Farmer Organizations in Participatory Irrigation Management in Sindh, Pakistan

FINAL REPORT

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International Water Management Institute

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SUMMARY

Institutional Reforms

The institutional reforms are underway in Pakistan to restructure the framework for irrigation and drainage services of the large canal system. These reforms aim at withdrawing subsidy by creating autonomous entities at various levels of the irrigation and drainage system. Provincial Irrigation and Drainage Authorities (PIDAs) have the mandate to establish financially autonomous Area Water Boards (AWBs) at canal command levels, responsible for operation and maintenance (O&M) of irrigation and drainage facilities located within their area of jurisdiction. The AWBs will promote and encourage the farmers to organize into financially autonomous and self-reliant Farmers’ Organizations (FOs) at secondary canal level to undertake O&M of their respective distributaries and drainage facilities and also pay for the O&M costs for the upstream system.

The Project

Being in the forefront of the reforms movement, the International Water Management Institute (IWMI) was requested by the Government of Sindh to undertake pilot-projects to test whether farmer participation through appropriately mobilized farmer organizations would be a viable and sustainable means of improved irrigation management. These pilot projects would simultaneously create ‘demand from below’ for the advancement of reform measures, and help define the legal framework permitting the participation of farmer organizations in distributary level management.

After the approval of the Sindh Irrigation & Drainage Authority (SIDA) 1997, the pilot project was approved by the Government of Sindh, financed by the World Bank under National Drainage Program (NDP), for 18 months from April 1999 ending 15 October 2000. The main purposes were to continue to support to the three pilot Farmer Organizations (FOs) already formed at Bareji Distributary, Heran Distributary and Dhoro Naro Minor and forming farmer organizations on additional 10 distributaries at Jamrao Canal command area. The social and technical information was gathered in selecting the representative distributaries/ minors which were approved by the project steering committee (PSC) constituted by the Provincial Development Working Party (PDWP).

Social Mobilization and Formation of WCAs and FOs

Well tested social mobilization methodology was adopted for forming the farmer organizations at the distributary canal level based on the principle of maximum participation of farmers in every aspect of the project. Social Organizer Volunteers from among water uses at watercourse level were identified who were responsible for planning the meetings and setting the time and place for meetings with water users at watercourse level.

330 watercourse associations (WCAs) and 14 Farmer Organizations (FOs) were formed, with a total of 4,336 members. Approximately 80% of all farmers joined their WCA, and 80% of WCAs joined their FO. All members paid Rs. 100/- as a membership, while each WCA paid Rs. 1000/- to their FO.

1 Formerly known as International Irrigation Management Institute (IIMI)
The members of associations represent a broad cross-section of the rural community, with a mixture of well educated and illiterate members, owners, tenants and managers. The membership had a broad geographical coverage so no areas were under presented. Two (2) women are members of the watercourse associations.

Regular meetings of management committees of WCAs and FOs as well as general body meetings of FOs were convened to discuss various issues related to the management of organizations, irrigation and drainage in particular and agriculture production in general and make decisions, where more than seventy (70) percent members actively participated.

The Capacity Building Programs

Capacity building programs were organized for the members of WCAs and FOs to facilitate the institution building process. Trainings were organized in the following fields:

- Awareness on institutional reforms
- Discharge measurement and work thru survey
- Organizational and financial management
- FO rules, regulations, bylaws, action plan and irrigation and drainage transfer agreement
- Crop assessment and abiyana collection
- Agricultural production practices

Trainings were imparted to 2,206 participants: including social organizer volunteers, management committee members of WCAs and FOs and officials of Area Water Board and On-Farm Water Management. Majority of the office bearers (Chairman, Secretary and Treasurer) of WCAs and FOs participated in the programs. Mostly landowners and owner cultivators participated in the trainings and participated in more than one training programs.

Social Organizer Volunteers took responsibility for arranging the meetings of water users in their villages and supported the field team in formation of WCAs. Water users irrespective of land holding, tenancy status and social and financial status, have sat together and discussed common issues breaking the skepticism that big landlords and privileged water users can not sit together with smaller deprived land owners. Members of organizations used their own transport to participate in the training programs. New organizational leadership has emerged in these organizations, with leaders who have a vision for better conditions in the future through these reforms. They have shown their ability to take over the responsibility of irrigation and drainage systems and distribute water equitably among the members.

The emerging leadership represents the first success on the path to final empowerment of FOs so that in the long run they can manage their affairs without external patronage, and negotiate as equals with the AWB and SIDA members.

For managing the irrigation facilities, reliable and equitable water supply, efficient O&M of the irrigation units, proper and timely financing of irrigation service, appointment of appropriate staff, and conflict resolution would be the major tasks of any FO in the pilot areas. While managing the drainage facilities, operation and maintenance of drainage tubewells and O&M of the surface drains below discharge of 15 cfs would require particular attention of the respective FOs.
To meet the costs of operation and maintenance of the irrigation and drainage facilities, FOs still need guidance in assessment and collection of the water rates and drainage cess. For the assessment of water rates by FOs a shift from Deh to Watercourse command would be needed immediately after the irrigation management transfer (IMT).

**Monitoring of Irrigation and Drainage**

To evaluate the performance of irrigation and drainage system, the relevant data were started collecting during phase I & II of the project (from April/May 1997 to March 1998 and May 1999 to July 2000).

Water deliveries to many distributaries are significantly above design levels, typically 125% - 150% in excess. However, some canals fail to get full design discharge. Similarly the data from several canals in the area show that there is a great variation in the number of days when water is not delivered to secondary canals during periods of rotation, with some canals closed two to three times more often than others. These are the problem areas where AWB will have to improve its performance if equity of water distribution is to be improved.

Our data indicate that there is still a significant difference between most favored and least favored watercourses, and this is an area of concern that the FOs will have to address when they eventually get control over operations.

Seepage losses were measured in all three of the original pilot distributary canals. Total average losses measured were 4.5% at Dhoro Naro, 8.5% at Heran and 8.9% at Bareji.

The estimated cost of maintenance per acre of CCA was between Rs.7.00 and 12.00, on the basis that farmers' labor is valued at Rs.80 per day. In actual practice all of the labor and almost all machinery were provided free by FO members. Analysis of flow data showed that the ratio of head-tail water deliveries fell from 1.68 to 1.22 following desilting.

Observations indicated that the running efficiency of deep tubewells installed under the LBOD program in Dhoro Naro was between 5 and 55 percent, insufficient to effectively lower the water table depth in command area. However, in the same area there are approximately 100 private shallow fresh water tube well which were operated during water short periods, and they have had an effect on lowering water table depth.

At Bareji distributary the operating efficiency averaged less than 10%, while at Heran distributary it was approximately 33%. In all three areas there was a highly inconsistent pattern of operation, with running hours ranging from 2 to more than 350 hours in one month. This type of operational practice has a reduced impact on water table lowering than running all wells for similar periods. As a result no water table lowering occurred in Bareji or Heran, while at Dhoro Naro the drop in water table level can be attributed to the large number of private shallow tubewells.

It is clear that in all distributaries the water table rises during the cooler winter months when crop water demand is less. This implies that in all three locations there is an over-supply of irrigation water which leads to groundwater table rise, and AWB and FOs need to cooperate to reduce water deliveries in this period.

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Achievements of the Project

The project has demonstrated that it is possible to create strong and viable FOs at Distributary/Minor level that are democratic, egalitarian and dynamic, and who can hold their own in discussions with officials from government agencies. It is clear that the approach adopted in this project is viable. No doubt the model adopted here can be modified and used to organize other canals more quickly, but the basic truth remains that for a pilot project it is important to proceed carefully so as to provide a viable and effect model for use on other locations.

During the annual closure of January 2000 all of the FOs that were functional at that time developed a systematic plan for maintenance activities prior to the closure period itself. The benefits of developing and implementing a systematic maintenance plan were not only that maintenance proceeded more efficiently and more rapidly, but also that all of the benefits could be clearly seen by the FO membership. In canals without FOs there was no mechanism for water users from different locations to see what benefits occurred, and their commitment was significantly lower as a consequence.

All FOs keep detailed records of their meetings with minutes of all matters discussed and the decisions that were taken. Meetings are held according to a prescribed schedule, and the names of all present are recorded.

Under the Sindh Irrigation and Drainage Act there is provision for representatives of FOs to be full members of the Area Water Boards. Admittedly the quota of two representative out of a total of at least seven means the views of the water users are underrepresented (in the Punjab case representation is equal between government officers and water users, showing considerably more commitment to the ideal of water users representation) but it is a start. Despite the gross under-representation of water users at the AWB level, the two delegates have attended all of the AWB meetings and have been able to participate fully.

The spontaneous development of the farmer organization council (FOC) which is a federation of all FOs is a significant and unplanned consequence of the project. It has no place under the official SIDA structure but resulted from the recognition of various FOs that they would be even stronger and more powerful if they could show a united stand on major issues. Quite voluntarily they decided to establish the FOC, in July 2000, to look after the interests of the FOs as a single united body.

The steering committee of the project has been very supportive in the variety of decisions during the life length of the project. Almost all the members or their representative participated in the seven meetings of the committee. The committee has shown its satisfaction of the achievement of the project by IWMI.

The project produced the necessary documents envisaged in the contract agreement. In addition to this, a few reports related to the irrigation and drainage have also been accomplished.
Lessons and Issues

Several issues relating to the design of the pilot project that, in retrospect, should have been more carefully considered when the project was conceived. These include:

- Imbalance in Focus between SIDA and FOs in project design.
- Failure to understand deep-rooted elements of institutional culture.
- Guiding SIDA officials towards their new, changed responsibilities.
- Assumptions about SIDA and Government of Sindh commitment to IDMT.
- Strong, Viable FOs can be formed and the time required is quite long.
- Sustainability of FOs.
- Internal factionalism and internal threats.
- The desire and need for federation.
- Issues of equity and equality.
- Record keeping in respect of water delivery and other hydraulic conditions.
- Head regular discharges.
- Records for assessment of abiyana and cost recovery.
- Capital investment and improvement in irrigation and drainage facilities.

Recommendations

Based on the experiences of the two phases of the pilot project on Farmer Managed Irrigated Agriculture, we have drawn up the following list of recommendations. The order is not necessarily indicative of the relative priority given to the recommendation, with the exception of the first recommendation which if it is not carried out will render all other recommendations completely meaningless.

Some of the recommendations presented below have financial implications. They are based on the belief that some form of follow-up activity will be required to help establish within the SIDA/AWB structure a greater capacity to support organizational efforts, to monitor their progress, and to monitor the performance consequences of IDMT. It is considered highly improbable that the full benefits of IDMT will attained if additional support for the process is not made available.

More details on the recommendations and some background explanations are given in section 9 of the Final Report.

Recommendation 1

The Government of Sindh must with no further delay approve the Irrigation and Drainage Management Transfer regulation and enable the first 14 Farmer Organizations to take over their agreed responsibilities.

Recommendation 2

The Farmer Organization Council be recognized as an integral part of the IDMT process, allowed to participate as a full member of the AWB, to be represented on the SIDA Board, and to have representation on the Steering Committee of any Project that may be
established in future dealing with IDMT activities. Where necessary, existing legislation or regulations should be modified to accommodate the FOC as a legitimate representative of FOs.

Recommendation 3

The representation of FOs on the AWB Boards and the SIDA board be increased from their currently low level to one that is similar to their counterparts in Punjab PIDA Board and AWBs

Recommendation 4

For the sake of simplicity and to speed up the organization process, the by-laws for FOs and their constituent WCAs should be made uniform.

Recommendation 5

The organizational process developed and tested by IWMI should with minor changes, be adopted as the standard approach to organization of water users at watercourse and distributary/minor level.

Recommendation 6

Organization of Distributaries and Minors should be concentrated geographically so that transfer occurs in contiguous areas.

Recommendation 7

Experienced organizers should be used to help train up other organizers, whether they be under the auspices of SIDA, On-Farm Water Management, or NGOs.

Recommendation 8

The organizational efforts should be treated as a priority crash program so that there is as little disadvantage as possible to FOs in areas which will be among the last to be organized.

Recommendation 9

AWBs be given additional resources to establish internal capacity to provide a centralized resource for organizational activities that will include a cell capable of arranging training and workshops for FOs and AWB staff.
Recommendation 10

AWBs be given additional resources to establish internal capacity to conduct monitoring and evaluation activities, with the establishment of a specific cell for this purpose that would include FO participation.

Recommendation 11

A crash program be developed that re-establishes discharge measurement capacity at the point of transfer of water between AWBs and FOs.

Recommendation 12

A policy review be held that reassesses water availability at the main barrages in Sindh and determines revised water allocations for all canal commands, and for their constituent distributaries and minors.

Recommendation 13

A full review of current policies and plans for transfer of drainage management be held so that a revised set of policies concerning the rights and responsibilities of both SIDA and FOs be established.

Recommendation 14

A research project should be commissioned to evaluate the opportunity for the provision of flat-rate billing for both irrigation and drainage charges.

Recommendation 15

A person should be appointed as a mediator to resolve disputes between AWB and FO so that both sides will be able to feel there is an unbiased and neutral arbiter available to them when required.
1. INTRODUCTION

1.1 Institutional Reform of Irrigation Management

The irrigation and drainage sector in Pakistan is currently undergoing a process of far-reaching institutional reform. This process was initiated in the 1980s, when several projects, such as the On-Farm Water Management Projects I and II and the Command Water Management Program, introduced farmer participation in irrigation management, although on a limited scale. For the first time, it was realized that improved irrigation management requires not only infra-structural hardware interventions, but also institutional-managerial innovations, including the participation of the users of irrigation services.

