencies alone prepare a proposal or a plan. Suggested approach is the preparation of plan by some experienced institutional consultant as a resource organization with interactive participation of the stakeholders in the process. The consultant should prepare proposal/plan in consultation with all relevant agencies/actors considering their fears and apprehensions about the forthcoming changes.

#### **3.2 Acceptance**

There is no doubt that approval of the plan and the commitment of the relevant authorities to implement the plan is another important ingredient for a positive change. For consensus and commitment, arrange workshops at regional and/or provincial headquarters, involve people from all levels i.e. policy level (Ministers and Secretaries, Bureaucrats) and executives from the relevant

agencies, experts, scientists, end-users and discuss the proposal. Review the draft proposal; incorporate the suggestions and present at a national seminar to the federal authorities, relevant stakeholders, experts and farmers representatives for securing their suggestions and approval. Also media dialogues through television, radio, and newspapers should be used to reach a wider audience. Refine the plan in the light of discussions held in the national seminar and suggestions made by the participants. This will complete the consensus building process. Submit refined Proposal to the government for final approval and implementation. Role, rules and responsibilities of different actors involved should precisely be defined at this stage.

#### **3.3 Support Mobilization**

Participatory Irrigation Management requires a new vision of people. The farmers or beneficiaries become the managers at tertiary and secondary level of the irrigation systems, and the agencies of the government are the service providers, with a strong say of farmers at the policy level. Farmers organize themselves into associations / organizations and operate and maintain the irrigation system through hired technical staff. The government has the responsibility of providing a supportive legal framework, enacting policies, and a range of technical and financial services to help the farmer organizations in this new management role.

To make PIM happen as a reality on ground, two steps are important. The first and the most important is that the government adopts a policy that clearly supports PIM, followed by the provision of legal framework. Second important step is the identification of various stakeholders of the irrigation system and addressing their issues and apprehensions to gain requisite support for implementation. Those with a "stake" in the irrigation sector are not confined to agency staff



## 4 PHASE II: COLLABORATIVE ARRANGEMENTS AMONG AGENCIES

### 4.1 Negotiate Institutional Arrangements

After the approval of the plan of the joint management, consultants along with agencies directly involved in implementation of this plan should meet and chalk-out the details of collaborative arrangements. A high level

committee under the direct supervision of the Planning and Development Wing of government with clear mandate and set objectives and goals may be constituted for the purpose. Important items to be decided are preparation of detailed program, establishment of review committee and field execution teams, site selection and budgets and training of staff (Figure 3).

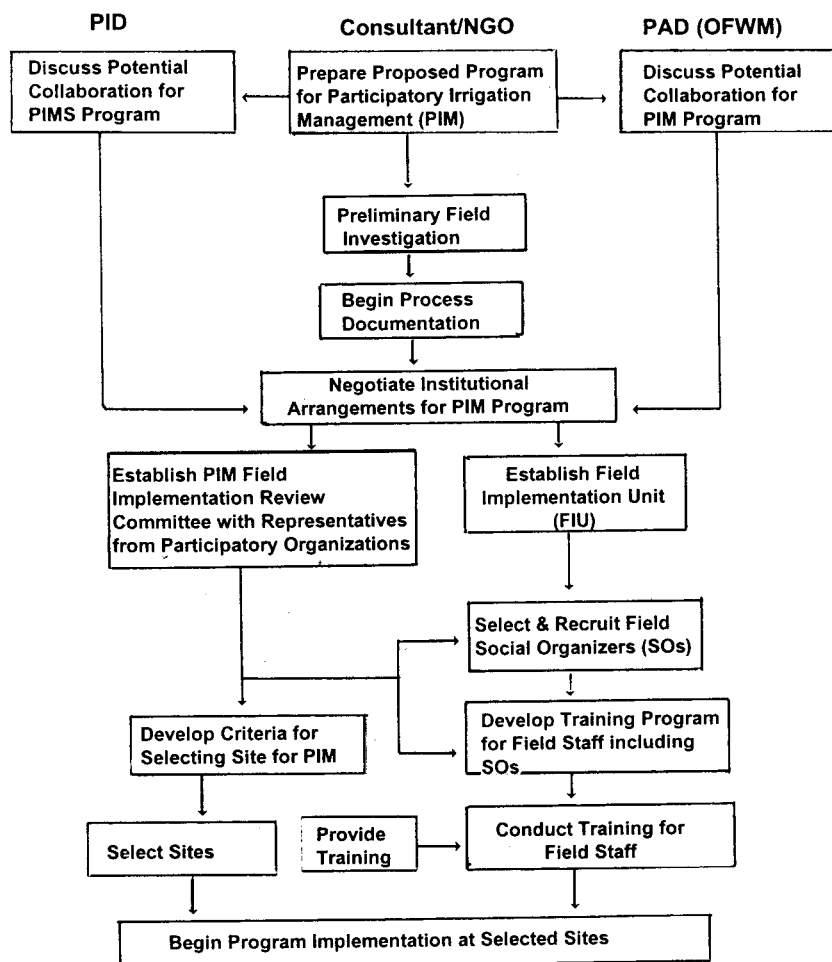


Figure 3. Phase II: Collaborative arrangements among agencies.

#### 4.1.1 Program Preparation

Prepare schedule of implementation, identify human and financial resources and other logistics needed for program implementation. Make necessary arrangements for required resources. Review and redefine roles and responsibilities of

each agency involved. The job description and performance indicators for the agency staff are modified as well. For proposed institutional set-up see Figure.4.

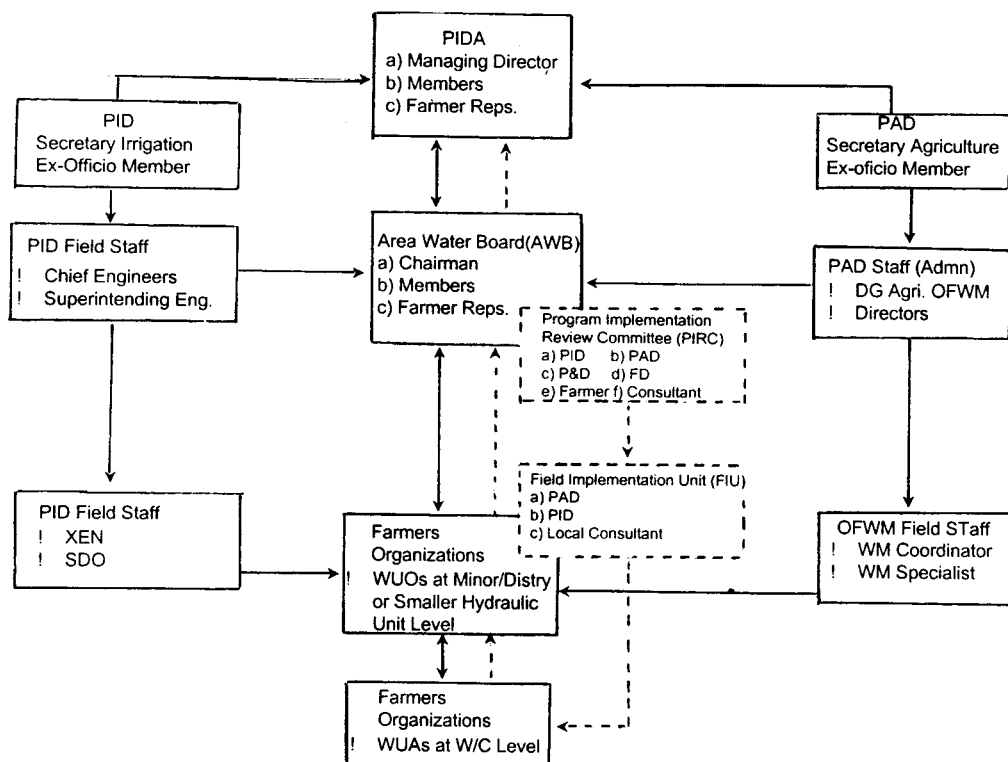


Figure 4. Proposed institutional structure for Jointly Managed Irrigation System (JMIS) in Pakistan.

#### 4.1.2 Establishment of Program Implementation Review Committee

For successful implementation of a program, an effective mechanism to monitor the progress needs to be developed. Establish a program implementation review committee comprising of some senior officials from PID, P&D, FD, OFWM, Local Consultant and a Farmer member. They should review day to day progress and constraints encountered and make quick decisions to solve the problems. Strict vigilance and monitoring and timely decision making by the committee helps in efficient implementation of the program.

#### 4.1.3 Site Selection

Develop a set of criteria for selection of an appropriate site to promote participatory irrigation management. The main points considered while selecting a site and its size are availability of human and financial resources and need of the area. It is worth to select a site, which is suffering

the most and needs immediate attention. Aside from above consideration, if program is new and there is no such example in the country then select an area where people are receptive to change. In a nutshell, the selected site should reflect the socio-cultural and water supply conditions that require change.

#### 4.2 Establish Field Implementation Unit (FIU)

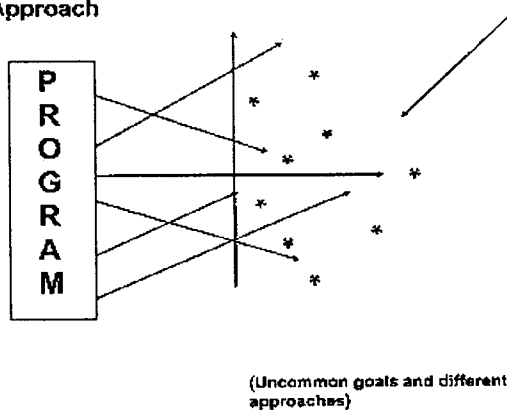
Mono-dimensional and mono-disciplinary or multidisciplinary approaches in the past could not result in sustainable institutional and irrigated agriculture development. The reasons were that their goals were uncommon, approaches were different and activities were uncoordinated. To achieve a common goal through coordinated activities, establish a truly participatory and interdisciplinary field team comprising of

professionals from all relevant disciplines such as engineering (civil & irrigation), agriculture, economics, social science etc. (Figure 5). Suggested strategy for successful implementation

of joint irrigation management is therefore a TEAMWORK approach. FIU should comprise personnel from PID, OFWM and local Consultants (Resource person and Social Organizers).

#### Multi-Disciplinary Approach

- Irrigation Water
- Social Science
- Engineering
- Agriculture
- Economics
- Water Users
- Facilitating
- Training
- Others



#### Inter-Disciplinary Approach

- Irrigation Water
- Social Science
- Engineering
- Agriculture
- Economics
- Water Users
- Facilitating
- Training
- Others

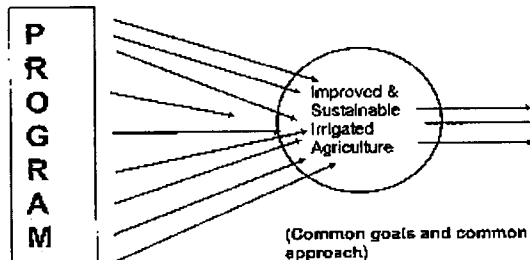


Figure 5. Multi-disciplinary vs. inter disciplinary approach for Participatory Irrigation Management.