The recognition that these early institutional innovations had remained non-sustainable prompted donors and policy maker to seek comprehensive institutional reforms during the 1990s. In 1994, the World Bank proclaimed the need for an encompassing new legal and institutional framework, in order to overcome significant deficits in financing, maintenance, and operation of the Indus Basin Irrigation System. The report of two World Bank missions to Pakistan (World Bank, 1994) identified the following causes of the irrigation and drainage sector's crisis:

- Expenditure for O&M fell short of funding requirements by 25 to 30 percent during the early 1990s.
- Recoveries of O&M expenditures for the canal system experienced a deficit of 45 percent in the same period. Including SCARP tubewells, the recovery rate was less than 30 percent. If drainage is taken by itself, recoveries were estimated to have been less than 20 percent.
- The system has low delivery efficiencies (35 to 40 percent from the canal head to the root zone).
- The distribution of water resources is inequitable and adversely affects the tail reaches.
- Water deliveries are supply based and prevent the economical allocation of scarce supplies (mismatch of supplies to crop water requirements).
- Waterlogging and salinity are spreading throughout the Indus Basin due to insufficient drainage (30 percent of GCA of Indus Basin are waterlogged).
- Over-exploitation of fresh groundwater causes declining water tables and intrusion of saline water.
- Water is under-priced, which encourages rent seeking and leads to revenue loss and inequity.
- The performance of irrigation personnel has declined considerably.

The Bank's proposals for a radical reorganization of the entire sector, including privatization, irrigation management turn-over to farmer organizations, the establishment of autonomous public utilities and the legal facilitation of water markets, met with considerable resistance and skepticism among Pakistan's irrigation managers and government officials. Seeking to generate acceptability of the intended reform process, the debate among policy makers, donors and experts shifted towards the concepts of decentralization and participatory irrigation management (Bandaragoda, Skogerboe and Memon, 1997).
To give weight to the concept of participatory irrigation management, the Government of Pakistan decided a program of devolution of powers to the beneficiaries at the secondary canal (distributaries/minors) level. Accordingly, the Provincial Irrigation and Drainage Authorities (PIDAs) in all four provinces of Pakistan have been established through enactment of Provincial Irrigation & Drainage Authority Acts 1997 for each province separately. The PIDA will be responsible for the intra-Provincial aspects of the system from barrages to canal head works, and from main drains that cross canal commands and major drainage basins to inter-provincial drains.

Being in the forefront of the reform movement, the International Water Management Institute (IWMI)\(^1\) was requested by the Government of Sindh to undertake pilot-projects to test whether farmer participation through appropriately mobilized farmer organizations would be a viable and sustainable means of improved irrigation management. These pilot projects would simultaneously create 'demand from below' for the advancement of reform measures, in particular the development of a legal framework permitting the participation of farmer organizations in distributary level irrigation management.

\(^1\) Formerly known as International Irrigation Management Institute (IIMI)
2. PROJECT BACKGROUND

The current project was preceded by the Action Research Program of the 'Pilot Project for Farmer-Managed Irrigated Agriculture under the Left Bank Outfall Drain (LBOD) Stage I Project', which covered three pilot sites in the LBOD area of the Sindh province. The focus of the action research was to test the viability of establishing effective user organizations to manage water resources at the secondary canal level. Three distributaries were selected as pilot sites, one from each of the three LBOD districts: Bareji Distributary in Mirpurkhas District; Heran Distributary in Sanghar District and Dhoro Naro Minor in Nawabshah District.

The program was financially supported by The World Bank and the Swiss Development Cooperation (SDC) and was sponsored by the Government of Sindh through its Directorate of Agricultural Engineering and Water Management, Department of Agriculture. The 30-month study (July 1995 to December 1997), aimed at enabling these Farmers Organizations (FOs) to assume responsibilities for operation and maintenance (O&M), while recovering the cost in the end. This meant they would collect water and drainage charges, and improve water management practices. Meanwhile, considerable effort would be made to improve the maintenance practices for irrigation and drainage facilities.

The project achieved its targets for the period. The project had proved to be socially viable. The formation of three Farmers Organizations (FOs) at the distributary level in Mirpurkhas, Sanghar, and Nawabshah had been successful in the existing socio-cultural and political environment. This has been a major achievement, considering the skepticism expressed by many of the agency staff and various circles.

The Government of Sindh enacted a law to establish the Sindh Irrigation and Drainage Authority (SIDA). This law empowers the SIDA to promote the formation of Farmers Organizations around distributary and minor canals. After a lapse of 17 months, the Government of Sindh approved a second phase of the project. It was designed to continue to support the three pilot Farmer Organizations (FOs) already formed at the Bareji Distributary, Heran Distributary and Dhoro Naro Minor in the districts, Mirpurkhas, Sanghar and Nawabshah, respectively, by IWMI, and an expansion of formation of farmer organizations on an additional 10 distributaries in Jamrao Canal command area. The second phase project was approved by the Provincial Development Working Party (PDWP) on 28 December 1998 and the contract agreement was signed on 16 April 1999.

The administrative department of the extended project was Irrigation Department, a significant change from the first phase which was under the Agriculture Department. The financial support to this project came from The World Bank through the National Drainage Program (NDP) Sindh. The purpose of the extended program was to assist farmers in the pilot areas to explore how the three distributary level farmer organizations (FOs) and the eighty watercourse associations (WCAs) in the pilot project can enhance their sustainability. Furthermore, it promotes the formation of FOs on ten (10) additional distributaries in the Jamrao Canal command area (Area Map is presented as Fig. 2.1).

More specifically, the extended program activities aimed at:

1. Consolidating the already initiated social organization processes in the pilot area;

2. Forming ten Farmer Organizations (FOs) at Jamrao Canal Command Area.
INDEX PLAN OF NARA CANAL CIRCLE

Figure 2.1
Location of IWMI Sample Secondary Canals in Sindh
3. Assisting the FOs to establish an appropriate system of internal bylaws;

4. Assisting the FOs to develop a financially feasible plan of action in O&M management for irrigation and drainage in the distributary command area;

5. Exploring the ways in which FOs can integrate irrigation and drainage functions in their O&M management responsibility; and

6. Monitoring and evaluating the implementation of this action plan by the FOs.

2.1 Assumptions

A number of assumptions were made at the beginning of the project and agreed with the client with regard to the planned activities in the pilot project.

1. Some of the activities are inter-linked with each other, if one activity is not carried out with any reason the other activity may be delayed or not happen.

2. It was assumed that social and political situation would not hinder the smooth running of the project.

3. It was clear that several activities need to be carried out extensively even after the 18 months period, which are envisaged in the three-year plan, including:
   - operation and maintenance of drainage system,
   - testing economic viability,
   - sustainability of FOs,
   - evaluate irrigation and drainage technologies for their cost effectiveness,
   - on farm water management,
   - efficient implementation of business plan,
   - assessment of impact of FOs on overall system performance.

4. Some of the exogenous variables may affect the time scheduling of the project activities, including canal rotation, breaches, rains and other unpredictable events.

2.2 Methodology

The project has adopted a field approach. It placed social organizers in selected communities to proceed through a series of dialogic steps to familiarize them with the organization process. They interacted with and slowly catalyzed farmers to identify their own problems, solutions, leaders, and arranged financing (through collection of the irrigation and drainage charges), budgeting, and environmental management for their own benefit. Many Social Organization Field Teams were deployed in this extended program. Besides the three (Mirpurkhas, Sanghar and Nawabshah), an additional field office was established in Dighri, so that the team could work on the additional distributaries in the tail portion of Jamrao Canal. An attempt was made in
the expanded program to transfer some of the project concepts and experiences to a selected group of Irrigation Officials through a few nominated government officials on secondment.

### 2.3 Identification of New Distributaries

IWMI has been supportive of the program of Participatory Irrigation Management (PIM). It wanted to see the project succeed and was instrumental in transferring the technology. In the extended project, IWMI was given additional task to form Farmer Organizations (FOs) on additional ten (10) distributaries at Jamrao Canal command area. Immediately after the inception of the project, basic information with respect to the following indicators was gathered on various distributaries at the Jamrao canal command area for identification and approval by the Project Steering Committee (PSC):

- Gross and culturable command area
- Design discharge of outlets and distributaries
- Number and types of outlets
- Length of channel
- Physical condition of the channel
- Law and order situation
- Distance from the nearby city
- Size of land holding
- Number of landowners
- Principal living castes
- Political situation

The information gathered helped in selecting the representative distributaries on Jamrao Canal for furthering the program of social mobilization for irrigation management. Mostly the technical data was obtained from the office of the Executive Engineer, Jamrao Canal, Mirpurkhas. A fair amount of time was spent in a discussion to adopt the following criteria in selecting the distributaries/minors:

- The selection of the distributaries should be made from the head, the middle, and the tail reaches of Jamrao Canal;
- The representative distributaries should not have very large landowners; however, about 15% large landowners are acceptable;
- The law and order situation should be considered;
- Three distributaries each from the head and the tail reaches whereas four distributaries from the middle reach should be selected.

For the selection of distributaries, Project Steering Committee assigned the task to the Director Nara Canal Area Water Board (NCAWB) and the Chief Engineer (Dev) Irrigation and Power Department (IPD) to finalize the selection of channels and these were finally approved by the Project Steering Committee. The names new ten (10) and three (3) pilot distributaries/minors are presented in Table 3.1.
2.4 Project Partners/Stakeholders

Several stakeholders/partners are involved in the water business of the country. The key actors in the pilot project were:

- Irrigation and Power Department (IPD)
- Sindh Irrigation & Drainage Authority
- Farmers Community
- National Drainage Program (Provincial Coordinator)
- Non-farming community
3. SOCIAL MOBILIZATION PROCESS

The social mobilization methodology tested in the previous phase of the project was replicated on the additional distributaries. Using a stepwise process is the key to this social mobilization methodology (Fig. 3.1). In the light of previous experience, more or less similar steps were proposed for the field strategy. At the first stage the following steps were taken at each watercourse for rapid appraisal of the location:

- Familiarization from the area and rapid appraisal;
- Drawing clear geographical picture of the area;
- Consideration of the physical condition of the distributary;
- Acquiring basic information about the people, villages and the castes; and
- Identification of persons as a social organizer volunteers (SOVs) at watercourse level.

**Fig. 3.1 Social Mobilization Process**

<table>
<thead>
<tr>
<th>STEP-I</th>
<th>Familiarization Meetings at watercourses with...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Familiarity with the area and</td>
</tr>
<tr>
<td></td>
<td>2. Gathering basic information</td>
</tr>
<tr>
<td></td>
<td>3. Identification of Social</td>
</tr>
<tr>
<td></td>
<td>Organizers Volunteers (SOVs)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP-II</th>
<th>Rapport - Building</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Meeting with SOVs &amp; Farmers in a small group.</td>
</tr>
<tr>
<td></td>
<td>2. Explain objectives, status and program of the pilot</td>
</tr>
<tr>
<td></td>
<td>project.</td>
</tr>
<tr>
<td></td>
<td>3. Mutual Trust Building</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP-III</th>
<th>Consultation Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Consultation notes and rules of FOs.</td>
</tr>
<tr>
<td></td>
<td>2. Detail of WCA.</td>
</tr>
<tr>
<td></td>
<td>3. Fixing date and place for the next meeting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP-IV</th>
<th>Formation of Watercourse Associations (WCAs) and selection of the FO representative.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Ensure that 70% shareholders are available.</td>
</tr>
<tr>
<td></td>
<td>2. Membership forms (Filled in) and collect membership fee.</td>
</tr>
<tr>
<td></td>
<td>3. Selection of FO representatives.</td>
</tr>
<tr>
<td></td>
<td>4. Move application from WCA for FO members.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEP-V</th>
<th>Formation of Farmers Organization (FO)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Selection or election of office bearers of FO.</td>
</tr>
<tr>
<td></td>
<td>2. Selection or election of management committee.</td>
</tr>
</tbody>
</table>
3.2 Implementation Highlights of Social Mobilization Process

3.2.1 Well Planned Activities

All the activities carried out were well planned by the staff members so that each step was fully clear. Specific activities schedule was prepared in the shape of monthly work plans and shared with all staff. These work plans guided and channelize all the project activities. The planning of activities facilitated the work without any ambiguity and almost targets were achieved. While planning the project activities all the field staff were involved in order to develop the sense of ownership of the activities. This team-work approach of management gave fruitful results.

3.2.2 Field Discussion

The field team comprising of social scientists and engineers had extensive and continuous field discussion on almost all aspects of the project activities. The regular field office staff meetings and monthly planning meetings of all field staff were of significant importance with respect to exploration of field complexities, problems, issues and observations and thorough discussion to identify the solutions. This strategy worked very well in the social mobilization process.

3.2.3 Informative Material

Verbal communication is highly effective but lasts for short time, whereas written messages have long lasting effects. All the relevant information collected and generated was processed, translated, published, and distributed among the target groups. The material was produced in local languages so as to reach the majority of the target farmers. This helped in creating the awareness among various actors and consequently supported the social mobilization process.

3.2.4 Comprehensive Documentation

Recording the activities, observation, and events is an essential measurement tool of research methodology, in addition to documenting the findings. Because this was an action research study, it required the comprehensive collection qualitative and quantitative field data. The field scientists collected and recorded all the relevant data on field notebooks monthly. These raw data were processed through computers and finalized in the shape of field reports.

3.2.5 Close Interaction

The significant features which contributed largely in social mobilization and building the rapport with farmers and other partners was to ensure frequent interaction between all involved parties. The formal and informal meetings, workshops, and training sessions, collaborative activities and exchange visits became the mode of this close coordination and interaction.

The close communication in the shape of interaction worked well in building the trust, understanding program objectives, organizing field activities, neutralizing the negative propaganda and enhancing the capacities of farmers.
3.2.6 Participatory Approach

The action research adopted a participatory mode. The activities were not imposed upon the FOs but adopted after mutual consultation and consensus. The farmers participation at the very inception of project activities both horizontally and vertically is an essential element of the entire process. This evolved the sense of ownership and responsibility among farmers and made them responsible.