### 4.2.1 Teamwork Approach

The first principal of teamwork is that all the members of an organization bring changes more effectively collectively than individually. To successfully utilize teamwork for enhanced productivity, there should be a well coordinated liaison between each member of the team. Organizations need to create a working culture in which people have confidence to challenge, to experiment and to seek and manage change. Organizations can deploy teams to achieve their strategic aims and carry forward their corporate objectives. But for this, teams should be selected and brought together in a way that maximizes their chance of success emphasizing on the compatible

mix of personality, background and working style. The team should have clear cut goals, precise implementation plans and availability of all necessary resources. Teams can measure and analyze their own working methods using their collective skills to improve quality and productivity. Those who actually do the work in the field could best plan the work. However, occasional guidance from the seniors may be needed. Strong monitoring and feedback mechanisms should be incorporated in the plan of operation.

#### **4.2.2 Select Social Organizers (SOs)**

Social Organizer is the key person in the team who does the basic work and interacts with the farming community in the process of participatory irrigation management. Successful implementation of the program largely depends upon identification and selection of appropriate Social Organizers. Three important aspects to be kept in view are 1) organization with whom SOs are going to work 2) their educational background, and 3) cost effectiveness of the approach.

#### **4.2.3 Social Organization Team**

Organizational work in rural community is very sensitive, difficult, time consuming and demands regular efforts. Observing office hours alone will never give desired success. It requires enthusiasm, commitment and devotion from organizers. Unfortunately, the agency's staff lacks these qualities. In bureaucratic hierarchy, government staff works in governance mode, instead of services supply mode, which doesn't fit into complexities of social organizational work. For process of participatory irrigation management, it is recommended that local consultant should hire social organization team, which is part of the FIU unit, and should work under its leadership in close collaboration with agency staff.

#### **4.2.4 Educational Background of SOs**

Farming in Pakistan is not a profitable business anymore. Besides irrigation, farmers encounter a variety of problems in their daily activities such as timely sowing of crops, availability of good quality seed, fertilizers, pesticides, other non water inputs, credit facilities, availability of agricultural machinery and marketing of farm produce. Aside from these problems sometimes they have to face natural calamities. Keeping in view all these and other possible problems, select/recruit Social Organizers who are able to address such issues. Social Organizers mostly interact with farmers and farmers are not always ready to listen to an

outsider. They might be upset at that particular moment due to insects' pest attack to their crops. To talk about benefits of organization or collective action might annoy them. It is therefore imperative to discuss their immediate problems first. Social organization for participatory irrigation management, therefore, demands selection of SOs with rural background and graduation in agriculture or sociology with sufficient knowledge of agriculture.

#### **4.2.5 Social Organization Approach for Irrigated Agriculture**

Community organization demands motivation, dedication, well planned efforts and round-the-clock hard work by the organizers. Unfortunately, with the passage of time agencies staff has lost these qualities. Now, agency staff is accustomed to working in governance mode with physical incentives to the community. Farming community is also addicted to this incentive-driven approach by government officials. But such efforts for community development usually tend to fail with respect to its sustainability. As the incentives are withdrawn from such programs, organizations disappear. For a sustainable social organization it is important, first to convince the community of the need and generate internal demand to get organized so that collective action reaps more benefits from whatever the government delivers, or from resource mobilization efforts. Experience in other countries also suggests that "**getting the process right**" (Uphoff, 1986) was a valuable initial investment in social organization work.

Therefore, to keep the process sustainable and cost effective, deploy a small team of young, energetic and motivated team of social organizers in FIU. Local consultant / NGO or agency who has experience in social organization in the rural community can organize the team. Organizing water users around watercourses and federating them at higher level requires one SO for seven to ten villages i.e. 15 to 20 watercourses. One SO can accomplish the task of water users

organization effectively and efficiently in 6 to 9 months period and then move on to other related activities or other sites as the case may be.

Thus, if size of the irrigation system where social organization work is to be carried out is fairly large, divide the system into sub-systems depending upon the number of watercourses and hydraulic structures available where flow can be monitored. Assign one SO for each sub-system. Switching SOs among sub-systems will impede the process. Try that SOs are responsible for a subsystem and complete their job while learning from others. This will help in developing quicker relationships and a sense of ownership with the community.

#### **4.2.6 Training**

Though people involved in social organization process might have sufficient theoretical

knowledge in sociology or irrigated agriculture but practical experience is very important. The concept of social organization for irrigation management in Pakistan is relatively new. Training is envisaged as a core element of capacity building. This new concept calls for new trainers, new curricula, and new mandates for training institutes.

Develop training curricula to meet the needs and arrange on-job training for all relevant staff in FIU. The main areas to be covered are. 1) Agriculture. 2) Irrigation system and problems related to it. 3) Merits of organized behavior. 4) Leadership. 5) Traditions and ethics rooted in rural areas. 6) Understanding of the process of social organization. 7) Responsibilities of stakeholders. 8) Legal framework.

## 5 PHASE III: INITIAL ORGANIZATION

Initial organizational phase has two sub phases and each sub phase has different activities. For detail see Figure 6.

### 5.1 Assess Community Characteristics

With the passage of time, for the majority of public institutions, managed by the government in Pakistan, there is a serious credibility gap between agencies staff and the people. The situation of

credibility problem and mistrust, also prevails between the irrigation agency staff and the farmers. The mistrust amongst the farmers and disbelief on their potential for organized behavior is also quite visible. Under such circumstances where community is already segregated into different groups or factions, credibility cannot be attained in a short time, years will be required to fill this gap of mistrust.

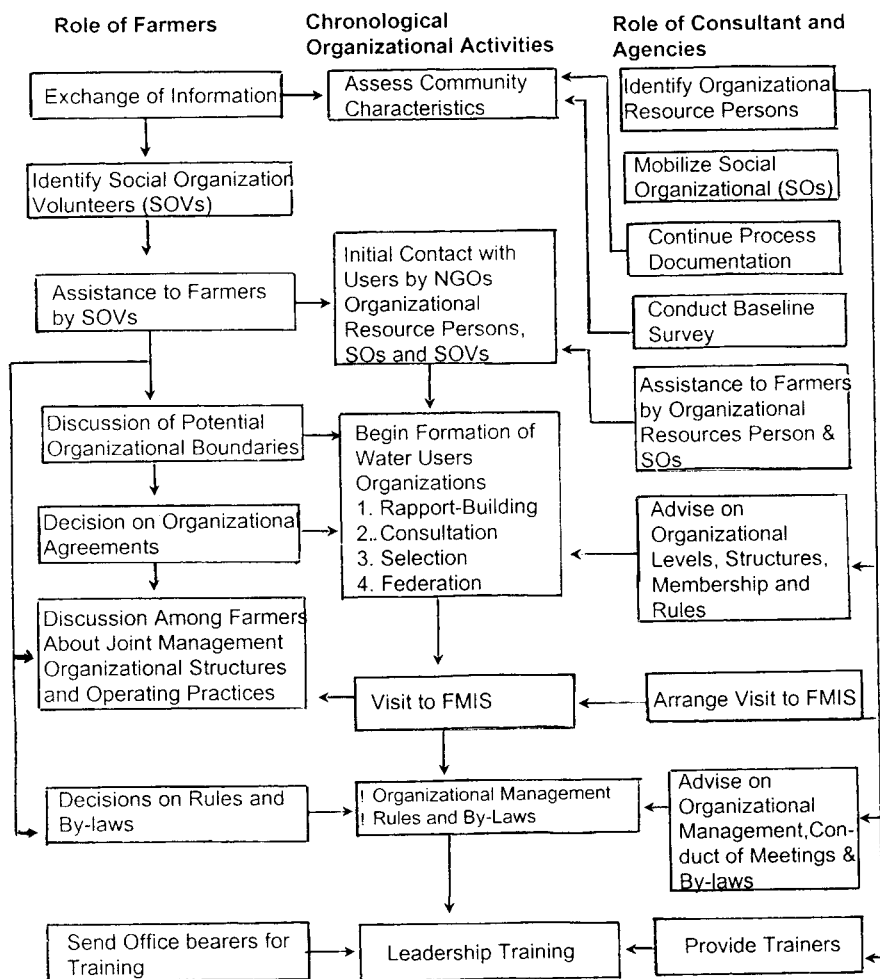


Figure 6. Phase III: Initial Organization.

Generally, there is very little communication between the two groups (agency and farmers) and within the agencies and farmers themselves. The initial steps in developing communication between the agencies and farmers are crucial and must be handled delicately to overcome lack of trust that

farmers have towards agencies and other stakeholder of PIM. In the context of Pakistan, it is more appropriate that first interaction with community is made by local NGOs through resource person and social organizers, building rapport with farmers and then understanding the

situation at grassroots level. Without understanding the ground situation, it would be physically difficult, socially unacceptable and politically vulnerable to intervene in a community, where environment is not conducive for social organization.

There is no best approach or solution for communication with the farmers in an irrigation system. Each country, region or society has to develop its own model to tackle the situation. However, in the PIM process, the suggested approach is to first collect baseline information through some appropriate rapid appraisal techniques and understand the socio-economic and cultural environment of the area. It will also help in developing initial contact with the farmers for awareness building and consequently they will start talking about the possibilities of solving their common problems through an organized effort.

### **5.1.1 Baseline Information**

The communities differ in their socio-economic, political, and cultural milieu. Similarly their irrigated agriculture problems are different in space, locality or region. To understand these relations and other complexities, stratify farmers on the basis of common pattern, problems and needs and then assess the community characteristics. For this purpose, collect baseline information through some rapid appraisal method such as Rapid Rural Appraisal (RRA) or any other similar technique.

### **5.1.2 Methodology for the Baseline Information Collection**

For collection of socio-economic information, community characteristics and hydraulic performance of the system, divide the irrigation system or command area in hydraulic boundaries i.e. head, middle and tail ends. Collect information through RRA from an appropriate number of groups of people from each hydraulic unit within the determined boundary area. Use trained SOs under close supervision of resource person from local consultants. He should have sufficient

knowledge in social organization and community development in rural areas for assessing community characteristics and other socio-economic and physical aspects of the area and the system.