3.2.7 Maximum Participation in All Events by Farmers

The participation theory means involving everyone in all activities. The emphasis was given to maximizing the participation of farmers in all-important events. The participation was ensured in the elections of watercourse associations (WCAs) as well FOs. Some meetings were postponed due to low participation because it was believed that the seventy-percent participation was essential for the formation of WCAs as well as FO.

3.3 Identification and Training Workshops for SOVs

One original idea introduced in the social organization process was the mobilization of local volunteers. The main reason of mobilizing the local volunteers was to develop the organizational concepts from within the community; another reason was to get the support of them as the research team was small. The following criteria were considered while identifying the SOVs:

- The person is well informed about the area, its people, traditions, geographical details, water and land resources and generally about its irrigated agriculture;
- The person is non-controversial, is not known as a troublemaker, an exploiter, or an anti-social person in any way;
- The person should be able and willing to communicate freely with all sections of the local community, and also with the outsiders who come to collaborate with the local people in community development activities;
- The person should be motivated to help others and should see value in collective behavior for the common good;
- The person should have the potential for acquiring some basic training to become a community-based social Organizer, and be part of our extended field team; and
- Having the ability to speak publicly would be an added advantage. (Bandaragoda and Memon, 1997)

The Social Organizer Volunteers were identified during the rapid appraisal of the villages. In case of long distributary having more than 25 watercourses, one SOV was identified from each watercourse command area and in case of medium and small distributary having less than 25 watercourses then two SOVs were identified from each watercourse command area. One-day workshops were organized for SOVs to define the program and FO formation process. The SOVs were fully supportive in organizing the farmers at watercourse level.
3.4 Formation of Watercourse Association (WCAs)

The second dialogue with the community was initiated after the SOVs workshop, and comprised of consultation meetings. The planning for the consultation meetings at each watercourse was made during the SOVs workshops. The consultation meetings were conducted at each watercourse with the majority of farmers. The purpose of consultation meetings was to form the watercourse association as the basic unit for the formation of Farmers Organization. The trained SOVs were responsible for planning the meetings, and setting the time and place. The important activities carried out at the consultation meetings were:

- Promulgation of the reform program
- Providing information on structure of WCAs and FO
- Identifying the Criteria for membership
- Distribution and filling up of membership forms and collection of membership fee
- Distribution of printed informative material
- Election of management committee members of WCAs
- Election for FO representatives from watercourses

The membership criteria envisaged in the FO bylaws were strictly adopted, which state that each member:

- Must be a Farmer or his representative possessing agriculture land on the watercourse;
- Must fill the membership form and pay Rs. 100 as membership fee;
- Must be of 18 years or above by age; and
- Must agree with the aims and objectives of the WCAs

The social mobilization process on all distributaries at watercourse level was started with the identification of SOVs and ended with the formation of WCAs. This process lasted about one year in which 330 WCAs were formed.

The final phase of the social organization process was to combine all these WCAs to form Farmers Organizations (FOs) for each Distributary/Minor command area. All the WCAs identified one representative for constituting the general body of the Farmers Organization. The general body for watercourse association is comprised of all water users who own the land on the watercourse, with at least 67 percent of landowners being members of the association. The management of committee for both FO and WCA comprised of: Chairman, Secretary, Treasurer and four executive members.

3.5 Formation of Farmer Organization (FO)

The WCA representative formed farmers’ organizations. When more than seventy percent WCAs were formed on the particular distributary/minor, the election for FO management committees was conducted. Before election a workshop of the FO general body members was organized to fill FO membership form by the representative of the WCA duly signed by the Chairman of WCA, and pay Rs. 1000/- as the FO membership fee for each WCA.
During the FO formation general body meetings, essential responsibilities of office bearers and election criteria for management committee were described to enable the members to choose the most suitable person for each position. It was prerequisite that the management comprised of following members as per bylaws:

- Two representatives of the tail portion of respective channel;
- One land holder possessing a small area only at the channel; and
- One office bearers should be elected from the above two categories.

Following the step-wise process and ensuring farmers participation at all levels, total fourteen FOs were formed. The details of the FOs formed on the distributaries selected and approved by the Project Steering Committee as shown in Table 3.1.

**Table 3.1 FO Formed on Selected Distributaries/Minors**

<table>
<thead>
<tr>
<th>S#</th>
<th>Distributary / Minor</th>
<th>RD, Canal</th>
<th>Total Length KM (RD)</th>
<th>CCA (Acres)</th>
<th>Design Discharge (cusecs)</th>
<th>No. of WCs</th>
<th>No. of WCAs formed</th>
<th>Member ship of WCAs</th>
<th>Deposited Membership fee</th>
<th>FO formed on (date)</th>
<th>Registration No. and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Heran</td>
<td>128-Nara Canal</td>
<td>10.60 (32.0)</td>
<td>15,410</td>
<td>62.50</td>
<td>31</td>
<td>31</td>
<td>562</td>
<td>31,000</td>
<td>20-Oct-99 (5)</td>
<td>25-Jan-2000</td>
</tr>
<tr>
<td>2</td>
<td>Rawtiani</td>
<td>56.4-Dim Br. of Jamrao Canal</td>
<td>8.83 (28.96)</td>
<td>9,026</td>
<td>29.00</td>
<td>19</td>
<td>18</td>
<td>329</td>
<td>1,700</td>
<td>30-Dec-99 (6)</td>
<td>25-Jan-2000</td>
</tr>
<tr>
<td>4</td>
<td>Tail</td>
<td>95.0-Shahu Br. Jamrao Canal</td>
<td>5.15 (16.90)</td>
<td>8,286</td>
<td>27.00</td>
<td>14</td>
<td>14</td>
<td>177</td>
<td>14,000</td>
<td>26-Apr-2000 (12)</td>
<td>5-May-2000</td>
</tr>
<tr>
<td>5</td>
<td>Bareji</td>
<td>408.5-Jamrao Canal</td>
<td>12.00 (39.31)</td>
<td>13,049</td>
<td>41.50</td>
<td>24</td>
<td>24</td>
<td>295</td>
<td>24,000</td>
<td>19-Jan-2000 (3)</td>
<td>25-Jan-2000</td>
</tr>
<tr>
<td>6</td>
<td>Mirpur</td>
<td>342-Jamrao Canal</td>
<td>14.80 (48.50)</td>
<td>16,218</td>
<td>63.80</td>
<td>53</td>
<td>40</td>
<td>418</td>
<td>44,000</td>
<td>12-Oct-99 (1)</td>
<td>25-Jan-2000</td>
</tr>
<tr>
<td>7</td>
<td>Sanhro</td>
<td>408.5-Jamrao Canal</td>
<td>10.00 (32.90)</td>
<td>15,367</td>
<td>53.80</td>
<td>25</td>
<td>27</td>
<td>290</td>
<td>26,100</td>
<td>18-Jan-2000 (4)</td>
<td>25-Jan-2000</td>
</tr>
<tr>
<td>8</td>
<td>Belharo</td>
<td>150-West Br. Jamrao</td>
<td>13.87 (45.50)</td>
<td>17,077</td>
<td>58.60</td>
<td>32</td>
<td>28</td>
<td>456</td>
<td>32,000</td>
<td>27-Jan-2000 (8)</td>
<td>2-Feb-2000</td>
</tr>
<tr>
<td>9</td>
<td>Potho</td>
<td>215-West Br. Jamrao</td>
<td>10.35 (33.11)</td>
<td>8,063</td>
<td>30.00</td>
<td>19</td>
<td>18</td>
<td>285</td>
<td>19,084</td>
<td>22-Nov-99 (2)</td>
<td>25-Jan-2000</td>
</tr>
<tr>
<td>10</td>
<td>Bagi</td>
<td>619.74 Jamrao Canal</td>
<td>7.60 (25.20)</td>
<td>8,128</td>
<td>28.00</td>
<td>14</td>
<td>14</td>
<td>205</td>
<td>12,000</td>
<td>22-Apr-2000 (10)</td>
<td>5-May-2000</td>
</tr>
<tr>
<td>11</td>
<td>Dighri</td>
<td>164.52- West Branch of Jamrao</td>
<td>29.35 (93.50)</td>
<td>31,627</td>
<td>101.80</td>
<td>72</td>
<td>57</td>
<td>590</td>
<td>66,000</td>
<td>25-Apr-99 (11)</td>
<td>5-May-2000</td>
</tr>
<tr>
<td>12</td>
<td>Khatian</td>
<td>300 West Branch of Jamrao</td>
<td>7.70 (24.60)</td>
<td>9,567</td>
<td>27.50</td>
<td>21</td>
<td>19</td>
<td>189</td>
<td>21,000</td>
<td>14-Jun-2000 (15)</td>
<td>30-Jun-2000</td>
</tr>
<tr>
<td>13</td>
<td>Tando*</td>
<td>300-West Br. Jamrao</td>
<td>5.10 (16.70)</td>
<td>1,806</td>
<td>5.50</td>
<td>6</td>
<td>6</td>
<td>51</td>
<td>5,100</td>
<td>14-Jun-2000 (14)</td>
<td>30-Jun-2000</td>
</tr>
<tr>
<td>14</td>
<td>Dhoro Naro</td>
<td>91.40-Gajrah Branch of Rohri Canal</td>
<td>9.84 (32.27)</td>
<td>13,382</td>
<td>51.60</td>
<td>25</td>
<td>24</td>
<td>400</td>
<td>19,960</td>
<td>9-Mar-2000 (9)</td>
<td>16-Mar-2000</td>
</tr>
</tbody>
</table>

* This is the additional minor where an FO was formed. It was not included in the TOR.
The major characteristics of the registered FOs are presented below:

- In all 330 Watercourse Associations (WCAs) on 14 FOs were formed involving almost all the landowners in the command areas of these watercourses.
- The landowners in general become formal members of these associations, although in few cases the representatives of landowners become members and paid Rs.100/- as membership fee.
- The transparent democratic process of election of WCA and FO Management Committee was adopted.
- The management committee members were elected on the basis of their dedication to work for the association, honesty, and social status.
- These WCAs selected their member representatives for forming FOs on their respective distributaries/minors.
- Similarly the WCAs formally become members of their respective FOs.
- Watercourse Associations have been formed on virtually every watercourse; however in some cases where the number of landowners is small and they have joint land on two watercourses, a joint WCA of both watercourses was formed.
- Membership fee for FO (Rs.1,000/-) was paid from contribution of membership fee collected at each watercourse level.

3.6 Profile of WCAs Members

The members of watercourse associations filled out their membership forms carrying the information related to various social indicators. In all 4,336 members filled their membership forms with 330 watercourse associations on 14 distributaries/minors. Analysis show some interesting results below:

- The members are well distributed from head, middle and tail reaches of watercourses (32% from head, 36% from middle and 32% from tail).
- Seventy nine (79) per cent of members of watercourse associations are literate.
- Interestingly 42 percent have passed their matriculation and beyond matriculation.
- Twenty nine percent members are have passed their primary education.
- Forty six (46) percent members are landowners, whereas thirty six (36) are owner-cultivators. The rest are lessee and managers. A few number of tenants are also members having been given the consent of their landowners.
- The mean age of members is 43 years. About 26 percent are more than 50 years.
- The mean farming experience of members is 22 years. About 7 percent of the members have more than 40 years of experience.
- Interestingly two (2) women are members of the watercourse associations.
<table>
<thead>
<tr>
<th>PARTICULARS</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location of the Members</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>1,389</td>
<td>32</td>
</tr>
<tr>
<td>Middle</td>
<td>1,565</td>
<td>36</td>
</tr>
<tr>
<td>Tail</td>
<td>1,392</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,336</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (Years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:20</td>
<td>132</td>
<td>3</td>
</tr>
<tr>
<td>21:30</td>
<td>791</td>
<td>18</td>
</tr>
<tr>
<td>31:40</td>
<td>1,245</td>
<td>29</td>
</tr>
<tr>
<td>41:50</td>
<td>1,042</td>
<td>24</td>
</tr>
<tr>
<td>51:60</td>
<td>698</td>
<td>16</td>
</tr>
<tr>
<td>61+</td>
<td>428</td>
<td>10</td>
</tr>
<tr>
<td><strong>Mean Age:</strong></td>
<td>43</td>
<td></td>
</tr>
<tr>
<td><strong>Std. Dev.:</strong></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td><strong>Minimum:</strong></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum:</strong></td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

| **Farming Experience (Years)**    |           |         |
| 1:10                              | 1,212     | 28      |
| 11:20                             | 1,270     | 29      |
| 21:30                             | 952       | 22      |
| 31:40                             | 578       | 13      |
| 41:50 and +                       | 304       | 7       |
| **Mean Experience:**              | 22        |         |
| **Std. Dev.:**                    | 13        |         |
| **Minimum:**                      | 0         |         |
| **Maximum:**                      | 70        |         |

| **Land Holding (Acres)**          |           |         |
| 0 acres                           | 390       | 9       |
| 1:10 acres                        | 785       | 18      |
| 11:20 acres                       | 1,086     | 25      |
| 21:50 acres                       | 1,265     | 29      |
| 51:100 acres                      | 460       | 11      |
| 101:200 acres                     | 241       | 6       |
| 201:500 and + acres               | 109       | 3       |
| **Mean Land:**                    | 42        |         |
| **Std. Dev.:**                    | 67        |         |
| **Minimum:**                      | 0         |         |
| **Maximum:**                      | 1,100     |         |

| **Tenancy Status**                |           |         |
| Land Owner                        | 1,979     | 46      |
| Owner-Cultivator                  | 1,578     | 36      |
| Lessee                            | 168       | 4       |
| Manager                           | 190       | 4       |
| Tenant                            | 200       | 5       |
| Land owner-cum-Lessee             | 204       | 5       |
| Owner-cultivator-cum-lessee       | 15        | .36     |
| Women                             | 2         | .04     |

| **Educational Level**             |           |         |
| Illiterate                        | 899       | 21      |
| Primary                           | 1,255     | 29      |
| Middle                            | 346       | 8       |
| Matric                            | 692       | 16      |
| Intermediate                      | 444       | 10      |
| Graduate                          | 478       | 11      |
| Post-Graduate                     | 222       | 5       |
3.7 Meetings of WCAs and FOs and Their Decisions

Since the formation of Watercourse Association on all fourteen distributaries, WCAs have been engaged in meeting to discuss various common issues and make decisions. In all 330 WCA management committee (MC) meetings were held on the fourteen distributaries.