Regarding community characteristics team should focus on gathering information on availability of basic facilities to community as health, education, sanitation, communication, electricity and marketing of their produce. Information regarding socio-economic and physical aspects should focus on water distribution, equity, reliability and water use practices at the watercourse level in the head, middle and tail ends regions of the system. Study the culture and norms, values that encourage cooperation or conflict. Information about the conflicts is very useful to assess the sensitivities of the community, and are useful tool to approach communities for collective action.

Information on operation and maintenance problems and likely costs that the farmers may bear and procedure they may follow is quite useful. Also gather information on existing cropping pattern, intensities, availability of non-water inputs, average crop yields, cost of production and marketing facilities. Identification of areas of collective action prevailing in the community and linkage with government agencies are other areas that need to be explored. All these information will provide a good indication of the environment before an intervention. During implementation these information will also be useful for monitoring, reviewing and feedback and refining the process for future programs.

After gathering all this information, analyze the data and share the results of survey with the farmers who are curious to know what happened to the information gathered from them. This makes them understand where they stand with their surrounding communities in terms of socio-economic conditions. They will understand their water related issues, as water distribution,

maintenance of irrigation at tertiary, secondary and primary level, water thefts and disputes. Sharing of information builds trust among farmers and SOs and is a good source of positive interaction.

### **5.1.3 Identification of Social Organizer Volunteers (SOVs)**

Organizing people is a socially sensitive and politically vulnerable activity. This is not a task solely undertaken by the donors or foreign consultants; rather, it is the responsibility of local people i.e. local agencies and the water users. Only an internally generated demand for social organization can make such organizations productive and sustainable. Nevertheless, there is a big credibility gap among government agencies and the water users. To fill this gap and avoid farmers mistrust from the start, intervene in the farming community through local people based in the community, know the people fairly intimately, share their language, beliefs, traditions, rituals, needs and concerns. The main advantage of involvement of these local community volunteers, called Social Organizer Volunteers (SOVs), is that the water users do not regard them as outsiders who are usually treated with mistrust. Suggested strategy, therefore, is to select SOVs from local community, train them and deploy them on voluntary basis as extended team of FIU. The facilitating role as a catalyst or as an agent of change should be provided by some local consultants or NGOs. Experience shows that this approach has the following benefits:

- Interventions can be routed through local people causing little or no room for mistrust;
- Large community can be reached fairly quickly;
- As the SOVs are deployed on a voluntary basis, the approach is cost-effective; and
- Interaction with water users through the community-based SOVs is more effective than the attempts by external change agents.

### **5.1.4 Criteria for Selection of SOVs**

As the activity of organizing water users involves a complex social organization process, it is important to select the correct type of persons as SOVs.

While selecting SOVs there are a number of factors that are to be considered keeping in view the socio-economic and cultural milieu of the society. In Pakistan criteria for selecting SOVs are that SOVs are:

- Interested to work with the community, and understand the value of collective behavior for common good
- Honest so that water users believe them;
- Well informed about the area, local languages, castes, traditions, rituals and other community characteristics;
- Knowledgeable about land resources of the area and also about irrigated agriculture;
- Non-controversial and not anti-social;
- Willing to become an SOV and spare time for community development work;
- Possessed with communication skill to communicate effectively with the outsiders and local people;
- Educated or at least having potential and ability to be trained to become a community based social organizer;
- Not necessarily farmers, big land owners or influential; and
- Not aspirant of any office of the farmers organization, nor expect any reward from facilitator / organizing agency.

The number of SOVs identified can vary in each village, but in general, there should be three to five SOVs depending on the characteristics of the water users' community.

### **5.1.5 Process of Identifying SOVs**

Organizing a community is essentially a learning process. The work guides the organizers about field methodology to be adopted, which is subsequently refined as the process develops. Since each community is unique in content and character, therefore, there can hardly be any rule-of-thumb or blue print for process of community organization. There is always a need to adopt a "home grown" model.



Experience in Pakistan (Hassan et al, 1996; Hassan et. al. 1998), suggests that SOVs should be selected on village basis rather than on watercourses, where farming community is more heterogeneous in terms of caste, biradari and socio-political interests. It is easy to identify few SOVs from same village within shortest possible time and with limited human and financial resources. Besides, saving time, the messages communicated to various sub-groups in the community remains uniform and stable.

Following step-wise approach is recommended to SOs for identification of SOVs (Hassan et.al, 1998).

1. Conduct "walk-thru" interviews by walking or traveling along different watercourses and visit the villages. Obtain information from a number of people about the watercourses associated with that village;
2. Meet several people from different watercourses, different castes and socio-political groups. Introduce yourself and the program. Obtain information on major problems related to irrigated agriculture and the socio-political situation;
3. Obtain information about potential SOVs, their characteristics and links and try to assess various groups' opinions about the suggested SOVs keeping in mind criteria for SOVs, and gather information about alternate SOVs in case of disagreement;
4. Select the most appropriate SOVs that are referred by the majority of the people and fit into set criteria. Pay a visit to each of them to confirm farmers' opinion;
5. If found suitable, discuss in detail about the PIM program and seek their consent of becoming prospective SOVs and get assurance of their continuous help during the process;
6. Repeat step 4 and 5 until a suitable number of SOVs for that village are identified;
7. Consult the FIU members and Team Leader to discuss the people identified for final selection;
8. Ask the selected SOVs to discuss with water users in their informal village meetings and social gatherings about PIM.

### **5.1.6 Familiarization Meetings**

Experience elsewhere shows that one of the essential elements of organizing people is that the social organizers are based in the community itself (Pradhan and Sharples, 1990). SOVs identified are the people based in community, selected by the community, and the people whom community believes and trusts. During identification process, they have initial contact with SOs and some basic information from them. This initial contact with SOs and their interaction with community might arouse curiosity in the rural community to know more about the program and newly identified SOVs might not be able to answer questions raised by them. In such a situation they are in an embarrassing position.

To help understand more about program and give an in-depth insight, resource person along with SO should conduct familiarization meetings with SOVs in-groups at village level. Give them brief overview of the program to initiate discussion. After the explanation of the program, SO and resource person should talk less and listen more, answer their questions or queries. Resource person and SOs should make them feel part of the team. This will build farmers confidence and trust on visitors. After concept clearance meetings, request SOVs to go back to their community, discuss the idea of participatory irrigation management with people individually and in informal group meetings for improved and sustainable irrigated agriculture.

### **5.1.7 Training of SOVs**

The main idea of selecting and mobilizing these SOVs is to train and upgrade their capacity as Social Organizers so that they act as catalysts and as an extended part of the FIU. For this, SOVs need to be confident about the program. Therefore, after a series of small group meetings with SOVs at village level, conduct a training workshop for them at sub-system or system level depending on number of participants. In general,

maintenance of irrigation at tertiary, secondary and primary level, water thefts and disputes. Sharing of information builds trust among farmers and SOs and is a good source of positive interaction.

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participants should not be more than thirty, which is a manageable group.

The training curricula should focus on. 1) Need for community involvement in development process. 2) Why organize people for community development. 3) How to exploit human and physical resources. 4) Qualities required for Leadership. 5) Identification of problems in irrigation and agriculture sectors. 6) Possible solutions by organized effort.

Training should not be restricted to lecturing only; rather, it should be participatory in nature and conducted through group discussions. Use of one or more appropriate participatory techniques is recommended.

## 5.2 Formation of Water Users Organization (WUO)

Before entering into the area of organizational work, SOVs identification and selection, familiarization meetings and training workshops generate interest and many concerns and expectations about the program. Therefore, to enter into a socially sensitive arena, a step-wise approach which is cautious, slow but build on trust and confidence is recommended that is eventually successful. Step-wise approach recommended (Figure 7) for formation of Water Users Organization is as follows:

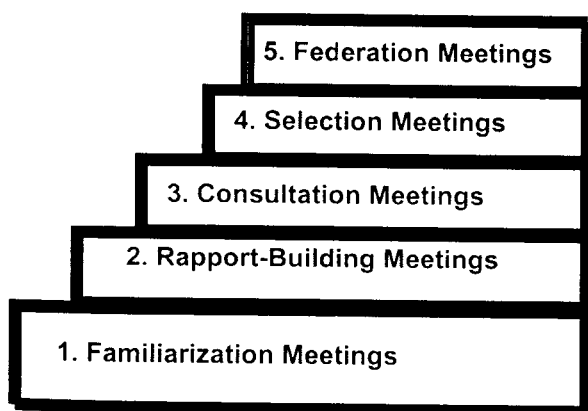


Figure 7. Five dialogic steps in social organization process.

### 5.2.1 Rapport-building Meetings

SOs with active involvement and participation of Social Organizer Volunteers should convene group meetings with water users at the village level for comprehensive farmer awareness covering clusters of watercourse commands. The meeting should be publicized through rural communication means like loudspeakers and chowkidars. SOVs and SOs should lead the discussion. The purpose of such meetings is building rapport with farming community, information sharing, and concept clearance, diffusing out misconceptions, doubts and rumors among water users. The resource person and agencies in PIM field unit should participate in these rapport-building meetings as observers. This direct contact with masses in rural area helps in diluting fears and misconceptions of the people and presence of agency people also helps in reducing environment of mistrust among farmers and agency's staff.

### 5.2.2 Consultation Meetings

Social organization should not be followed as a blueprint approach, enforced from top (top down approach), rather it should be a bottom-up approach. Each and every step is carefully planned and discussed amongst the actors i.e. agency people and farmers. During formation of WUOs, decisions about the structure, membership, tenure, (s) election procedure and rules and by-laws for effective functioning of the WUOs at different level of the system should be discussed.

SOs should hold meetings in each village to consult with water users tentative plans for establishing water user organizations. Arrangements of meeting are made by the SOVs. Invite all water users served by the system and residing in that village by sending hand written messages, announcing in mosques or through personal communication. After a brief overview of the program by SOV, consult the water users about organizational structure, membership pattern, selection procedure, and tenure of the

executives and any other relevant issue they like to discuss or feel important. The SOs document the process and note down the suggestions made by the water users. Use field note book for documentation.

### 5.2.2.1 Organizational Structure

After conducting comprehensive farmer awareness and consultation meetings covering clusters of watercourse commands at village level, FIU should be able to identify appropriate organizational structure for WUOs. All FIU staff should meet and discuss appropriate size of organizational structure. The main objective is to ensure maximum participation of water users in irrigation management decision making. Consideration should be given to: 1) farmers suggestions during consultation meetings; 2) size of the system; 3) hydraulic structures present on the physical system; 4) social set-up; and 5) cropping pattern in the command area of the system.

There is no fixed approach for deciding size or type of organization structure. However, depending upon the situation, two structures are recommended, 1) two-tier structure, 2) three-tier structure.