Table 3.3  
Meetings of WCAs and FOs

<table>
<thead>
<tr>
<th>Distributary /Minor</th>
<th>WCAs</th>
<th>FOs</th>
<th>General Body (G.B) of FOs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of MC Meetings</td>
<td>No. of MC Members</td>
<td>Participation %</td>
</tr>
<tr>
<td>Heran</td>
<td>103</td>
<td>1008</td>
<td>85</td>
</tr>
<tr>
<td>Rawtiani</td>
<td>28</td>
<td>192</td>
<td>92</td>
</tr>
<tr>
<td>Mohd Ali</td>
<td>2</td>
<td>14</td>
<td>48</td>
</tr>
<tr>
<td>Tail</td>
<td>11</td>
<td>75</td>
<td>88</td>
</tr>
<tr>
<td>Bareji</td>
<td>63</td>
<td>483</td>
<td>68</td>
</tr>
<tr>
<td>Mirpur</td>
<td>33</td>
<td>119</td>
<td>80</td>
</tr>
<tr>
<td>Sanhro</td>
<td>31</td>
<td>117</td>
<td>70</td>
</tr>
<tr>
<td>Belharo</td>
<td>56</td>
<td>223</td>
<td>50</td>
</tr>
<tr>
<td>Potho</td>
<td>18</td>
<td>110</td>
<td>57</td>
</tr>
<tr>
<td>Bagi</td>
<td>9</td>
<td>47</td>
<td>85</td>
</tr>
<tr>
<td>Dighri</td>
<td>33</td>
<td>170</td>
<td>76</td>
</tr>
<tr>
<td>Khatian</td>
<td>15</td>
<td>75</td>
<td>76</td>
</tr>
<tr>
<td>Tando</td>
<td>6</td>
<td>34</td>
<td>70</td>
</tr>
<tr>
<td>Dhoro</td>
<td>77</td>
<td>787</td>
<td>50</td>
</tr>
</tbody>
</table>

WCA and FOs members through their management committee, special and general body meetings took several decisions with related to the organization, irrigation and drainage issues. Brief decisions and discussions in their meetings are presented below:

- Confirmation of minutes.
- Discussion on the audit reports for the year 1999-2000.
- Preparation of progress reports of the organization.
- Formal approval of petty expenses.
- Establishment of FO offices.
- Discussion on sudden rotation plans.
- Approach government on the issue of delaying the IDMT through letters.
- Planning for desiltation.
- Installation of sign boards in front of FO offices.
- Collection of Fund for the construction of offices.
- Nomination of the members of the FO for various training.
- Publication and distribution of the quarterly newsletter FO Bareji Distributary.
- Acquire plots from IPD for FO offices.
- Completion of membership forms at the watercourse level.
- Collection of share lists from IPD.
- Removal of silt from the banks of distributaries/ minors.
- Discussion and understanding FO bylaws.
- Understanding business plan.
• Organizing oath-taking ceremonies for the management committee members;
• Planting trees on the banks of the distributary/minor.
• Extending cooperation for drainage management
• Assigning the responsibility on FO member(s) of
• Recording gauge height through installed gauges.
• Participation of FO management committee members in management committee meetings of WCAs.
• Identification and approval of drainage schemes on participatory agreement with NDP (where drainage is not available).

3.8 Formation of Farmer Organizations Council

The FOs were assisted to form a common plate-form for keeping close communication with each other and raise the issues jointly higher levels. The forum established for high level communication was the Farmer Organizations Council (FOC). The broad purposes of the FOC was to assist government in implementation of reform agenda and promote participatory irrigation management activities in the province of Sindh particularly. The main objectives of FOC are to:

• assist government and other actors in strengthening institutional reforms in irrigation and drainage management;
• collect and disseminate social, economic and technical information related irrigation, drainage and agriculture to various stake holders;
• advise public and private institutions, organizations and farmers on the agricultural policies; and
• establish effective network to disseminate information.

The by-laws of FOC has been prepared and circulated for members to approve in their general body meeting. The by-laws describe that:

• The membership of a FOC shall be comprised of all FOs formed and registered under the SIDA Act 1997.
• Each FO will pay Rs. 1000 to FOC as a membership fee.
• FOC will issue membership certificate to member FO.
• The general body of FOC shall be composed of a representative from each FO elected by the Management Committee of FO as its constituent members.
• The general body will elect the management committee and delegate to it the powers necessary for the performance of its tasks.
• The management committee of FOC shall be composed of three office bearers: chairman, secretary and treasurer and not more than four such other members as shall be elected by general body meeting.

• The management committee shall be elected for a period of two years by the general body of the FOC, renewable for one further term, after such member shall be ineligible for re-election for a further full period of two years.

• The management committee shall meet once in a month or as often as required by the affairs of the FOC. Its decisions shall be taken by simple majority vote. A quorum shall be constituted by not less than four members.

• No remuneration, allowance or salary in any form shall be paid to any member of management committee for the performance of his duties. Members may however claim reimbursement of any legitimate expenses incurred in the performance of such duties, within limits determined by the general body.

• Upon an affirmative vote by an absolute majority i.e two third of the members of the General Body meeting of the FOC, any of the office bearers may be removed and his successor elected for the duration of un-finished term of office bearer so removed.
4. CAPACITY BUILDING AND EMPOWERMENT TO FOs

4.1 Capacity Building

Capacity is the ability of the person or organization to do things with maximum competence. The organization needs to be effective in the delivery of the services and efficient use of resources (Alaerts et al. 1991). Peoples are key players in establishing an effective operation of the institutions. In case of irrigation the service provision means to acquire, allocate and distribute water equitably and reliably to all the legitimate users in sustainable way. In the case of drainage the FO needs to maintain surface drains having less than 15 cusecs discharge, guard the tubewell pumps and sump houses of tile drainage units and maintain disposal channels. Enhancing the abilities of the leaders to smoothly establish the institution and perform the designed functions is essential. Human resource development and capacity building program ensures sustainability of the institution, laws and regulation can efficiently be used, and more resources can be mobilized.

The capacity building program was initiated after the formation of FOs on distributaries/minors. Due to previous lack of involvement in management, farmers in Pakistan are less informed about water resources and their management. The governmental management pattern and the societal structure also kept farmers away from this business. In this environment, the task envisaged for FOs is unattainable until an intensive capacity building program has been implemented. The job analysis of the FOs was the key of this capacity building program.

4.1.1 Objectives of the Capacity Building Program

The capacity building program was initiated with several objectives. These objectives are well defined but are difficult to measure because the results of capacity building are intangible in most cases. The capacity building program was designed to form and strengthen the farmers institutions as well as develop the necessary skills among the leaders of these institutions. The overall objectives are as follows:

- To facilitate the institution building process, legal requirement and formulation and adoption of rules and regulation.
- To fill the knowledge gap among farmers regarding their new role and responsibilities.
- To transfer basic organizational and financial skills
- To enhance the technical know how of irrigation and drainage management
- To provide external support in order to create the conducive environment for weaving the fabric of new institutions
The following fields were identified where the water users needed to develop their capacity for smooth functioning of their organizations and operate and maintain the distributary and drainage systems:

- Rules, regulations and bye-laws
- Participatory irrigation management
- Effective communication strategy and conflict resolution
- Organizational and financial management
- Project planning and implementation
- Operation and maintenance of irrigation and drainage system
- Equitable water distribution
- Optimum use of irrigation water
- Discharge measurement
- Resource mobilization
- Crop assessment, abiyana collection and record keeping
- Business plan
- Financial management

4.1.2 Trainings Organized

As mentioned earlier, the training envisaged in the project TOR was assessed by the field team, and the following training programs were organized for the members of watercourse associations and farmer organizations during the project period. Table 4.1 shows the training organized.

<table>
<thead>
<tr>
<th>S#</th>
<th>Training</th>
<th>No. of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Social Organizer Volunteers (SOVs) workshop</td>
<td>361</td>
</tr>
<tr>
<td>2</td>
<td>Awareness on institutional reforms</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>Discharge measurement and walk through survey (O&amp;M)</td>
<td>487</td>
</tr>
<tr>
<td>4</td>
<td>Organizational and financial management</td>
<td>577</td>
</tr>
<tr>
<td>5</td>
<td>FO rules, regulations, bylaws, action plan and transfer agreement</td>
<td>184</td>
</tr>
<tr>
<td>6</td>
<td>Crop assessment and abiyana collection</td>
<td>105</td>
</tr>
<tr>
<td>7</td>
<td>Workshops on agricultural production practices</td>
<td>372</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>2,206</strong></td>
</tr>
</tbody>
</table>
4.1.3 The Participants

The training programs were organized for the following clientele:

- Social Organizer Volunteers (SOVs);
- Management Committee Members of Watercourse Associations (WCAs) and Farmer Organizations (FOs) and
- Officials of Area Water Board and On-Farm Water Management

In all 2,206 members of watercourse associations, farmer organizations and agency officials were given training in different fields. Some of the characteristics of members of WCAs and FOs participated in the programs are presented briefly hereunder.

- A total number of 2,039 office bearers/members of watercourse associations (WCAs) and farmer organizations (FOs) have participated in these training programs.
- The majority of the office bearers (Chairman, Secretary and Treasurer) of watercourse associations and farmer organizations participated in the training programs.
- Ninety (90) percent of participants were literate.
- Twenty three (23) percent of the participants were post graduate having masters degree in various fields.
- Twenty nine (29) percent participants were having primary education.
- The participants were well distributed from head, middle and tail reaches of the distributaries/ minors (35 percent from head, 31 percent from middle and 34 percent from tail reaches)
- Mean age of the participants was 42 years. A few members having age more than 60 years took part in the training programs.
- The majority of farmers attending the training were well experienced. On average participants had at least 20 years of farming experience.
- Mostly land-owners and owner cultivators participated in the trainings.
- A smaller number of managers, lessees and tenants participated.
- Most of the members participated in more than one training programs.

4.1.4 Methodology Adopted

Senior people from IWMI having experience in organizing FO on three pilot distributaries during the first phase of the project were involved as the trainers. In addition, some trainers were invited from other organizations and departments. The training courses were organized at places suitable to all members of the FOs. Maps, drawing sheets, flip charts were used during training. During discussion the sheets were used to note the remarks of each participant. The participants were encouraged to share their experiences on every aspect of the contents of the
training. Local language was used mostly in the trainings and written material was distributed among the participants.

The latest communication equipment such as multi media, over head projector, flip charts and white boards were used to deliver the message properly and maintain attention of participants in order to achieve the desired results. In the technical sessions discharge measurement equipment was used including current meters and cutthroat flumes. The theoretical/conceptual knowledge was augmented with the practical sessions both in the classroom and in the field. The printed material shared with the participants was: farmers organization bye-laws and SIDA Act, action plan for operation and maintenance of irrigation and drainage system, draft irrigation and drainage management agreement document, and discharge measurement training notes.

4.1.5 Impacts of the Training Program

The impacts of training program assessed by the field team at different occasions are presented below:

4.1.5.1 Social Organizer Volunteers (SOV) Workshop

- Supported in convening the meetings at watercourse level
- Helped in social mobilization process and formation of watercourse associations
- Motivating members for more participation in WCA
- Created awareness of institutional reforms in the community
- Most of the SOVs were selected as office bearers of WCAs, as they have remained engaged in the process right from the inception.

SOVs made themselves responsible for arranging the meetings of water users in their villages. They believed that the water users can get free time only after sun set. The SOVs conveyed messages to water users through the loud speakers of the mosque to participate in the meetings on one of the autaq (guest room) of one of the landowners, where they served evening tea and biscuits to all participants.

4.1.5.2 Organizational and Financial Management

- Water users irrespective of land holding, tenancy status and social and financial status, sat together and discussed common issues breaking the skepticism that big landlords and privileged water users cannot sit together with smaller deprived land owners.
- Members of organizations used their own transport to participate in the training program and no transportation charges were paid from the project funds.
• Intimacy among the farmers of various watercourses and distributaries and even different districts was established. This new friendship among farmers has created cohesion among various communities.
• Developed a common sense of friendly competition among various farmer organizations to see who can do the best job.
• The organizations maintain proper records such as minute books, correspondence files, cash, receipt and visitor books.
• To keep the financial record transparent, the Accounts have been audited by independent auditors.
• Emerging new organizational leadership in these organizations, who have a vision of improvements in the future through these reforms
• Focussing on small groups of people at various levels has created a new organizational leadership. A group of leaders has emerged who possess all the qualities of leadership.
• Organizing meetings on regular basis to discuss different issues

One of the members of management committee of FO gathered information with regard to desired and actual gauge reading of Jamrao canal. He also collected the same for Dighri sub division which starts at 28 mile cross regulator. After comparison with the data, he felt that Dighri sub division is getting less share than its entitlement. He brought this issue before the Field Implementation Coordination Committee (FICC) where irrigation official was present. He also wrote letters to the concerned officials to increase the share for Dighri sub-division.

Five FOs management committees organized an oath taking ceremony jointly and invited about 375 members including government officials, NGO representatives, members of watercourse associations and farmer organizations, and prominent landowners of the area. All FOs contributed and organized the joint program in a befitting manner. One of the speakers remarked that he had not seen such organized gathering of farmers in this area, and was convinced it will eventually bring the irrigation water users together.

4.1.5.3 Discharge measurement and Walk Thru Survey

After attending the training, participants were able to:

• Understand the different ways of discharge measurements in the distributary and watercourse.
• The members of FOs have shown their ability to take over the responsibility of irrigation and drainage system and distribute water equitably among the members by preparing the action plan.
• Recording the water flow at gauges installed at the head, middle and tail of the channel. They now understand the concept of design and actual discharges at the head of main canal, distributary and watercourse.
• In the case of low discharge in the distributary/main canal, they contact to the concerned field officer of irrigation department.
• FO representatives played a significant role in preparing the clauses in irrigation and management transfer agreement, specially the requirement to deliver a specified discharge at the head of the distributary
• Understood the outlet characteristics such as B, Y and H.
• Gained knowledge regarding the physical characteristics of distributary and irrigation terminology
• Understood the need for proper desilting of the channel

Water users are measuring discharges of watercourses which are apparently getting more water and discussing the issue in the meetings of the FO. One water user of Rawtiani minor measured the discharge of one of its watercourses and complained in the FO meeting that he has measured discharge using float method and found a higher discharge as compared to its designed discharge mentioned in the outlet register.

4.1.5.4 Overall Impact

• Mobilization of human, capital and financial resources by the members.
• Effective communication among the different tiers of the organizations and between line agencies including irrigation department.
• Presenting the achievements of FOs at different forums like inauguration ceremony of the AWB on Desert Pat Feeder Canal in Baluchistan, and AWB on Swat Canal Area Water Board at Mardan in NWFP and AWB on Nara Canal Mirpurkhas Sindh.

The Minister of Irrigation and Power Department N.W.F.P. appreciated the efforts for forming Farmers Organization Council (FOC). He suggested that such a council be formed in other provinces and at national level as well. FOC has been formed by the farmer organizations with the main objectives to:

assist government and other actors in strengthening institutional reforms in irrigation and drainage management;
collect and disseminate socio-economic and technical information related irrigation, drainage and agriculture to various stake holders;
advise public and private institutions, organizations and farmers on the agricultural policies; and
establish effective network to disseminate information.
4.1.6 Recommendations

For more details the Project Report entitled “Capacity Building for Participatory Irrigation Management in Sindh Province of Pakistan” can be referred to which has been submitted to the client and donors as per the TOR. The study recommends that:

- It is widely recognized fact that without some form of long term and consistent support mechanism, the rural groups can not easily be maintained because the change process in ruralities is very slow. The examples of the Aga Khan Rural Support Program (AKRSP) and National Rural Support Program can be cited in this regard. The one-decade-old village organizations in AKRSP still require external support. Some kind of external support is still needed to nurture these newly born organizations, and this is likely to be true for the FOs.

- It is recommended that the training needs assessed by the field team and water users which could not be organized during the project period, be imparted so that they could be familiar with all the aspects they would face after the transfer of responsibilities of IDMT. Specially, the following left over areas which require training to be organized are:
  - Effective communication strategy and Conflict resolution
  - Equitable water distribution after IDMT
  - Optimum use of water
  - Business plan
  - Financial management (Memon et. al 2000)

4.2 Empowerment of Farmer Organizations

Empowerment denotes an increase in the power of an actor or group of actors commands. Power is defined here in relational terms, as a capacity that actors have or lack in the transactions between themselves. Anthony Giddens (1979) has defined power as transformative capacity, the ability to bring about changes in the state of things and relations among actors. Through the exercise of power, actors seek to get others to comply with their wants. Giddens argues further that power engenders relations of autonomy and dependence.

The social features of an irrigation system includes the effective involvement of water users and their real empowerment in attaining a positive change in the performance of system. A rationale for organizing the water users is to approach the problem from the demand side of irrigation management equation. (Bandaragoda and Skogerboe, 1994). Results show that in watercourses where farmers are empowered, they proved their ability to strictly follow the warabandi, undertake desiltation, and follow the rules formulated by the community are being honored.

Following Merrey (1996), the meaning of empowerment may be brought into focus through the concepts of organizational and financial autonomy. Within a broad regulatory framework, farmer organizations need a sufficient degree of autonomy in managing their organizations, assets,
tasks and finances, so that they can enter into service agreements as described by Hofwegen. Only then can stakeholders hold each other accountable and ensure that mutual commitments are honored and behavior is rule-conforming. If both finances and internal governance are too tightly controlled by government and farmers’ dependency is maintained, there is a danger that organized farmers will perceive themselves as a labor force which is also made to pay. This would undermine their motivation and capacity to undertake the essential tasks of local irrigation management.

Empowerment is the process by which a newly created organization is fostered and nurtured so that it will ultimately be in full control of its decision-making capacity. At the end of this process it can be expected to establish policies and objectives, develop and implement plans that will meet these objectives, be able to manage itself internally both administratively and financially, and be able to deal with other organizations and agencies as an equal partner.

For empowerment to be successful and sustainable there has to be patience and support from other organizations and agencies so that during the first stages of growth when mistakes are being made and difficulties encountered the new organization and its members do not become discouraged and give up.

4.2.1 Conceptualizing Win/Win Approach

Here comes the paradigm of thought. If one of the actors thinks that empowerment of others will cripple their power and they will lose authority this is a purely pattern of thought which can be said win/lose approach. This is very narrow minded, shows a weak thought pattern and only looks at the consequences of initiatives in one way. But the rationale is to align the pattern of thought, and think in a win/win way. This will keep a healthy mental attitude, thinking that the empowerment of farmers will not be seen with the glasses of powerlessness but that this will be beneficial to all. As a result the system's performance this investment in it will give returns to society as a whole in the shape of overall improvement in the socio-economic situation and preventing the system from increasing deficiencies. Besides the improvement in system will bring prosperity, honor to laws and values, increases in productivity, while sharing the responsibilities will lessen the burden from agency so that other visible and invisible future benefits can be perceived.

The result of this sequence of events should result in the establishment of specific policies of Participatory Irrigation Management (PIM) whereby the focus of continued investment in irrigated agriculture and associated drainage would require wholesale changes in the way in which government agencies would function. The primary goals were that they could become self-financing and independent bodies where water users and government agencies worked together as equal partners for the common good of water users and society as a whole.

The core of PIM is that users of irrigation water and beneficiaries of improved drainage would become full and equal partners with government agencies. They would be involved not merely at tertiary level where agency involvement was, at best, weak but in planning of allocation and distribution at main and secondary level, the collection of irrigation fees, the decisions over how
some, if not all, of the collected money would be spent, and in the assumption of full responsibility for operation and maintenance at secondary and tertiary level.

The PIM approach has required the complete restructuring of agencies to cope with this change in responsibility of both government agencies and farmer organizations, supporting the legal changes to permit new bodies to take over their assigned responsibilities, and participating a range of training and other supporting activities that will enable the new structure to function. In some countries, notably Turkey and Mexico, this approach has been very successful and in the space of a few years newly created farmer organizations have assumed full responsibility for all aspects of water management at secondary and tertiary level, and can collect sufficient revenues from their members to break their financial reliance on government support and subsidies.

Part of the empowerment process is, therefore, to establish a legal framework in which farmer organizations can function. Because in most cases there is no legal provision for having such organizations with legal powers and responsibilities, specific enabling legislation had to be passed in the form of the Sindh Irrigation and Drainage Authority Act 1997.

### 4.2.2 Technical Elements of Empowerment

It is one thing to establish the legal framework that defines the organizational structure within which farmer organizations exist, quite another to ensure that the organization’s members can actually take over the responsibilities and obligations required of them.

As part of the process of creating FOs under the SIDA Act, efforts were made to try to upgrade the existing management capacity of FO members so that they would be able to assume their responsibilities at the time of management transfer. A specific project was established to this end in which the International Water Management Institute would help to create and strengthen FOs and assist in the provision of specific training activities that would impart to the FOs the necessary skills.

Among the topics that were considered priority areas for FOs were:

- **water measurement and monitoring** so that FOs would be able to ensure that water distribution was equitable and according to plans drawn up by FOs for water distribution among members;

- **development of maintenance plans** so that during annual closure periods the FOs would have a clear understanding of what labor and other materials would be required for canal cleaning and repair of structures;

- **assessment of cropping patterns** for purposes of revenue collection, so that the financial obligations of each member in respect of crops grown and the area under each crop are properly recorded and the correct irrigation fee assessed;
• **financial management training** that involved attention to bookkeeping and simple accounting procedures, establishment of bank accounts, and financial reporting procedures; and

• **establishment of a business plan** for spending and control of revenues under their control, and addressing institutional and organizational management issues that affect the way in which the FOs will function.

### 4.2.3 Institutional Elements of Empowerment

An institution is more than just a legal identity with technical capacity to undertake its responsibilities and obligations. It has to have an identity and a corporate culture, and above all it has to believe in its own capacity to serve its membership in the best ways possible.

An important element in establishing a new organization is the way in which it is crafted. Crafting an institution is a complex process that aims for several objectives that include:

- helping new and inexperienced members of organizations gain the self-confidence to make decisions in their own right rather than relying on outside institutions to do this;

- developing the capacity of members to define policies that best serve the interests of all and reflect the diverse values of all sections of the community;

- developing the skill to implement policies through community actions in such a way that all members are happy and feel that all have benefited and there are no major winners or losers;

- developing a sense of ownership in the institution so that members would feel a psychological and physical loss if the institution collapsed or became ineffective;

- identifying mechanisms to discuss and resolve differences in opinion between individuals or sections of the community in such a manner that at the end all parties feel content with the result and that the result benefits all; and

- developing the skill and confidence to deal with other organizations, particularly government agencies, on a fair and equal basis.

This is a far cry from a traditional paternalistic situation where a government agency makes decisions on behalf of the community, and it requires that a simultaneous effort is made to get organizations who will have to interact with the newly established community to allow them to develop their skills in a fostering and sympathetic manner.

In most cases where such crafting has been successful there has been some form of neutral facilitator who is able to work with all parties concerned, not just the community being organized but also the institutions and organizations with which they will have to interact. In the context of this project IWMI also played the facilitator role, working with incipient farmer organizations,
NGOs, and SIDA and AWB staff who would have to deal with farmer organizations within the SIDA structure.

To support this type of training other community based activities were initiated that were aimed at getting the FOs and WCAs to understand that they could benefit by acting jointly on a wide range of activities other than just water management. Typical initiatives included:

- tree planting along canals to minimize erosion and to provide a sustainable source of fruits, timber and firewood that could supplement FO and WCA incomes;
- vaccination programs for livestock of members of the FOs and WCAs in conjunction with government agencies and private companies;
- agricultural extension programs to inform members of appropriate crop varieties, fertilizers, weedicides and pesticides in conjunction with different commercial companies;
- programs for women.

While not strictly in the narrow interpretation of what water management is about, these ancillary activities are of great importance in the crafting process: they have limited goals that are relatively easy to achieve and provide the basis for building the confidence of members to tackle more difficult and contentious issues. Their value as institution-building mechanisms should not be overlooked.

4.2.4 Legal and Technical Progress

From a strictly mechanical point of view considerable progress has been made which may be equated in our analogy to the physical growth of the child. Farmer Organizations, and their constituent Watercourse Associations, now exist. They have by-laws and have been officially registered so they are legal entities, they have office bearers and a general membership who have undertaken their responsibilities to date to the best of their abilities, they have collected membership fees, have established bank accounts, have accounted to the membership for income and expenses, and they have had technical training in a wide range of subjects.

For their part the government has passed the SIDA Act defining the new structure and describing the basic responsibilities and obligations of SIDA and the Area Water Boards, they have registered the organizations that have been created, and have approved regulations that define the responsibilities and obligations of those organizations.

Both sides have agreed to the documents that will give formal transfer of authority from government to the FOs for operation and maintenance of the secondary canal system.
From the mechanical perspective perhaps only one more thing remains incomplete, which is the official approval of the Government of Sindh for the implementation of the transfer agreements giving the FOs the legal right to undertake operation, maintenance, fee assessment and collection, and so forth.

The lack of final approval of the transfer process has created an awkward situation. FOs have received the technical training believed necessary for them to undertake their proscribed tasks but they cannot undertake these tasks in practice. Because of this, it is not possible to make an independent judgement as to whether the FOs can actually achieve what is hoped and expected from them. It is a bit like a young teenager who has been shown how to drive a car by letting him or her watch the parent doing it, and then told they can't actually drive because they are too young to get a license and they will have to wait.

But there is another side to this story: when the child is old enough to drive, will the parent really hand over the car keys? And this also remains to be seen in terms of this project, to understand whether both parties are really willing to go along with the moves towards transfer of management authority to FOs.

4.2.5 Supporting Moves to Help Craft Farmer Organizations

At the end of this project it is clear that there is still a long way to go before we can claim that there is genuine empowerment of the FOs in the pilot project. While part of this is because not all of the legal conditions are in place perhaps more important is the continued lack of mutual trust between government agencies and the FOs.

From the FO perspective there is a perception that the government has not always acted in ways that have encouraged their growth and strengthening. They feel that the government has made use of traditional bureaucratic stratagems to delay each step in the legal process. Whether it has been in the development of by-laws, in the drawing up of registration agreements, in the formulation of transfer agreements, the FOs feel that there have been delays that they see as symptomatic of an unwillingness on behalf of government to provide the necessary legal setting. The ultimate cause of this lack of trust has been the slow pace at which the final transfer agreement has moved. FOs claim that they have been promised for months, if not years, that transfer will occur very quickly but it never materialized.

It should be recalled that transfer was actually granted in October 1997 during the first phase of this project through a joint management agreement. However this was quickly withdrawn for several reasons, and in retrospect it probably was premature because not all of the details of how FOs would function had been worked out. But with a gap of 1 year between the two phases of the project and the 18 months of the current project it is easy to see why FOs feel that government has not been willing to move quickly on their behalf.