## 5.2.3 Two-tier Structure

Where the number of watercourses is less than thirty on a system or a distributary, two-tier structure is suggested (Figure 8). Every shareholder will have an equal opportunity in decision making. In two-tier structure, Water Users Association (WUA) is established at each watercourse command (WC). Elected representative(s) from each watercourse as decided in the consultation meetings (President of the WUA and or any other selected member for the purpose) constitute the general body of Farmers Organization (FO) at the distributary level.

### 5.2.3.1 Three-tier Structure

In medium to large size system or distributary, having more than thirty watercourses, three-tier organizational structure (Figure 9) is suggested and its division into sub-system is recommended. The number of divisions largely depends on length of the system, number of irrigation outlets, presence of hydraulic or drop structures, existence of minor or sub-minors, and sometime may be on the basis of social groups.

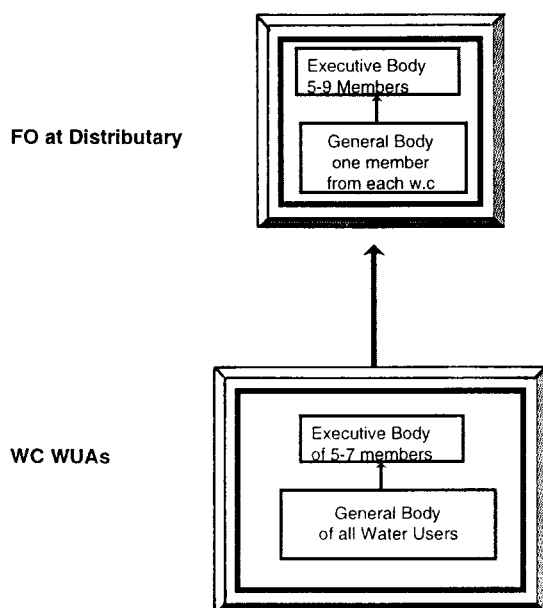


Figure 8. Two-tier structure for WUOs.

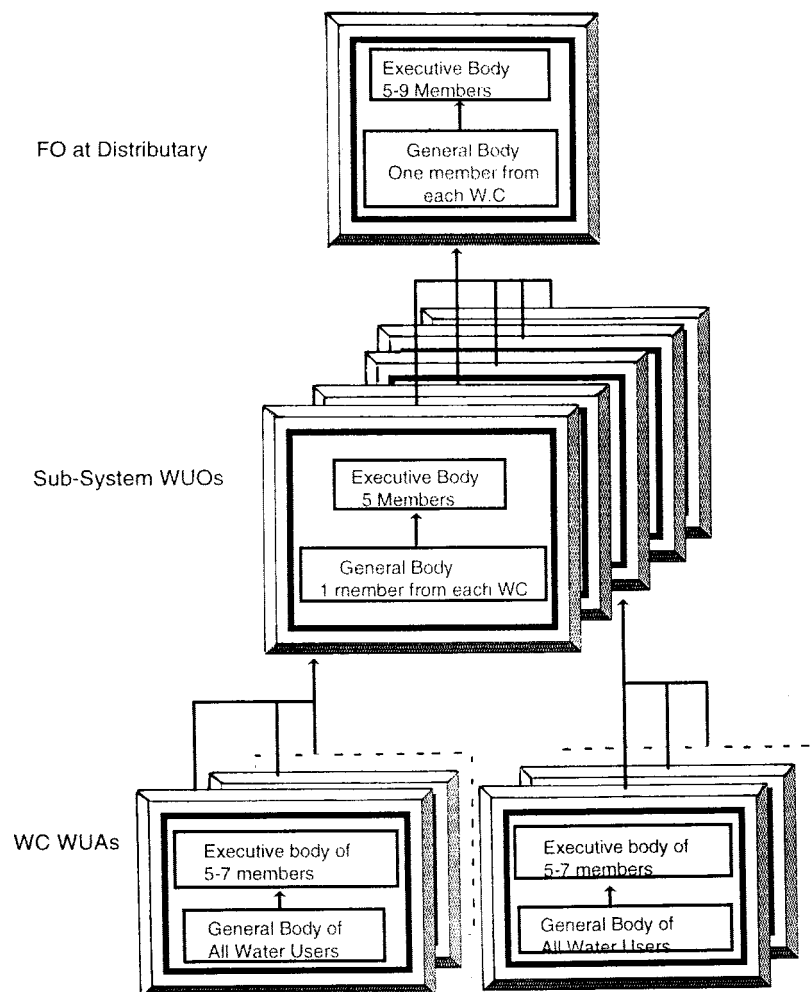


Figure 9. Three-tier structure of WUOs.

Identification and division of these logical sub-units or sub-systems helps in providing equal opportunity to each water user in decision making. The greater users' participation in turn contributes to improve the efficiency, equity, reliability, productivity and sustainability of irrigation water resources. Additional benefits are:

1. The division on the basis of hydraulic/drop structures helps in calibrating the structures for discharge measurement at each inlet and outlet point;
2. The division of the system on the basis of hydraulic structures helps in monitoring the discharge in time and space;
3. Medium sized groups are more suitable for effective social organization;

4. Representation at the intermediary sub-system level enables equality of opportunity to the water users in gaining membership in executive bodies for participation and decision making;
5. Water users groups (leadership) can be identified in clusters of watercourses in each sub-system, which helps in arranging meetings, discussing problems and resolving disputes more effectively
6. The initial identification of these sub-systems helps in generating common interests and common problems.

In a three-tier organizational structure, WUAs are established at each watercourse command. The general body of WUAs (s)elects one nominee

WUO chooses their executives body to run the sub-system affairs.

## **5.2.4 Selection Meetings**

### **5.2.4.1 Selection of the Watercourse Representatives**

SOs with the active involvement of SOVs conducts series of selection meetings at watercourse level. Meeting date, time and venue should be fixed in such a way that suits water users' convenience. Give a wide publicity to the program and provide equal opportunity for all eligible water users to come forward for leadership and to negotiate amongst themselves about the suitable leadership choice. In this regard announcements in the village mosques two to three days ahead of the meetings and written messages to all water users are highly useful. Ensure maximum participation (at least 60 percent), if it is less than the set criteria, postpone selection meeting. Water users present in the meeting should announce next schedule at the spot with consensus.

In selection meetings, before proceeding for (s)election of watercourse representatives, it is important to give a brief description of the program, qualities of good leadership and selection by consensus. Depending upon the size of watercourse, number of shareholders, castes and interest group, water users may select an appropriate number of executive body members and one nominee for membership of sub-system organization or federation as the case may be. The executive body consists of an appropriate number of office bearers, i.e. President, Vice President, General Secretary, Joint Secretary, Treasure and some executive members.

### **5.2.4.2 Introductory Meetings at the Sub-System Level**

After the watercourse representatives are selected, groups of these watercourse nominees identified for the respective sub-system level organizations should be invited to attend introductory meeting. This gives them an

opportunity to meet and get to know one another well. The agenda for discussion in these introductory meetings should be to refresh the minds of the nominees about the program, to consult organizational structure and to define selection procedure and set date, time and venue of selection meeting.

The participants at meetings should be briefed about 1) Organized and participatory effort in irrigation management. 2) Decentralization of authority and management responsibilities and. 3) Greater equity in distribution of irrigation water, 4) reliable water supplies. 5) Better access to government facilities and services as organized group. 6) Self governance. 7) Self reliance.

Afterward, general body members decide on date, time and place for next selection meeting. Ideally the selection meeting should be held at some community center, local body office, school, agri. extension training hall or any common place in village where no individual or group has any reservations to participate.

### **5.2.4.3 Selection of Sub-system WUO Office Bearers**

On the selection meeting of executive body members for sub-system water users organization, all the Field Implementation Unit (FIU) members should participate and play the facilitator role. Give a brief presentation on characteristics of good leadership, identified by most of them during the SOVs training, and consultation meetings. Also discuss the importance of selection by consensus. Then provide them sufficient opportunity to negotiate among themselves, develop consensus and come up with a list of proposed office bearers. Someone from them should present this proposed list to general body for approval. If consensus is not reached, postpone the meeting and get agreement on next date, time and venue. Repeat the process, if even then consensus is not reached, elect the office bearers through secret balloting.

## **5.2.5 Federation**

### **5.2.5.1 Introductory Meeting**

SOs and SOVs play a pivotal role in organizing and conducting this meeting. All other members of FIU should also participate in FO meeting playing the facilitator's role where and whenever needed. After introduction of the participants repeat the process of briefing as explained for sub-system level introductory meetings. FO general body should decide the date, time and appropriate place for selection meeting.

### **5.2.5.2 Selection of FO Office Bearers**

This is an important event of the organizational process. The enthusiasm among farmers will be quite visible. Interference from political corners is possible. Therefore, FIU again briefs the participants about the basic objectives of participatory irrigation management and highlights the envisaged benefits of organized behavior. Explain the concept of "Unity is Strength". Allow them sufficient time for negotiation to select their leaders with consensus. The important point to be considered is the sustainability of the organization, which will largely depend upon 1) degree of political interference, 2) selection through consensus, 3) provision of equal opportunity to all decision makers, and 4) equal representation of all sub-system distributary reaches in executive body of FO.

Preferably, the selection of the executive body should be done with the consensus of the general body members without any external interference. If more than one candidate competes for a single position, efforts should be made to compromise between them for selection of executive members through consensus. If there is no consensus and it is difficult to reach on some agreement secret ballots should be used to select one of them.

### **5.2.5.3 Visit to a Farmer Managed Irrigation System**

Majority of the farming community in Pakistan is managing its irrigation system at the tertiary level and in fact, it does not have any experience to manage the secondary level irrigation system. One way to build water users confidence to take up O&M responsibilities is to show them a successful farmer managed irrigation system.

For this select an appropriate site inside or outside the country and take a manageable group of FO leaders to visit the site, where farmers are managing part of the irrigation system. It is important to select a site, which has similarities in physical features of the system and socio-economic and cultural milieu. If the farmers can speak and understand each other's language without much facilitation, it is of much greater value (Hassan and Memon, 1998). During the visit farmers are briefed about the way they are managing their system, organizational matters, rules, by-laws, fund raising and water charges assessment and collection procedures. This helps in building their confidence as "seeing is believing".

### **5.2.5.4 Leadership Training**

After the formation of the FO, in the first phase executive body members of the FO should be trained in related activities to be undertaken for irrigation system management. The training program should be focused on subjects like flow measurement, organizational management, financial management, record keeping, framing of by-laws, and methods of mobilizing resources for the system operation and maintenance. The important aspect to be considered is provision of a competent and an experienced trainer. Agency staff should arrange relevant trainers from agency staff or hire local consultants. This training should be a continuous process and be conducted for grassroots level organizations i.e. WUAs. The farmers leaders trained at higher level of the organizations should be used as resource persons

for lower tiers of the organizations, because farmers learn quickly and much more easily from their fellow farmers.