There is also a sense on behalf of the FOs that at times actions have been taken that have been detrimental to the ability of FOs to function easily. There are anecdotal reports of canals being given less water after the FO was formed, or getting longer periods of closure during
rotations. There are anecdotal stories of rival organizations being promoted that aim at splitting the integrity of newly created FOs.

From the perspective of the SIDA staff there are also suspicions. They are reported to feel that the FOs are not as democratic as they claim, that they are not and will not be able to overcome problems of water distribution inequity, that they will continue to underreport the irrigated area and therefore underpay their irrigation fees, and that they will continue to try to get more water than their fair share into their secondary canals.

SIDA views the FOs as a threat to their power and authority, they are concerned that FOs will try to manipulate joint meetings to their advantage, and that ultimately they will lose control over the system that they feel is theirs and which they have had responsibility for over several generations.

In reality both sides are probably correct in their suspicions. But this hardly matters because if there is mutual distrust, irrespective of whether the reasons are right or wrong, then the correct atmosphere for crafting a new and sustainable institution are not present.

And under these circumstances empowerment cannot occur because the true win:win conditions have not been achieved. If neither side trusts each other then there is little scope for the type of approach that parents have to take, to let their children make mistakes, to help them learn from mistakes, and to guide them to become stronger and more independent in the future.

It is unfortunate that as this project comes to a close we cannot test the reality of the newly created FOs by observing them in the first stages of independence, by helping them when things, inevitably, go wrong and by sharing in their sense of achievement when things go well. For details the report as per TOR submitted to the client and donors on “Empowerment of Farmer Organizations: the case of the Farmer Managed Irrigated Agriculture Project, Sindh Province of Pakistan” can be referred to. The report concluded that:

- The Farmer Managed Irrigated Agriculture Project in Sindh has shown that, despite a lot of initial skepticism, that it has been possible to establish farmer organizations that can sensibly address complex issues related to irrigation management. Further, they have been able to discuss these issues with a wide range of agencies including, but by no means limited to, the SIDA authorities at Provincial and Area Water Board level.

- However, the full transfer of responsibility did not occur during the life length of the project and it is impossible to come to any clear conclusion about the long term future of these FOs.

- The lack of formal transfer of responsibilities to FOs means that they have not been able to put into practice the skills they have learned through the project, ranging from water measurement and crop-based assessment to financial management and the development of business plans.
• But this does not mean the project has failed. It would be naïve to think that such dramatic changes in responsibility for water management at secondary level would come easily or quickly.

• On the government side there is a strong and well established bureaucracy that has proven time and again its ability to resist change, a proud tradition of irrigation development that favors a paternalistic, top-down approach to water management, and a genuine concern for loss of power and authority if FOs become strong and powerful. It is therefore not unexpected to find the agency charged with its own weakening and loss of identity to resist the changes inherent in the PIM approach.

• For their part, the farmers themselves are not a homogenous community: there is much inequity and continuous power struggle in rural areas, and access to and control over water is a powerful weapon in this struggle. To expect rich and powerful interests to accede to the desires of the currently disadvantaged is unrealistic.

• From a distance it is clear that the focus of the project has been too one-sided: too much emphasis on the development and strengthening of the FOs and not enough attention to the needs and concerns of SIDA. With this imbalance in emphasis they naturally have little interest in providing the type of nurturing and sympathetic environment which is necessary to lead to stronger and more empowered FOs.

• The seeds of the change process have been sown, and perhaps in the next effort there will be more concern with the needs and aspirations of SIDA to make them partners in progress rather than potential adversaries, and we all be able to see a future where both sides are equally willing and capable to make the type of changes envisaged by PIM to become a reality (Murray-Rust et al 2000).
5. SUPPORT FOR INSTITUTIONAL DEVELOPMENT

The participatory irrigation management was very new concept in the country and farmers organization was a very novel idea. There were several multi dimensional problems to make these institutions viable. Weaving the very fabric of new farmers institutions required several support activities be executed in order to enable the newly formed FOs to become self sustainable and viable institutions. The support activities comprises the following key areas;

- Development of business plan
- Preparation of irrigation and drainage management transfer document
- Development of action plan for operation and maintenance of irrigation and drainage
- Enabling environment and legal authority
- Preparation of FO bylaws
- Assisting in the development of strong Linkages
- Facilitation for agency and FOs interface
- Facilitation for obtaining necessary record
- Formation of FOC

5.1 Business Plan for FOs

The approaches to irrigation management transfer and its financing needs must be understood in relation to irrigation development program in a certain area. The effects of financing policies depend on the organization of responsibilities to the Farmer Organizations who can control the resources obtained from the beneficiaries with full or partial financial autonomy. With financial dependence, Farmer organizations have no control over any funds collected from the water users, and thus remain dependent on the resources allocated to it through the government procedures.

For the past several years, the top priority in the Sindh Irrigation and Drainage Authority (SIDA) has been in learning how to organize farmers at the secondary canal level. At this time SIDA is working on the issues related to irrigation management transfer, particularly how to give legal authority in terms of managing parts of the irrigation system and how to share water charges. With these legal authorities, farmers are ready to takeover the irrigation system from the Government.

This project has provided guidelines in general to the Farmer Organization (FOs) on how to develop economic viability and the for some effective monitoring through an accountability mechanism. The proposed business plan is an important document which could be helpful in developing the future action plan after irrigation management transfer takes place. The potential for implementing an effective action plan depends on a effective operation plan.

Farmer Organizations have been provided with guiding principles to implement necessary tasks about water supply and distribution, operation and maintenance, assessment and collection of water rates and financial record keeping. The procedure for the revision of the proposal has been laid down to accomplish the efficient irrigation and drainage management. It has been emphasized that scrutiny of expenditures should be done more carefully. The financial autonomy of irrigation management and the financial linkage between water user charges and funds for O&M require some degree of control over expenditure.
Finally, revision of the proposed business plan has been suggested time to time depending upon the needs when actual business takes place. For determining O&M expenditures, some form of assessment of the "requirements" for operating and maintaining various physical structures present in the irrigation and drainage facilities would be needed every year after the IDMT (Rehman et. al 2000).

5.2 **Irrigation Management Transfer Document**

The participatory Irrigation Management plan envisages that authority of the Distributary management to be completely transferred to FOs. The FOs were assisted in preparing a draft agreement for Irrigation and Drainage Management Transfer. The FOs were assisted in identification of activities. The final draft of IDMT is presented in Annex-1. The key points of the IDMT are given below:

- AWB shall provide the assured supply of no less than designed discharge of water at the head of the distributary/minor. If excess discharge is available in the parent canal, it shall be made available to FOs proportionately.

- FO shall assess and collect water charges (abiyana), drainage cess and non-agriculture use charges within the jurisdiction of the command area of the distributary/minor.

- FO may modify the present pattern of assessment and collection if the need arises

- FO shall pay sixty per cent (60%) of the assessed abiyana, drainage cess and non-agriculture use charges to AWB.

- All the disputes internal to the FO regarding the water allocation, entitlements, and distribution will be resolved by the water committee constituted by FO.

- FO shall employ the necessary staff required for fulfillment of its tasks.

- FO shall maintain drains up to 15 cusecs, sump wells, interceptor drains and tile drains in its command area.

5.3 **Developing Action Plan for Operation and Maintenance of Irrigation and Drainage**

The planned schedule of the activities helps an organization to execute the activities on time and arrange both human and financial resources. The action plan developed in consultation with the office bearers of the FOs was a slow process; it took six months to finalize the organizational development actions, technical duties and financial obligation of the Farmers Organization. (Annex-2)
The FOs will have to perform a variety of activities such as:

- Establish and enforce with sanctions an internal system of rules
- Ensure adequate information gathering and flow through formal and informal channels of communication
- Hire and supervise staff
- Design, discuss and approve an annual business plan
- Monitor irrigation supplies at the head regulator of the distributary on the basis of a service agreement with an AWB
- Allocate and distribute water supplies among watercourses and individual irrigators on equitable basis
- Manage groundwater levels and drainage facilities
- Plan and execute activities such as desilting, weeding and repairs of the irrigation and drainage infrastructure
- Manage resource mobilization activities, including the assessment and collection of irrigation, drainage and other related service fees
- Mobilize labor and equipment
- Follow a detailed and accurate procedure of accounting and record keeping
- Establish and utilize mechanisms of conflict management
- Organize training activities for improved irrigation management practices from the head regulator to the field level
- Mobilize support services from government agencies, public utilities and NGOs
- Ensure persistent communication with other stakeholders in the irrigation sector at local and higher levels
- Manage non-irrigation assets

The actions mentioned in the plan are specific and time bound. Thus there are some specific targets to be achieved by the FOs. This is a guideline for streamlining the action of the Farmer Organizations. A series of debates were arranged in the field as well as in project offices to understand the action plan and the same document was translated in local languages and distributed among the member to give their input. The major topics of the action plan are inception, capacity building, technical, financial and organizational activities.

5.4 Enabling Environment and Legal Authority

Less institutional support came from the government side to the future role of the FOs and their trust was shaken badly. The facilitators created enthusiasm and inspiration among the leaders of new organization and had tremendous support for making them come alive in a difficult situation.

Today's reality of the FOs as a working institution is due to the untiring support mechanism provided to them at key moments. There is recognition of the Farmers Institution at both government level and a strong internal sense of identity. All the FOs have been registered under the new act and thus acquired the legal status. The registration process was supported and necessary assistance provided to make FOs eligible for registration. The registration criteria were determined and FOs were assisted to meet those criteria (Annex-3) and they got registration with SIDA (Specimen of registration certificate Annex-4).
5.5 Bylaws for FOs

In order to standardize the formation of FOs at all distributaries/minors in Sindh province under the Sindh Irrigation and Drainage Act 1997, a common by-laws for FOs have been proposed. The project steering committee after thorough discussion recommended that these by-laws be approved by the SIDA Board for adoption by the water users who would like to form the watercourse associations and then farmer organizations at the distributary command level. The by-laws are presented as Annex-5. The by-laws describe the following:

- Establishment, Status and Area of Jurisdiction of Farmers Organizations and Watercourse Associations.
- Functions and Powers of FOs
- Membership
- General Body of FO and WCA
- Composition of Management Committee
- Powers and function of Management Committee
- Duties of Office Bearers (Chairman, Secretary, Treasurer) and their Vacancies
- Removal of Office Bearers
- Resolving Disputes
- Notice and order of the Meeting of General Body/Management Committee
- Financial Resources
- Investment and operation of Funds
- Apportionment of costs payable to the supplier
- Financial Year, accounts, statements and audit
- Publication of Accounts and Reports
- Suits and Legal Proceedings
- Amendment of Bye-laws and liquidation/dissolution of FO

5.6 Linkages

Sound organization keeps the links alive with the external world. It is obvious that a variety of organizational benefits can be yielded from establishing and consolidating linkages with the different organizations and agencies. The efforts were rooted in the action research program to have a sound and effective linkage of the FOs with other line agencies.

The Field Implementation Coordination Committee (FICC) concept was realized to provide the opportunity to the FO leader to sit together with the officials of various agencies and discuss with them on the mutual interest. Through the FICC, FOs established the effective partnership with numerous agencies dealing with agricultural extension, revenue, forestry and veterinary.

Though this forum FOs links were established with various commercial input companies and research organizations and universities such as Engro chemicals and Sindh Agriculture University and they came forward to provide the services to FOs. These external links proved very useful for the FOs. Now they have a good reputation, and sound basis for partnership with the line agencies. This partnership is growing and is used for the common benefit of the farmers. This has given internal recognition of the organization and realized the goal of common platform for solving their problems. Using these linkages, the following activities were carried by various organizations for the socio-economic benefit of members of FOs:
Lectures on cotton varieties, insects and pest management
Field day and establishment of demonstration plot at farmers' field
Vaccinations to live-stocks
Workshops on the importance of soil testing
Seminar on wheat crop
Formation of community organization by National Rural Support Program (NRSP)
Appropriate use of fertilizer

5.7 Facilitation for Agency and FOs Interface

The FOs and Area Water Board (AWB) are two key partners of this new set up of irrigation management. Efforts were made to get both partners to come closer to understanding each other. Several meetings were arranged between them. Officials of AWB participated in variety of programs organized by the FOs. This interface reduced communication gap between the two key stakeholders.

5.8 Facilitation for maintaining necessary records

Farmers Organization required lot of record for smooth functioning. They have little access to the governmental record. FOs were well assisted in this sphere to help them obtain the required documents and records from IPD and revenue department. They were helped to collect:

- share lists
- design parameters of channels
- maps of watercourses
- record of rights and
deh maps from revenue department.