#### **5.2.5.5 Formulation of By-laws**

The By-laws of an organization are dynamic instruments used for enforcing; regulating and promoting disciplined action in an organization. They are referred to as dynamic instruments because they are not static or permanent, and can be changed by the general body when necessary with a two-third of majority. No organization can function properly or sustain for longer time unless organization has clearly defined rules to abide by.

FO should be encouraged to develop and establish an initial draft of by-laws for proper functioning of FO under the rules framed by the government. The agency people in shape of some model by-laws or by arranging appropriate legal consultant should provide technical assistance. The main areas to be covered are 1) Duties and functions of different office bearers. 2) Procedure and time of meetings. 3) Eligibility for membership. 4) Termination from office or termination of membership. 5) Membership fee. 6) Fund raising. 7) Operation and maintenance of the system. 8) Dispute resolution. 9) Assessment and collection of water charges and (10 Sanctions.



## 6 PHASE IV: JOINT MANAGEMENT AGREEMENT

Joint Irrigation System Management (JISM) means that some part (primary) is operated and maintained by the state agency and remaining part (Secondary and Tertiary) by water users organizations. However, certain agreed level of involvement in planning, decision making support, monitoring and feedback both by the FOs at higher level and state agency at secondary level is needed to make JISM more transparent and effective.

Joint management agreement is an important factor in the sense that in this phase direct face to face

interaction of farmers and agency people takes place. Secondly in contrast to previous phases where most of the activities relate to social aspects of organizational process, in this phase most of the activities are centered around technical aspects.

The flow chart for joint management phase is shown in Figure 10. This phase also consists of two main subphase; 1) develop a plan of action; and 2) agreement on joint management responsibilities and then each phase has sub-activities to be carried out.

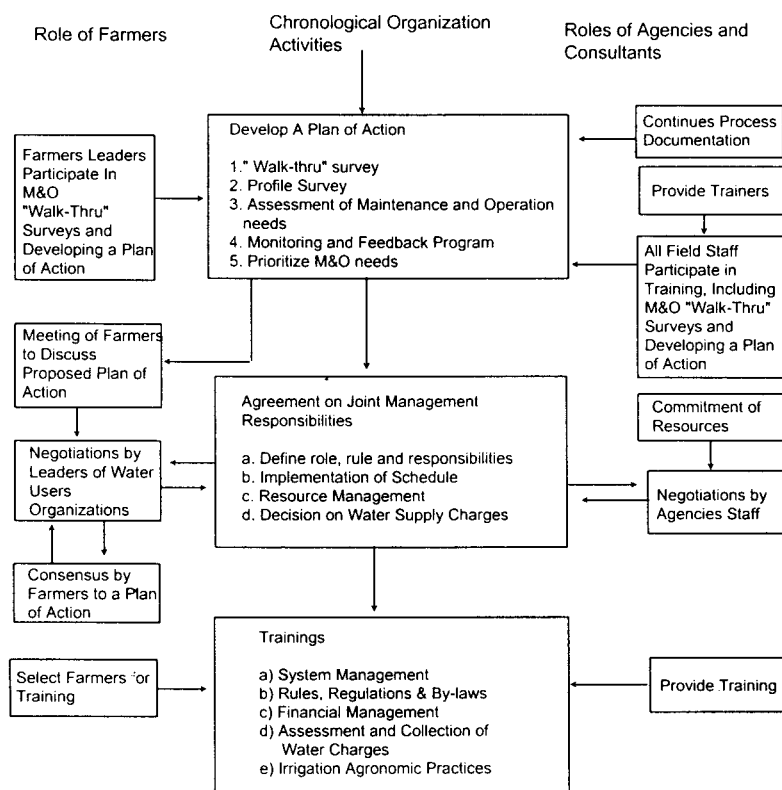


Figure 10. Phase IV: Joint Management Agreement.

### 6.1 Develop Plan of Action

The most important aspect of this sub-phase is that most of the activities are undertaken jointly by the agency field staff (FIU) and the farmers and their leaders. The activities undertaken independently by the FIU staff are shared with

farmers. This is not only important for building trust and developing more effective communication between the two partners, but also provides much more valuable learning experience to both the agency staff and the farmers. Aside from these joint field activities, data collection and its analysis

helps in preparation of joint management agreement between FO and agency for sharing future O&M responsibilities.

This sub-phase consists of five major components; 1) "walk-Thru" survey, 2) Profile survey, 3) assessment of maintenance and operation (M&O) needs, 4) Prioritize M&O needs; and 5) Monitoring and Feedback program. There could be two ways to develop a plan of action: 1) it could be developed jointly by the farmers and the FIU staff as part of their work assignment. The task of these components can be achieved as part of the training program; 2) "Walk-Thru" survey by the technical staff of the FIU, farmers and their leaders. As regard other activities such as profile survey and assessment of M&O needs agency staff (FIU) can independently do the task. However, at the end of each activity share the information with farmers and their leaders, and incorporate their suggestions. First option not only provides training to farmers and agency staff, but also has the added advantage of completing this process in a relatively short time period.

### **6.1.1 "Walk-Thru" Survey**

Presently in a government managed irrigation system, Irrigation Department receives funds annually for O&M of irrigation system. These maintenance funds are used to undertake routine or deferred maintenance works. Unfortunately, majority of the canals, distributaries, minors and water control structures are deteriorating under a combination of unavailability of sufficient funds for maintenance, increased political interference, lack of interest and motivation of government officials, and poor reward system for good work performance. Aside from this, with the passage of time, agency officials have left the habit of patrolling the irrigation system network, which they did. Water users, the actual beneficiaries are also not in a habit of walking along the irrigation system beyond the outlet i.e tertiary level of the system,

because they don't own it and consider it as government's property.

Therefore, the most important and foremost step after the formation of Water Users Organizations is to conduct a detailed "walk thru" survey that lists all type of maintenance needs on the distributary or minor including outlet structures which preclude efficient management of the irrigation system. The survey should jointly be conducted by a team of technical persons from FIU and a group of farmers and their leaders from the area.

Involving the farmers in the "walk - thru" survey of the secondary level irrigation system is very essential. Because, sometime they know problems better than the field staff. Some minor problems, which may not be noticed by the technical group can sometime be identified through the farmers.

Generally maintenance need arise from some minor problem, which when neglected for longer time gives birth to major problem. Accumulation of such major maintenance problems ultimately needs expansive rehabilitation. Unfortunately, in many irrigation systems throughout the world, only major maintenance problems are resolved and minor problems are overlooked until they grow into major expensive problems. "Nip the evil in the bud" is a good strategy for making any irrigation system sustainable and cost effective.

"Walk-thru" is a good tool to help identify these minor problems which can easily be observed in the field while walking along the channels. Therefore, it is imperative to have a formal meeting at each strategic point, especially the outlets and all other water control structures delivering water to each water user groups. The meeting should be attended by FIU technical team and the farmers and their leaders. It is important to take detailed notes of all minor and major problems, farmers perception about the causes of that damage and possible cost effective solutions. The maintenance should be focused on 1)

strengthening of banks, 2) desiltation, 3) removal of shrub and trees, 4) repair of gate structures, 5) open channels, 6) outlets, 7) bridges and crossovers, 8) service roads, 9) structures for calibration to monitor the flow; and 10) condition of gauges. The "walk-thru" surveys are carried out twice in a year; once when the channel is dry and once when the channel is running at full supply level.

Technical staff in consultation with and involvement of farmers should start flow monitoring at all strategic points in the distribution system. For example, inflow at the head and outflow at the tail of the system. Similarly all inflow - outflow positions where each WUO is receiving and delivering water to other WUO. This flow monitoring gives a good indication of flow conditions, equity position and overall reliability of water supply in the system with time and space.

### **6.1.2 Profile Survey**

Walk-thru survey provides general first hand information on deficiencies, problems and farmers perceptions about these damages and deficiencies precluding system's efficient operation. To have a good insight and extent of the damages and estimated costs for bringing back the system to optimum standard, technical staff needs to conduct different technical surveys such as profile, operation control maintenance, hydraulic and diagnostic and 'walk-thru' maintenance survey.

Profile survey is important in determining the extent of siltation and damages such as bed siltation or scouring, weakened banks, widening of distributary or minor banks due to vehicle and animal crossings or animal bathing and service roads. It is pertinent, while conducting all technical surveys, to always go back and consult "walk-thru" notes.

### **6.1.3 Establishment of Bench Marks**

The foremost step to conduct any type of engineering survey is to establish benchmarks at different locations along the distributary, minor or

watercourses, which help in monitoring closing and start of the survey. While establishing benchmarks, also put upstream and downstream white marks on water control structures. These white marks are especially established on all outlets and inflow - outflow structures where each WUOs gets their share of water and releases others share at outflow structure. These benchmarks and white marks are used in the profile survey and in developing discharge ratings for flow measurements.

### **6.1.4 Conduct Profile Survey**

After establishing permanent or temporary benchmarks along the irrigation network, conduct a detailed profile survey. Take elevation readings from the bed and banks of the distributary / minor and adjoining fields at both sides of the system. Irrigation channels should be surveyed and marked with stations at least every 100 meters. All important structures should also be accurately determined and listed. Make necessary drawings and sketches while conducting profile survey. Analyze the data, draw the existing position of the distributary / minor bed and banks. Obtain cross section / L-section maps from relevant authority to evaluate the prevailing situation. Identify the deviations and calculate work required for changes to be carried out and prepare cost estimates to bring the system to desired standards. Share information with farmer leaders.

## **6.2 Assessment of Maintenance and Operation Needs**

### **6.2.1 Essential Structure Maintenance (ESM)**

ESM is required for those flow control structures where FO receive their due share of irrigation water. The accurate maintenance allows these structures for flow measuring devices after calibration. To assess the needs an operational control maintenance survey of flow control structures should be conducted.

### **6.2.2 Operations Control Maintenance Survey**

This is another important activity for developing plan of action in the joint system management process wherein FIU staff and farmers need to work together in the field. The field staff should share information with farmers. During the process of social organization sub-system level WUOs are already established on the basis of hydraulic boundaries. Therefore, by then each WUO should defined hydraulic boundary such as weir structures, fall or drop structures and flow regulating structures (bifurcation and diversions) in case of WUO and outlets in case of WUAs where water is received by relevant organization and distributed equitably amongst its members. It is important to keep in consideration all such inlet points, which regulate and measure the amount of water flowing in and out of the organizational boundary.