5.9 Support to Area Water Board

During the project period, support was extended to the officials of Nara Canal Area Water Board (NCAWB) for its various functions such as:

- Preparation of business plan
- Conducting meetings
- Preparation of inventory of FOs and AWB
- Organizing of NCAWB inauguration ceremony
- Imparting training for officials of AWB
5.10 Participation in Drainage Management

FOs show their willingness to participate in the operation and maintenance of (O&M) of drainage infrastructure installed under left bank outfall drain (LBOD) project. Two FOs at Bareji and Heran distributaries, extended collaboration with the management of LBOD in their respective areas. FO Bareji distributary maintained a complaint register for the purpose to notify the faults in the functioning of the system as reported by the farmers which aimed to communicate problems directly to concerned officials.
6. MONITORING AND ASSESSMENT OF THE IRRIGATION AND DRAINAGE SYSTEM

6.1 Data Collection

6.1.1 Canal Water Measurement Program

**Water discharge measurements:** To monitor or observe discharges downstream of head regulators of distributaries and minors, downstream gauges were installed at suitable locations, approximately 200-500 feet downstream of the head regulator. The gauges were calibrated by taking four measurements of discharges at about 100%, 80%, 60%, and 40% of the design water depths. Using these measurements into the KD formula, which is \( Q = KD^n \), the coefficient \( K \), and exponent \( n \) with \( \Delta G \) were determined.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Parent channel</th>
<th>Measurement period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhoro Naro</td>
<td>Gajrah Branch, Rohri</td>
<td>May 97-March 98, May 99-August 2000</td>
</tr>
<tr>
<td>Rawtiani</td>
<td>Dim Branch, Jamrao</td>
<td>November 99-August 2000</td>
</tr>
<tr>
<td>Mohammad Ali</td>
<td>Dim Branch, Jamrao</td>
<td>November 99-August 2000</td>
</tr>
<tr>
<td>Tail</td>
<td>Shahu Branch, Jamrao</td>
<td>November 99-August 2000</td>
</tr>
<tr>
<td>Mirpur</td>
<td>Jamrao East</td>
<td>November 99-August 2000</td>
</tr>
<tr>
<td>Bareji</td>
<td>Jamrao East</td>
<td>June 97-March 98, May 99-August 2000</td>
</tr>
<tr>
<td>Sanhro</td>
<td>Jamrao East</td>
<td>November 99-August 2000</td>
</tr>
<tr>
<td>Bellaro</td>
<td>Jamrao West</td>
<td>November 99-August 2000</td>
</tr>
<tr>
<td>Digri</td>
<td>Jamrao West</td>
<td>December 99-July 2000</td>
</tr>
<tr>
<td>Potho</td>
<td>Jamrao West</td>
<td>December 99-July 2000</td>
</tr>
<tr>
<td>Khatian</td>
<td>Jamrao West</td>
<td>December 99-July 2000</td>
</tr>
<tr>
<td>Bagi</td>
<td>Jamrao East</td>
<td>December 99-July 2000</td>
</tr>
</tbody>
</table>

**Heads of Secondary Canal Reaches:** Gauges were installed at locations that represented the start of the middle reach and the tail reach of the secondary canals.\(^2\) The exact location of the gauges was selected to ensure suitable hydraulic conditions to eliminate backwater effects but as far as possible they were located approximately one-third and two-thirds of the distance from the head of the secondary canal. At each location water levels were taken each day (except for one day a week and on public holidays). Each staff gauge was calibrated using a current meter and a rating curve developed. If changes in canal cross-sections occurred, staff gauges were recalibrated.

---

\(^2\) In two very short secondaries, Bagi Minor and Tail minor, only one gauge was installed as close as possible to the halfway distance along the canal.
Table 6.2  Showing measurement period at middle and tail sections for each distributary canals.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Offtaking channel</th>
<th>Measurement period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhoro Naro Gajrah Branch, Rohri</td>
<td>No measurement</td>
<td></td>
</tr>
<tr>
<td>Heran Nara Canal</td>
<td>August 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Rawtiani Dim Branch, Jamrao</td>
<td>December 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Tail Shahu Branch, Jamrao</td>
<td>November 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Mirpur Jamrao East</td>
<td>November 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Bareji Jamrao East</td>
<td>August 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Sanhro Jamrao East</td>
<td>November 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Bellaro Jamrao West</td>
<td>November 1999-August 2000</td>
<td></td>
</tr>
<tr>
<td>Digri Jamrao West</td>
<td>December 1999-July 2000</td>
<td></td>
</tr>
<tr>
<td>Potho Jamrao West</td>
<td>December 1999-July 2000</td>
<td></td>
</tr>
<tr>
<td>Khatian Jamrao West</td>
<td>December 1999-July 2000</td>
<td></td>
</tr>
<tr>
<td>Bagi Jamrao East</td>
<td>December 1999-July 2000</td>
<td></td>
</tr>
</tbody>
</table>

Discharge at Heads of Watercourses: each watercourse structure was calibrated through the use of painted reference marks on the upstream and downstream face of the outlet structure. Readings of the difference between the water level and the reference mark were converted to actual upstream and downstream head, and the data converted to discharge based on rating curves developed by current metering in the head of the watercourse. When outlets were tampered with, current metering was repeated and a new calibration curve developed.

To take this important aspect into consideration, the monitoring of discharge at each outlet was carried out. During the first phase of the project from 1997 to 1998 the measurements were taken twice a week. However, during this second phase of the project the measurements intensity was reduced due to workload of forming the farmer organization on additional ten distributaries in Jamrao Canal command area. The measurements of discharges that had been conducted on every watercourse twice a week were reduced to once a week and later reduced to a program of sample watercourses that were selected from head, middle and tail section of the pilot distributaries. These measurements were taken every day. The measurement period is described as below.
Table 6.3 Discharge measurements period at watercourses of three pilot distributaries.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Offtaking canal</th>
<th>Measurement period</th>
</tr>
</thead>
<tbody>
<tr>
<td>All watercourses (outlets)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dhoro Naro</td>
<td>Gajrah of Rohri canal</td>
<td>June 1997 – March 1998 (twice a week)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 1999 – Oct 1999 (once a week)</td>
</tr>
<tr>
<td>Heran</td>
<td>Nara Canal</td>
<td>April 1997- March 1998(twice a week)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>August 1999 – Sept 1999(once a week)</td>
</tr>
<tr>
<td>Bareji</td>
<td>East Jamrao canal</td>
<td>May 1997- March 1998(twice a week)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>August 1999 – Sept 1999(once a week)</td>
</tr>
</tbody>
</table>

| Sample watercourses (outlets) |                          |                                                        |
| Dhoro Naro   | Gajrah of Rohri canal    | August 1999 – Oct 1999 (daily)                         |
|              |                          | July 2000 (once a week)                                |
| Heran        | Nara Canal               | August 1999 – Oct 1999 (daily)                         |
|              |                          | July 2000 (once a week)                                |
| Bareji       | East Jamrao canal        | August 1999 - Oct 1999 (daily)                         |
|              |                          | July 2000 (once a week)                                |

Measurements of channel losses: The term “channel losses” is used to reflect that the assumption that measured losses will be a combination of “seepage” plus “leakage”. This is particularly case for the inflow–outflow method, but may also be true for the ponding method when water depths are high and there are losses through cracks and snake holes.

To determine water losses in distributaries and sample watercourses, the inflow-outflow method was used. In the majority of cases, the inflow-outflow method of measuring channel losses was highly preferred because the losses are measured under the usual operating condition of the canal. The best procedure, although rather time consuming, is to sub-divide the canal network into reaches. Cross-regulators along a canal or branch canal should be used to define the boundary between two reaches. Then, the gates at each cross-regulator are calibrated in order to develop a discharge rating for each flow control structure, along with each distributary head regulator off-taking in each reach. Then, during the inflow-outflow test, discharge is monitored at the head of the system to detect any changes in the water supply entering the canal; the water levels were monitored every 15 – 30 minutes to assure that steady–state flow conditions are occurring in the system. Then, the water levels are recorded at each structure for a relatively short time period, normally one or two hours. If steady-state flow conditions continued to exist during the duration of the test, then the results are accepted; if not, the test is repeated until this steady – state flow condition is satisfied Skogerboe et al (1999).

Seepage losses in distributary channels: The seepage losses of three pilot distributaries (Bareji, Heran and Dhoro Naro) were measured using the inflow-outflow methods. The distributary channel length, as mentioned earlier, was divided in three subsections. Discharge at head of each section was measured with the help of gauges installed at head of each subsection. However, the discharges of all offtaking channels (watercourses) of each section were measured using current meter.
6.1.2 Drainage Measurement Program

Drainage is an integral part of the irrigation system. Seepage from the canal system and over-irrigation on farmers' fields both contribute to the water table resulting in rising the water table depth. To control the water table depth at required level of crop root zone, the drainage system should be constructed in all parts of the irrigation system.

As a part of the LBOD project some form of new drainage facility has been constructed by the Government of Pakistan in the command area of each of the three original pilot distributaries. In the command area of Dhoro Naro Minor, saline tube wells have installed that discharge into the newly constructed surface drainage system. In the command area of Heran Distributary surface drains and a combination of saline and scavenger tube wells have been installed, while in the command area of Bareji Distributary a tile drainage system has been installed with sump pumps that discharge into surface drains.

No monitoring of the drainage facilities were made in any of the eleven distributaries that were added during the second phase of the project.

To understand the performance of the system, the different parameters need to be monitored. The drainage infrastructure system in the command area of each of the first three pilot distributaries was monitored.

6.1.2.1 Vertical Drainage (Tube Wells) Nawabshah

There are seven saline/drainage tube wells in the head and middle portions of the command area of Dhoro Naro Minor. These tube wells were monitored monthly. During monitoring the data relating to energy consumption through recording meter reading, and the total running hours of tube wells were recorded.

6.1.2.2 Sub-Surface (Tile) Drainage Mirpurkhas

Bareji Distributary command area has thirteen sump houses constructed to remove excess water collected by tile drains. These sump houses are spread over the full command area of the distributary. To evaluate the operational performance, data on running hours and energy consumption through meter readings were recorded on monthly basis.

6.1.2.3 Surface and Vertical Drainage, Sanghar

Heran Distributary command area includes four surface drains and seventeen tube wells (14 saline and 3 scavenger) to control the water table depth and dispose of surface run off. Tube well data collected by an M.E student for his master's degree including running hours of tube wells, discharge of tube wells, and energy consumption.
Table 6.4 Drainage observation period at watercourses of three pilot distributaries.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Measurement period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhoro Naro</td>
<td>February 1997- March 1998</td>
</tr>
<tr>
<td></td>
<td>August 1999 – July 2000</td>
</tr>
<tr>
<td>Heran</td>
<td>May 1997-April 1998</td>
</tr>
<tr>
<td></td>
<td>Sept 1999 - April 2000*</td>
</tr>
<tr>
<td>Bareji</td>
<td>August 1999 – August 2000**</td>
</tr>
</tbody>
</table>

* Tube wells operation started in late 1999 and for this Muneer (M.E student) has collected the data.
** Tile drainage was completed in 1998, so measurements were only taken in Phase II of the project.

6.1.2.4 Water Table Depth

To monitor the fluctuation in the water table approximately 200 piezometers were installed during the first phase of the project in the three initial pilot distributaries. In each watercourse command area three piezometers were installed in representative head, middle and tail locations. The location of these piezometers is shown in Figure 6.1-6.3.
Although some of the piezometers were choked or damaged, more than 80% were still functioning during the second phase of the project. The field team collected the data of water table depth in each piezometer. Bench marks were established on each piezometer by taking readings of four ground elevations and an average of four readings were taken and permanently noted on a record sheet. After observing the tape reading the portion of the piezometer tube which was above the ground level was subtracted and actual depth to watertable was calculated.

Table 6.5  Showing measurements of watertable depth period in each command area of pilot distributaries.

<table>
<thead>
<tr>
<th>DISTRIBUTARY</th>
<th>MEASUREMENT PERIOD</th>
</tr>
</thead>
</table>
### 6.2 Performance Assessment Criteria

#### 6.2.1 Performance Assessment Criteria for Canal Operations

**Table 6.6 Designed objectives, performance indicators and data requirements**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Performance Indicator</th>
<th>Data Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a) Normal Conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity of water distribution at secondary canal level</td>
<td>Delivery Performance Ratio at head of secondary canals</td>
<td>Design discharge and actual discharge at secondary canal head</td>
</tr>
<tr>
<td>Equity of water distribution along secondary canals</td>
<td>Delivery Performance Ratio of head, middle, and tail reaches of secondary canals</td>
<td>Design discharge and Actual discharge at head of each canal reach</td>
</tr>
<tr>
<td>Equity of water distribution between watercourses</td>
<td>Delivery Performance Ratio at head of watercourses</td>
<td>Design and actual discharge at head of watercourses</td>
</tr>
<tr>
<td>Discharges within acceptable range of tolerance</td>
<td>Coefficient of variation of discharges</td>
<td>Actual discharges at heads of secondary canals and watercourses</td>
</tr>
<tr>
<td><strong>b) Water Short Conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair and equal rotation among secondary canals</td>
<td>Proportion of time each canal remains closed</td>
<td>Presence/absence of water at head of secondary canal</td>
</tr>
<tr>
<td>Discharge remains above 70% of design discharge</td>
<td>Delivery Performance Ratio is above 0.70</td>
<td>Design and actual discharge at head of secondary canal</td>
</tr>
<tr>
<td>Discharges within acceptable range of tolerance</td>
<td>Coefficient of variation of discharges</td>
<td>Actual discharges at heads of secondary canals and watercourses</td>
</tr>
</tbody>
</table>

6.2.1.1 Delivery Performance Ratios

Each main, secondary and tertiary canal in Pakistan has a known design discharge and it is expected that as far as possible the actual discharge should equal the design discharge. This makes it a simple matter to calculate the Delivery Performance Ratio (DPR):

\[
\text{Delivery Performance Ratio (DPR)} = \frac{\text{Actual Discharge}}{\text{Design Discharge}}
\]

To make the evaluation easier, there is one tolerance standard defined by the Irrigation Department. If the actual discharge drops below 70% of design discharge then rotation should be implied, so the minimum acceptable DPR is 0.7. There is no comparable upper limit but it seems realistic to have a similar upper limit, so anything above 1.3 would be considered poor performance.

A more rigorous performance criteria is used at watercourse level where discharges are supposed to be within ±10% of design. We therefore adopt the following performance assessment criteria:

- Good performance: DPR between 0.9 and 1.1
- Fair performance: DPR between 0.7 and 0.9 or between 1.1 and 1.3
- Poor Performance: DPR less than 0.7 or more than 1.3

Wherever possible, IWMI has converted actual discharge data into DPR values because this is a standardized ratio that permits simple comparison of performance in canals with different design discharges. This comparison can be made using daily data for a single day for several canals, or be calculated for a single location over a set time period (typically a week or a month) so that a time series of DPR values can be developed.

A second way of using DPR values is merely to add up the number of occurrences when DPR falls outside the acceptable limit. The percentage of sub-standard days should be equal over space if all areas are to be treated equally.