Conduct an operations control maintenance survey of all Essential Structure Maintenance (ESM) for flow control and water measurement. Identify the extent of damages, causes, maintenance needs (quantity of material required and cost estimate); and installation of new flow measuring devices or gauges if required. The field inspection results for each structure should be recorded with sufficient details. Necessary drawings and sketches should also be made so that afterwards a good cost estimate can be prepared. The operations control maintenance survey should be conducted at least twice, once during the canal closure to inspect visible damages and once when system is in operation to inspect actual problems such as leakage and other operational and flow regulating difficulties in gate structures and open channel constrictions.

### **6.2.3 Essential Structure Maintenance Plan**

After conducting operations control maintenance survey, prepare a detailed ESM plan. While

preparing the ESM plan, consult original drawings and maps obtained from the agency and notes recorded in the field during the "walk-thru" survey, wherein farmers perceptions about damages, causes and possible cost effective solutions are noted. ESM plan should include: 1) physical description of the system, 2) list of ESM, 3) cost estimates of ESM, 4) proposed program for measurement of flow and seepage losses in the channels for maintaining better equity in water distribution, 5) field notes, sketches and drawings; and 6) tentative implementation plan. For further details suggested outline reported by Skogerboe (1990) should be consulted.

## **6.3 Operation**

### **6.3.1 Develop Discharge Ratings**

After completing structure maintenance plan, calibrate all flow control structures where each FO, WUO or WUA receives their share of irrigation water and develop discharge ratings. For calibration of these essential flow control structures and water diversion structures for each organization, use already established network of benchmarks and white marks. Calibration of structures in large channels i.e. distributary and minors where discharge is more than 150 liters per second (5 cusecs), a current meter should be used to calibrate each structure or flow measurement. For smaller channels (watercourses) having less than five cusecs discharge, a cut throat or broad crested weir (BCW) flume is used to calibrate the structure or measure the flow passing through that structure. It is also appropriate to use Current meter in lined watercourses for flow measurement.

To develop reliable discharge rating for essential flow control structures, at least four to five readings are taken from each site. Each reading contains upstream, or upstream and downstream flow depth measurements and the corresponding discharge rate. Install gauges at essential flow control structures in the irrigation

system. Develop discharge rating for necessary inflow and outflow points. Farmers are not necessarily required to participate in the process of structure calibration and development of discharge rating. Nevertheless, participation of a few educated youth as trainees from farming community helps in providing an understanding and importance of essential structure maintenance for calibration or flow measurement. It is pertinent to keep in mind that discharge rating can change with time, because minor change in the outlet or flow control structure effects the flow. Therefore, periodic checking and readjustment of discharge rating is highly important for continual equitable water distribution to each FO, WUO or WUA.

### **6.3.2 Calculate Water Duties**

After the successful completion of social organization process and farmers participation in "walk-thru" survey, farmers would want to know how much water they are actually getting against their share in the distributary. One of the way is to measure inflow and outflow of water at strategic points in each reach, deduct seepage losses and calculate water duties for each reach and for each watercourse command area. This part of the exercise can be completed as part of the training to the farmer leaders. The involvement of the farmer leaders with the technical staff during this exercise provides them with an excellent opportunity to learn 1) what is the staff gauge and how to read it? 2) How to correlate gauge readings to determine discharge rates at a flow control structure? 3) Use of simplified discharge-rating tables to know the flow rate in the distributary or watercourse and 4) importance of maintaining an essential flow control structure to minimize the chances of change in discharge ratings with time. Aside from these benefits, it will help in building farmers' confidence of their capabilities to share O&M responsibilities and improve farmers' agency interaction.

### **6.3.3 Measure Channel Losses**

To calculate the duty of water for each command area, measurement of losses in the main system i.e. distributary and minor is a prerequisite. The most important technique for measuring channel losses in an irrigation system is the inflow - outflow method. To do this test effectively, technical staff of relevant agency should provide necessary training to FIU staff and farmer leaders in gauge reading, development of discharge ratings, use of discharge rating tables and calculation of water duties. It is important to involve as many farmer leaders as possible especially in flow measurement and inflow - outflow test exercise.

Technical staff should arrange classroom training and some practical exercises at site, then divide the participants into group of five to eight persons. Each group notes down the inflow at each essential water control structure and outflow from each irrigation outlet and those outlets delivering water for other purposes in the command area. The training materials should include handouts to be delivered to the participants for future reference. A copy should be placed in FO office record.

Analyze the data, evaluate seepage losses in each reach between two strategic structures. Also evaluate the seepage losses for the entire length of the distributary and minors. On the basis of actual water delivered (after deducting seepage losses and water delivered other than agricultural purpose) to each subsystem (WUO) and watercourse (WUA), calculate duty of water i.e. cusecs of water delivered per thousand acres of culturable command area. Normally in case of equitable water distribution, it is almost the same for all reaches. The copies of the results are placed in FO/WUO office record.

### **6.3.4 Prepare Operations Plan**

As mentioned earlier, farmers must be curious about what is happening in their irrigation system with respect to water losses and equity in distribution of water. Most of the farmers very

keenly observe data collection procedure, data analysis and results obtained. Share the results with farmers. FIU staff must be very careful while presenting the results, because, if there is a big equity gap between different reaches or outlets, a hot and sensitive discussion among farmers can take place. FIU staff should tackle it sensibly.

This information sharing helps in developing an initial operational plan to achieve equitable water distribution in the irrigation system. The input from the farmer leaders is crucial to develop this plan. Farmers should discuss openly, suggest how to incorporate channel losses, and improve equity by remodeling the over size or under size outlets and other water control structures and how to implement this plan. The agency staff role is to provide necessary technical assistance. The time frame and work plan is devised to undertake remodeling of structures and other activities.

#### **6.4 Monitoring Evaluation and Feedback (ME&F)**

Monitoring, evaluation and feedback should also be part of the operations plan developed for improved water distribution under joint irrigation management program. This ME&F program will help in developing communication and credibility amongst the farmers and between farmers and agency staff responsible for O&M of the main system and delivering water to FO at the head of the secondary level irrigation system.

A detailed program of (ME&F) should be prepared covering data collection on daily discharge rates at each inflow and outflow point and analysis of data to check hydraulic performance of the system. Communicate evaluation results to the farmers to get proper feedback. The implementation of operations plan is very sensitive both socially and technically and may have implications on organizational sustainability. Therefore, a strong and transparent mechanism of ME&F needs to be evolved. It is suggested that for initial two to four crop seasons

daily discharge monitoring and weekly, monthly and seasonal hydraulic performance evaluation should be carried out jointly by the FIU and farmers representatives and at the head regulator of secondary canal by the representative of farmers and the agency.

To improve the hydraulic performance of the irrigation system is highly important to make the process transparent, do the seasonal evaluation of the monitored data, discuss with farmers' leaders, and incorporate their suggestions for improvement. Revise the operations plan accordingly, implement it and continue the process for at least two to four crop seasons or till the hydraulic performance of the system reaches desired level i.e. each FO, WUO and WUA receives due share of irrigation water when canal is flowing.

#### **6.5 Prioritize M&O Needs**

Based on the information gathered from "walk-thru" survey, profile survey and operations control survey and cost estimates prioritize the maintenance needs. Generally these needs will be prioritized on the basis of their importance and their impact on hydraulic performance. Three important maintenance needs are: 1) essential structure maintenance, 2) deferred maintenance; and 3) rehabilitation of the system, if the system has deteriorated due to accumulation of deferred maintenance for longer time and the system hydraulic performance is very poor. Therefore, if the system is performing badly and it needs rehabilitation than plan accordingly subject to availability of funds, because it is a costly process. If, system's condition is not hampering its operation badly then give priority to the maintenance of essential flow control structures, because these structures are used as flow measuring devices for monitoring the daily discharge and evaluation of hydraulic performance of the system.

Deferred maintenance is the accumulation of maintenance needs, generally deferred due to

paucity of funds. The main criterion for prioritizing deferred maintenance needs is on the basis of impact of deferred maintenance on hydraulic performance of the irrigation system. Thus, the maintenance needs, which have severe negative effect on system's operations, are normally given the highest priority, keeping in view the resource availability. As soon as sufficient funds are available, remaining maintenance needs should be completed.

Another important point to keep in mind while prioritizing O&M needs is to involve the farmer leaders. The FIU should only forecast the impact of various maintenance alternatives. The farmers should be encouraged to prioritize the maintenance, as they have to share the cost of maintenance. The farmers should be involved because they are very intelligent, have good understanding of the field situation and judgment of extent of work and can suggest cost-effective solutions.

At this point prepare a comprehensive action plan for M&O needs covering all necessary details, drawings, sketches, cost estimates, human and financial resources required and priorities made. This document is highly important and is needed for preparation of agreement on joint management responsibilities.

## **6.6 Agreement On Joint Management Responsibilities**

By now farmers organization has an action plan ready with them with all necessary details. The FO leaders should convene a general body meeting to discuss the proposed plan of action and decide their terms and conditions before entering into negotiation process for the joint management responsibilities with the government. FIU staff should also attend the meeting as observers and provide necessary technical assistance wherever required by the farmers. After finalizing their terms and conditions, FO executives start negotiation with relevant authority for sharing the

responsibilities between the agency and farmers organization in the future. One good way is to constitute a FO general body negotiation committee, send them to negotiate with relevant authority after deciding date, time and venue of the meeting. After first meeting if both parties reach some agreement, FO negotiation committee goes back and put draft agreements before the general body, get their approval and then FO leaders sign the agreement with the agency or authorized nominees. However, in case of disagreement, FO negotiation committee should go back, hold a general body meeting and discuss again with the members. Make necessary amendments in the light of discussion held with agency staff. If FO members agree, negotiate again with agency staff and continue the process till a consensus is reached. Before signing the agreement with the relevant authority, FO leaders must get approval from general body. Implementation phase requires some resources to implement the plan of action after joint management agreement, therefore, negotiation process should be held at a level which is authorized to arrange required resources or can have firm commitment from higher authority / government to make available committed resources. Besides other necessary details, joint management agreement for sharing responsibilities should include the following.

### **6.6.1 Define Roles, Rules And Responsibilities**

Without strong legal protection, implementation of joint management agreement between farmers and agency for sharing of O&M responsibilities is of no use and is ineffective. The agreement should clearly define the role-played and responsibilities borne by the farmers organizations, agency field staff and higher authority. The rules for effective governance and implementation of joint management agreement should also be explicitly formulated and enacted.

### **6.6.2 Implementation of Schedule**

Keeping in view the human and financial resources, schedule for implementation of essential structure maintenance, operations, prioritized deferred maintenance, rehabilitation if required; and monitoring, evaluation and feedback program should be clearly chalked out and made part of the agreement. It is suggested that initially agreement should be signed at least for a period of three to five years, which is required for the farmers organization to learn O&M activities, implement the plan, revise it as per needs, refine it and sustain the organization.

### **6.6.3 Resource Allocation and Management**

Another important area to be clearly defined in agreement is who will provide what, when and how much. For example allocation of water at the head regulator, reliability in water supply, personnel, budget, equipment, management of trees at canal banks and property rights and facilities such as office buildings and service roads. The most important decision to be made under joint management agreement is sharing of water supply charges (aabiya) presently received by the government. After the joint management agreement FOs are responsible for O&M of part of the irrigation system i.e. secondary and tertiary level. FOs need financial resources to carry out functions transferred to them. For this an appropriate ratio to share the collected money (aabiya) between FO and agency should be decided and made part of the agreement. Based on the international experience and socio-economic condition of the Pakistani farming community a ratio of 50:50 is recommended for agency to meet upstream O&M costs and farmers organizations to run their affairs at secondary and tertiary level of the system respectively.

At places where a transfer program is already in progress, and where the systems are large, the farmers alone may not be able to manage the

systems. They may require hired staff for carrying out O&M tasks on farmer's behalf. The FOs should hire the staff in accordance with the jointly agreed criteria and procedures. Clear arrangements should be spelled out about who pays the hired staff, when they are recruited, to whom they are accountable, and who trains the staff. At the start of a pilot experiment, it is always useful to involve FO's staff in planning the joint management agreements and management plan.

### **6.6.4 Water Charges**

Annual O&M action plan should be translated into financial implications. Besides, the overhead costs need to be identified and added to the costs. These costs then are translated to work out water charges (Hassan and Chaudhry, 1998). The structure of water charges needs to be defined by the farmers. There are several possibilities for assessing water charges, which are documented by Hassan and Chaudhry (1998). The charging method should be cost-effectiveness and easy in terms of assessment and collection and should be chalked out with the consultation of water users and their leaders. Generally, water users are reluctant to change the water charge structure. The FIU should clearly discuss the administrative costs involved in assessment, billing, and collection of various water charge structures. Sometimes it might be difficult to change the structure without government's approval.

### **6.6.5 Training**

To build the capacity of the members of the farmers organizations (FO, WUOs & WUAs) and to perform the O&M responsibilities effectively, FO executive committee members and staff need training in organizational and financial matters and system management affairs. For development of their capabilities, FIU staff should arrange short training courses in organizational, financial and system management aspects.

For developing their capabilities in organizational matters, farmers leaders should be



trained in convening meetings, recording minutes of the meetings, presenting and getting approval of the minutes, undertaking follow up of the decisions made and actions taken.

For building capacity of farmers in managing their financial resources they should be trained in maintaining record of financial matters such as membership fee, share money, fines, record keeping for O&M activities, assessment & collection of water supply charges, land record and rotational turns of water to individual farmers.

To build farmers trust on their capability and further enhance that capacity, FIU staff should also conduct training courses on system management. Generally two to three days course is sufficient. Nevertheless, it is better if duration of the training is decided jointly by the FOs leaders and FIU staff. Initially the primary focus of the system management training is that the farmer leaders are able to measure flow on essential flow control structures using discharge rating tables, flumes and current meter. Training in assessment and collection of water supply charges is another area to be arranged by agency staff with the help of the revenue staff of the irrigation department.

The ultimate goal of involving the water users in operation and maintenance of the irrigation system is to improve the system's hydraulic performance, ensure equity in water distribution and reliability in water supply and increase agricultural productivity for the uplift of the rural community. However, increased agricultural productivity does not only depend on improved hydraulic performance of the system, but also on efficient use of every drop of irrigation water conveyed to farmer's field. Therefore, to improve application efficiency and water use efficiency at the farmers' field, agency staff should impart training to farmers in advanced irrigation and agronomic techniques such as precision land leveling, field layout and sowing methods. They should also be trained in when to irrigate a crop, how much water to apply, fertilizer application and plant protection measures.

All above-mentioned training is a continuous process until farmers are able to handle their affairs effectively on sustainable basis. The trainers and training materials such as notes, flip charts, boards and equipment for field exercises is provided by the agency. The trained farmer leaders are used as resource persons in subsequent training courses.

## 7 PHASE V: JOINT MANAGEMENT IMPLEMENTATION

Joint Management Implementation (JMI) is a very important and final phase (Figure.11) of the social organization process for joint irrigation system

management. Again, it has two sub phases i.e. implementation and monitoring & review. Each sub phase has different activities, which are explained below.

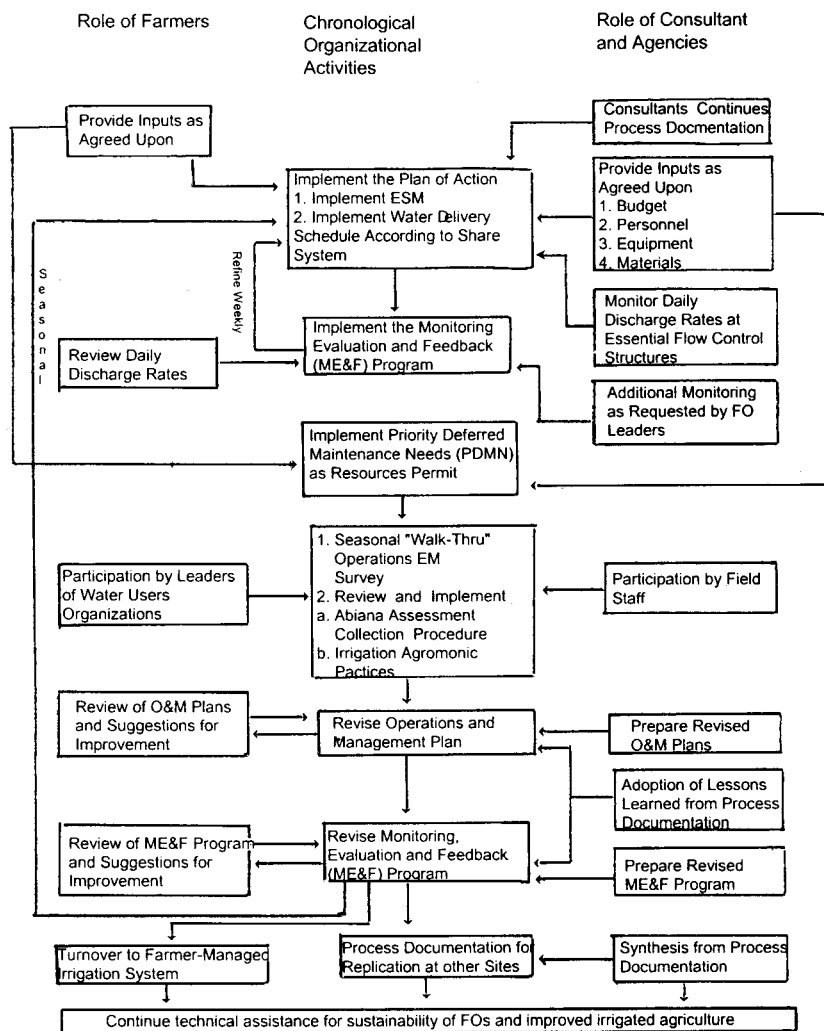


Figure 11. Phase V: Joint Management Implementation.

### 7.1 Implement Plan of Action

While working on joint management agreement phase, FIU staff with the participation of farmer's leaders has developed plan of actions regarding maintenance, operations and prioritizing M&O needs. Both agency staff and farmers know that system needs major rehabilitation or regular maintenance. Because rehabilitation is an expensive activity and farmers don't have the

capacity and willingness to pay for it. It is therefore, suggested that if system needs a major rehabilitation, it should be done by the state prior to implementation of plan of action under the joint management agreement for sharing of O&M responsibilities. Nevertheless, involvement of the farmers to make the rehabilitation activity effective and transparent is imperative. In case of

rehabilitation of the irrigation system, maintenance needs regarding essential flow control structures, priority deferred maintenance are taken care of and for implementation of plan of action only operational plan is carried out. But if that is not the case (no rehabilitation is required) then proceed as follows.

### **7.1.1 Maintenance Plan**

There are two major maintenance needs, Essential Structure Maintenance (ESM) and Priority Deferred Maintenance Needs (PDMN) are carried out under maintenance plan of action. The maintenance plan, which is part of the plan of action, is carried out first because maintenance has direct effect on operations.

### **7.1.2 Essential Structure Maintenance**

The first priority should be given to maintenance of essential flow control structures, because these structures are used as flow measuring devices after their calibration. That in turn ensures better management of irrigation water and helps improve equity within the system. Maintenance of most of these essential flow control structures is difficult to carry out when system is delivering water.

Therefore, these maintenance activities should be completed during the first canal closure period after JMA between farmers organizations and agency. If agreement is reached in a part (month) of the year when closure period is still far ahead, it provides a good opportunity for the agency to arrange funds and for the farmers to mobilize their resources as agreed in the JMA. Because this activity generally demands minor repairs and replacements or remodeling of essential flow control structures, therefore, it can be completed in one or two months of canal closure period. Keep all relevant record of actual expenditures for comparison with estimated cost. It helps agency staff and the farmers to prepare more realistic and cost effective estimates. This record keeping also helps in building trust between farmers and agency staff, enhances farmers confidence to share O&M

responsibilities and also brings transparency in financial matters.

### **7.1.3 Priority Deferred Maintenance Needs (PDMN)**

Generally this is an expensive activity as compared to ESM; its implementation is purely dependent upon availability of funds. However, if funds are available, it is highly important to complete PDMN in first year of JMA, because accumulation of delayed maintenance needs further deteriorates the system and enhances the maintenance cost.

In case funds are short and it is difficult to complete all PDMN, complete those works, which are hampering hydraulic performance of the system. In such circumstances, it is also important to prepare annual maintenance plan for deferred maintenance needs for each coming budget year (like five year plan) and forward it to competent authority for approval and arranging necessary funds. Because PDMN is part of the plan of action prepared for JMA, therefore, it should be covered in JMA but it can be revised annually considering the availability of resources, actual cost incurred and price escalation.

As already mentioned transparency and accountability are the key factors for the success of JMA and ultimately JMIS. Therefore, FIU technical staff should keep record of all activities and the cost incurred and shares this information with FOs and senior officials to develop credibility. The strong accountability mechanism and transparency in transactions helps in timely provision of human and financial resources from FOs and higher authority and turnover plan is completed within scheduled time.

## **7.2 Operational Plan**

The main purpose to implement operations plan is to bring equity in water distribution as much as possible. Based on the water duties calculated, while preparation of operation plan in previous

phase, repair or remodel (as the case may be) all the essential flow control structures where each FO, WUO and WUA receives their share of water to remove or minimize the discrepancies in water distribution. As the purpose of the operation plan and JMIS is to ensure equity in water distribution for each organization at lower tier of the system farmer members of these organizations should incorporate seepage losses in the system and keep check of free riders. They should also identify remedial measures for unauthorized water deliveries and outlets tempering. Their decision should be implemented with the technical assistance from agency staff.

In general, this repair or remodeling of essential flow control structures is carried out during canal closure period and it is not possible to confirm the accuracy in water delivery. Therefore, there is a chance that repair or remodeling of these structure might not deliver water as equitably as envisaged when operated after canal closure. It is suggested that farmers and agency staff should keep strict monitoring of daily discharge rates and revise the operation plan as early as possible. Continue the process until optimum level of equity is achieved.

### **7.2.1 Reliability in Water Supply**

Farmers tend to over-irrigate the field due to fear of unreliable water supply because they don't know when irrigation supply will be cut down partially or completely. This tendency of over-irrigating the fields and seepage from the system itself causes twin menace of waterlogging and salinity, which in turn precludes increased agricultural productivity.

Under the JMIS an effective communication mechanism should be developed and adhered to. Therefore, a quarterly water supply schedule should be prepared in consultation with the FO and circulated by the agency staff to the FO, WUOs and WUAs well ahead, so that farmers can plan crop sowing and subsequent irrigation. Water users should also prepare their seasonal crop plan

and give it to agency staff before the start of crop season, so that irrigation water supplies can be arranged at the head regulator where FO will receive their agreed share.

## **7.3 Assessment And Collection Of Water Supply Charges**

As per agreement on joint management of irrigation system and sharing of responsibilities by FOs regarding O&M of part of the system, farmers organizations will need financial resources: 1) to pay agreed share to the concerned agency for supply of water at distributary head and for the maintenance of the main system, and 2) to operate and maintain the secondary and tertiary level irrigation system they are responsible for. The main financial source is the water supply charges collected from water users. So FOs needs to collect water supply charges from the users deriving benefit from that distributary system.

Presently in Pakistan, PID and revenue department are responsible for assessment and collection of water supply charges (aabiana) through numberdar, a village farmer, representing government authorities. After taking over the responsibilities, the FOs at the distributary level will need to assess and collect the water supply charges from the water users. There are two broad options for the assessment and collection of water supply charges. 1) continue with the exiting arrangements (procedure) with necessary check on assessment. Nevertheless, numberdar deposits collected amount with FO instead of revenue department and FO pays the agreed amount to agency and keeps remaining with it for carrying out O&M at distributary level, or 2) fix the water charges on acre basis as certain fixed amount of water is supplied on acre basis. Numberdars or WUA's presidents collect the charges and deposit these with FO. The FO in turn disburses or uses this money as agreed in joint management agreement between agency and the FOs.

Because second option is simple, have minimum complications, less manpower requirements and is more transparent, therefore, second option is recommended for adoption. However, it is better to leave it up to farmers to adopt, what suits their socio-economic environment. In any case, FIU staff with the help of revenue department should impart necessary technical assistance in record keeping and dealing with different defaulters if any, under the legal provisions.

### **7.3.1 Crop Assessment And Water Charges (Abiana) Collection**

At the end of each crop season, review the crop assessment and water charges collection procedure, the improvements made, the difficulties faced and the modification needed for improvement. WUOs leaders with technical assistance from FIU and relevant revenue staff should prepare a draft report on assessment and collection of water charges, compare the collections with the assessment and also with financial resources needed for next year. If there is any shortfall, WUO leaders make suggestions for improvement and get approval from the general body.

## **7.4 Improved Irrigation Agronomic Practices**

The ultimate purpose of a JMIS is not only restricted to the transfer of responsibilities from the government agency to the water users but to improve agricultural productivity through enhancing irrigation system delivery efficiency, equity in water distribution and bringing reliability in water supply. Nevertheless, only these improvements can not enhance agricultural productivity, until and unless every drop of irrigation water is not used efficiently at the farm or field level (improved application efficiency), besides judicious use of other non water inputs. Both over-irrigation and under-irrigation

have negative effects on soil health, environment and crop productivity.

The efficient use of irrigation water at field level, therefore, cannot be overlooked. FOs should start implementing advanced irrigation and agronomic techniques to enhance crop productivity through efficient use of resources. The main focus should be: 1) precision land leveling, 2) proper field designing and layout, 3) when to apply water to a crop, 4) how much water to apply, 5) how to apply, 6) use of healthy seeds, 7) balanced fertilizers dose and proper time of application, 8) effective plant protection measures, 9) timely harvesting of crops, 10) storage of produce; and 11) collective marketing of agricultural produce.

The collective action of the WUOs is helpful in enhancing agricultural productivity and increasing profitability of their inputs. FIU staff should provide training and technical assistance to the water users to enhance their capabilities. Relevant FIU staff should monitor the irrigation practices adopted, quantity of water and non water inputs applied and yields obtained.

### **7.4.1 Impact Of Improved Agronomic Practices**

After each season it is also important to evaluate the impact of implementation of improved irrigation and agronomic practices on crop production. Data collected during the crop season should be evaluated. Compare crop productivity with improved and traditional way of crop sowing, water and non water inputs, cost benefit ratio and farmers perception about improved practices. Discuss the results with farmers to get feedback, incorporate their suggestions, plan for next season and prepare report.

## **7.5 Monitoring, Evaluation And Feed-Back Program**

### **7.5.1 Seasonal Monitoring of O&M**

The primary purpose of monitoring operational activities is to monitor incoming flow to FO at the

head regulator of the system, at inlet and outlet boundaries of each WUOs or WUAs and also to evaluate these deliveries in comparison with due shares of each organization. This will be an important activity to achieve the ultimate goal of equitable water distribution amongst the different WUOs and WUAs. This monitoring and evaluation program will be helpful in introducing strong accountability mechanism and transparency at all strategic water distribution points i.e. head regulator at FO level, at hydraulic boundary of each WUO and WUA. Daily discharges at each essential flow control structure should be monitored jointly by representative of agency staff and FO member. The data should be evaluated weekly, monthly and on seasonal basis.

For the monitoring and evaluation of maintenance of general hydraulic structures, essential flow control structures, distributary banks, service roads and siltation problems and a seasonal walk-thru survey is carried out to monitor the operational deficiencies caused by maintenance problem. This survey is conducted jointly by the farmers' leaders and agency staff. Adjoining farmers also participate and inform about their observations and feelings. An informal meeting and discussion should be held at each essential flow control structure and detailed notes should be taken in field notebook. Also discuss with the farmers O&M problems encountered during the season. This improves the credibility and communication between FO members and their leaders and between agency staff and water users.

Based on the data collected and evaluation of daily discharges at each essential flow control structure and walk-thru operation survey, prepare a hydraulic performance report covering improvements, deficiencies, difficulties, maintenance needs to further improve hydraulic performance.

### **7.5.2 *Revise Plan And Feedback***

The information gathered through seasonal monitoring of O&M activities (hydraulic performance and walk-thru operation survey), crop assessment, collection of water supply charges, impact of improved irrigation and agronomic practices and report prepared in this context by the agency staff and farmers leaders should be presented to the members of FO. Discuss the results and get feedback from farmers, incorporate their suggestions for improvement. Revise the O&M plan and Monitoring, evaluation and Feedback program, implement it during next crop season. Continue ME&F program during the season. This process of revising O&M plan and ME&F program should continue in each season until an acceptable level of equitable water distribution and reliable water supply is achieved. This may require two to four seasons depending upon the size of the system and farmers capacity to learn and handle the O&M. However, to achieve ultimate objectives of increased crop productivity, environmentally sustainable irrigated agriculture, and poverty alleviation in rural areas, continuous strong institutional support for efficient use of irrigation water, adoption of advanced agronomic practices and collective marketing should continue. An effective monitoring and feedback mechanism is highly important to move in the right direction.

### **7.6 *Turnover to Farmer Managed Irrigation System***

Generally within two to four crop seasons FO leaders should have sufficient experience and confidence to take over and independently perform the responsibilities of Operation and Maintenance of the distributary, if strong legal, technical and institutional support is provided. Transfer O&M responsibilities to FO at secondary and tertiary level of the irrigation system but the property rights should remain with the state. Initial agreement for farmers managed irrigation system at secondary level should be made at least for five years.

Continue technical support as long as these organizations ask for.

## **7.7 Replication and Upscaling**

While completing various phases of the process, the policy makers can decide to replicate the experiences in other parts of the irrigation system. The replication of various phases can start after the lessons have been incorporated in the process for that phase. For example, after establishing FOs in one branch canal, the formation of FOs can be started at another branch or main canal in another area. Likewise, turning over management responsibilities successfully to few FOs may lead to management transfers for other FOs.

For large scale up-scaling of the experiences, the implementing agency needs to develop groups of individuals who specialize in the IMT process. Once a critical group of people becomes available, efforts should be launched to devise support services for FOs. The tasks of the support system should be placed in a semi-autonomous Support Services Unit for a region or a canal command, which gradually becomes financially independent to support the FOs in legal matters, capacity-building and training, technical advice and services.

As the FOs gradually grow in numbers and become more experienced in managing secondary

systems, they should be involved in management of the primary systems. Their primary tasks should be decision making on financing, management, operation and maintenance. The implementation of these decisions should be the responsibility of the agency staff, who are either made more accountable to the FOs, or the federated FOs become independent organizations having service-payment link to the higher system.

## **7.8 Performance Indicators**

Often the state is worried about the performance of the farmers. It is always useful to devise and agree on a few very objective performance indicators. For example, equity and reliability indicator in Pakistan is the water level at the last outlet. This is not very objective, as it ignores what happens between the head regulator and the tail outlet. To make things transparent, the FO may need to maintain some record, such as account books and water supply data. However, only that record should be maintained which is very essential to assess performance and assure transparency. Improved accounting and record maintenance procedures should be introduced. Care should be taken that the focus remains on improving the performance of the system and does not shift to un-necessary documentation and record maintenance.

## 8 CONCLUSIONS

Both national and international experience suggests that small irrigation schemes, fully managed by the water users and large irrigation systems, jointly managed (may have different forms) by the state and FOs can improve the irrigation system O&M and bring equity in water distribution for all water users. This in turn helps in increased crop productivity and environmentally sustainable irrigated agriculture. However, successful implementation of this process demands some conditions to be fulfilled such as:

- 1 Political will and firm commitment both by the government and bureaucracy;
- 2 Enabling legal framework;
- 3 Selection of farmer's leaders in a truly democratic way;
- 4 Independent collective decision making by FOs;
- 5 Effective and continuous institutional support from relevant agencies; and
- 6 Participation of FOs in decision making at higher hierarchy of the irrigation system management.



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