6.2.1.2 Variability of Discharges

The second performance parameter used by IWMI is aimed at assessing the variability in canals over a specified time period because there is evidence that if canal supplies are unreliable, water users risk fewer inputs and yields drop.

While an average figure for discharge or DPR over a period of time may fall within the tolerance limits defined above, the variability may not. The easiest standardized measure of variability that can be compared to DPR is the Coefficient of Variation (CV), which is independent of the actual average:

\[
\text{Coefficient of Variation (CV)} = \frac{\text{Standard Deviation of Discharge}}{\text{Average Discharge}}
\]

CV values can also be used on both a spatial manner, where CVs for the same time period in different locations are compared, and in a temporal dimension to see how variability changes over time at a single location.
The tolerance for CV is more difficult to define because there are no specified targets in the operational rules of the Irrigation Department. Two approaches can be adopted, one based on general guidelines developed by Molden and Gates (1990), or more site-specific tolerances based on operational rules of the Irrigation Department.

Molden and Gates propose that the temporal measure of variability, which they term reliability, should have three categories: if CV$_t$ is <0.10 variability is good, if CV$_t$ is between 0.10-0.20 it is fair, and if CV$_t$ is more than 0.20 it is considered poor. The spatial measure (CV$_s$) is slightly less stringent: good is still less than 0.10, fair is when CV$_s$ is between 0.10-0.25, while poor is when CV$_s$ is greater than 0.25.

However, these limits do not fit comfortably with those inherent in the Irrigation Department rules. It would in theory be within current Department rules to deliver water on alternate days into a secondary canal with a DPR of 0.7 and a DPR of 1.3. This would translate over a month into a CV of 0.305. A rather more stringent rule is applied at watercourse level where discharges are not supposed to vary by more than ±10%, so that the maximum acceptable CV is 0.101. Combining these two criteria is impossible, and so a three-fold assessment of CV is used here:

- **Good performance:** CV $<$0.10
- **Fair performance:** CV $<$0.30
- **Poor Performance:** CV $>$0.30

No distinction is made between spatial and temporal CV because the rules of the Irrigation Department do not distinguish between tolerances for spatial and temporal variation: all canals should be treated equally at all times.

One methodological problem that arises is that there are sometimes days when no water is delivered to the head of a secondary canal but rotational irrigation is not being practised. Typical causes for such interruptions in supply include upstream or downstream breaches that require canals to be closed so that repairs can be made, or closure of canals due to rainfall that means crops do not require water. Most data sets do not indicate whether water users knew of such disruptions in advance or, more likely, they did not. The CV values can be calculated to include or exclude occasional closures depending on whether we assume there is good communication or not.

We therefore calculate the data in two ways. We use all data, including days when there was no discharge recorded, to represent the situation where communications are extremely poor and water users do not know when water supplies will stop, and we use a data set with all zero discharge days removed to represent the situation where water users are assumed to have advance warning of all closures and disruptions to supply. In reality, some intermediate situation is probably close to what water users actually experience.

### 6.2.1.3 Rotation

The final performance evaluation relates to the implementation of rotations. Normally most water users know when they are in a period of rotation, and will therefore expect some periods when canals are closed. However, the precision of implementation of rotational irrigation is not always guaranteed. Performance assessment therefore looks at two different elements of the
implementation of rotational irrigation: equality of dry days between canals, and the attainment of minimum discharge targets during periods when water is flowing.

A well-implemented rotation period would ensure that all canals get an equal number of days of closure, but when water is delivered it is with a DPR of 0.7 to 1.3 to maintain hydraulic integrity along the secondary canal. It is inevitable that there will be higher variability of discharges in periods of rotation because of the frequent draining and filling of canals but the differences in CV between different canals should be more or less the same if the implementation is done with care.

6.3 Performance Assessment Criteria for Drainage System Infrastructure

To evaluate the operational performance of the drainage system provided in the command area that includes saline tube wells, tile drainage and surface drains. The data required to see the impact of drainage system included running hours of the tubewells/tile sumps, consistency in running of tube wells/tile sumps, maintenance of drains, vegetation growth in drains, thickness of vegetation, frequency of cleaning of drains, water levels in the surface drains at source point (where drain enters into command area) and water levels at the disposal point (where drains leave the command area), and maintenance activities in disposal channels.

In addition, the impact of the drainage systems was seen through monthly observation of the water table depth through piezometers installed in command area of each distributary.

6.4 Summary Results

This section provides a summary of results. For more details on water distribution equity refer to the project report entitled "Equity of Water Distribution in Sindh Province, Pakistan". Other data are provided in the five Project Quarterly Reports.

6.4.1 Equity between most favored and least favored watercourses

From the detailed observations of discharges in watercourses it is possible to calculate the DPR for the 25% of canals that receive the most water and the 25% which get least water. From this it is possible to calculate the Inter-Quartile Ratio (IQR), a measure of equity between most favored and least favored watercourses.

The data shown in 6.7 show that in all three canals there are large differences in the IQR. At Heran, where water is most abundant, the IQR is between 2 and 3, while in Dhoro Naro, where water is relatively scarce and there are distinct head-tail differences, the IQR is about 4 but rises to over 6 in the driest season when measurements were taken.

These data indicate that there is a significant difference between most favored and least favored watercourses, and this is an area of concern that the FOs will have to address when they eventually get control over operations.
Table 6.7  Delivery Performance Ratios and Interquartile Ratios Between Watercourses of pilot distributary channels.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Heran Distributary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPR at head of secondary</td>
<td>1.79</td>
<td>1.12</td>
<td>1.98</td>
</tr>
<tr>
<td>Ave. DPR most favored 25%</td>
<td>2.67</td>
<td>2.34</td>
<td>3.55</td>
</tr>
<tr>
<td>Ave. DPR least favored 25%</td>
<td>1.11</td>
<td>0.77</td>
<td>1.55</td>
</tr>
<tr>
<td>Interquartile Ratio</td>
<td>2.41</td>
<td>3.04</td>
<td>2.29</td>
</tr>
<tr>
<td>Bareji Distributary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPR at head of secondary</td>
<td>1.70</td>
<td>1.53</td>
<td>1.98</td>
</tr>
<tr>
<td>Ave. DPR most favored 25%</td>
<td>3.38</td>
<td>3.28</td>
<td>3.61</td>
</tr>
<tr>
<td>Ave. DPR least favored 25%</td>
<td>0.76</td>
<td>0.77</td>
<td>0.78</td>
</tr>
<tr>
<td>Interquartile Ratio</td>
<td>4.45</td>
<td>4.26</td>
<td>4.63</td>
</tr>
<tr>
<td>Dhoro Naro Minor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPR at head of secondary</td>
<td>1.08</td>
<td>1.29</td>
<td>0.95</td>
</tr>
<tr>
<td>Ave. DPR most favored 25%</td>
<td>3.59</td>
<td>3.98</td>
<td>3.37</td>
</tr>
<tr>
<td>Ave. DPR least favored 25%</td>
<td>0.85</td>
<td>1.01</td>
<td>0.55</td>
</tr>
<tr>
<td>Interquartile Ratio</td>
<td>4.22</td>
<td>3.94</td>
<td>6.13</td>
</tr>
</tbody>
</table>

6.4.2 Rotation

The extent to which canals receive equal treatment can be measured in part by examining the way in which rotational irrigation is implemented. If it is done in a correct manner, all canals should be closed for an equal period of time. Examination of the data from several canals in the area, including some of those included in this project, show that there is a great variation in the number of days when water is not delivered to secondary canals.

Although there is no specific pattern it is clear from each season that some canals are closed two to three times more often than others. This is a source of frustration for FOs when they see their canal closed more than another one, and it is an area where the AWB will have to pay close attention.
Table 6.8  Percentage of each season that distributary channels are closed.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhoro Naro</td>
<td>14%</td>
<td>14%</td>
<td>34%</td>
<td></td>
<td>61</td>
<td>345</td>
<td>18%</td>
</tr>
<tr>
<td>Heran</td>
<td>7%</td>
<td>8%</td>
<td>10%</td>
<td></td>
<td>29</td>
<td>360</td>
<td>8%</td>
</tr>
<tr>
<td>Rawtiani</td>
<td>4%</td>
<td>30%</td>
<td></td>
<td></td>
<td>23</td>
<td>186</td>
<td>12%</td>
</tr>
<tr>
<td>Md. Ali</td>
<td>32%</td>
<td>30%</td>
<td></td>
<td></td>
<td>28</td>
<td>92</td>
<td>30%</td>
</tr>
<tr>
<td>Tail</td>
<td>15%</td>
<td>33%</td>
<td></td>
<td></td>
<td>37</td>
<td>176</td>
<td>21%</td>
</tr>
<tr>
<td>Mirpur</td>
<td>8%</td>
<td>17%</td>
<td>1%</td>
<td>15%</td>
<td>72</td>
<td>594</td>
<td>12%</td>
</tr>
<tr>
<td>Doso</td>
<td>19%</td>
<td>13%</td>
<td>0%</td>
<td></td>
<td>38</td>
<td>413</td>
<td>9%</td>
</tr>
<tr>
<td>Visro</td>
<td>6%</td>
<td>14%</td>
<td>1%</td>
<td></td>
<td>31</td>
<td>414</td>
<td>7%</td>
</tr>
<tr>
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<td>0%</td>
<td></td>
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<td>414</td>
<td>7%</td>
</tr>
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<td>6%</td>
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<td>6%</td>
<td>32%</td>
<td>11%</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Sanro</td>
<td>6%</td>
<td>6%</td>
<td>9%</td>
<td>27%</td>
<td>36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lakhi</td>
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<td>396</td>
<td>11%</td>
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<td>Sangro</td>
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<td>442</td>
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<td>Daulat</td>
<td>8%</td>
<td>19%</td>
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<td></td>
<td>51</td>
<td>439</td>
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<td>Bellaro</td>
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<td>34%</td>
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<td>32</td>
<td>149</td>
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</tr>
<tr>
<td>Potho</td>
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<td>21%</td>
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<td></td>
<td>29</td>
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<td>20%</td>
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<tr>
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<td></td>
<td>32</td>
<td>150</td>
<td>21%</td>
</tr>
<tr>
<td>Bagi</td>
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<td>25%</td>
<td></td>
<td></td>
<td>30</td>
<td>140</td>
<td>21%</td>
</tr>
</tbody>
</table>

Total closed 52 280 46 69 203 215 868 7154 12%
Total Days 822 2013 1753 403 1401 762 7154
% Closed 6% 14% 3% 17% 14% 28% 12.13%

6.4.3 Seepage Losses in Secondary Canals

The seepage losses were measured in all three of the original pilot. These losses are expressed in percent loss in respect of the discharge at the head of the distributary. The losses were determined as the difference between the inflow (discharge at downstream of head regulator) and outflow (discharge from all outlets of the distributary). Average losses measured were 4.5% at Dhoro Naro, 8.5% at Heran and 8.9% at Bareji.

6.4.4 Operational Hours of Tubewells/Sump House (1997-2000)

The saline tube wells running in the command area of Dhoro Naro Minor were monitored in the phase one and also in the extended program. The observations indicated that the running efficiency of deep tubewells installed under the LBOD program was between 5 and 55 percent (Fig 6.4), which obviously is insufficient to effectively lower the watertable depth in command area. However, in the same area there are approximately 100 private shallow fresh water tube
well which were operated during water short periods, and they have had an on lowering water table depth.

The status of the LBOD tile drainage project at Bareji Distributary also shows that there has not been consistent operation of the pumps, and again there has been no significant lowering of the water table level. Our observations show that only 50 percent of sumps were running at all, with less than 10% overall efficiency for the distributary command as a whole (Table 6.9).
Table 6.9  Operational hours of tile drainage unit at Bareji Distributary command area, Mirpurkhas.

<table>
<thead>
<tr>
<th>Sump #</th>
<th>Near W/c</th>
<th>Dispose of to</th>
<th>Aug-99</th>
<th>Sep-99</th>
<th>Oct-99</th>
<th>Nov-99</th>
<th>Dec-99</th>
<th>Jan-00</th>
<th>Feb-00</th>
<th>Mar-00</th>
<th>Apr-00</th>
<th>May-00</th>
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<th>Jul-00</th>
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<tbody>
<tr>
<td>3L-25 A</td>
<td>6-R</td>
<td>DC-1R</td>
<td>98</td>
<td>167</td>
<td>354</td>
<td>456</td>
<td>493</td>
<td>309</td>
<td>185</td>
<td>178</td>
<td>364</td>
<td>384</td>
<td>179</td>
<td>73</td>
</tr>
<tr>
<td>3L-22 B</td>
<td>7-R</td>
<td>DC-1R</td>
<td>20</td>
<td>24</td>
<td>45</td>
<td>56</td>
<td>90</td>
<td>86</td>
<td>41</td>
<td>47</td>
<td>40</td>
<td>22</td>
<td>11</td>
<td>3</td>
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<tr>
<td>3L-22 A</td>
<td>8-R</td>
<td>DC-1R</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>140</td>
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<td>102</td>
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<td>0</td>
<td>0</td>
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<tr>
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<td>10-R</td>
<td>SD-3L</td>
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<td>NA</td>
<td>73</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>256</td>
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</tr>
<tr>
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<td></td>
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<td>NA</td>
<td>91</td>
<td>97</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>3L-17(1)</td>
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<td>SD-3L</td>
<td>NA</td>
<td>NA</td>
<td>98</td>
<td>0</td>
<td>0</td>
<td>130</td>
<td>171</td>
<td>353</td>
<td>277</td>
<td>180</td>
<td>99</td>
<td>0</td>
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<tr>
<td>3L-17(2)</td>
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<td></td>
<td>NA</td>
<td>NA</td>
<td>233</td>
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<td>NA</td>
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<td>159</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>244</td>
<td>19</td>
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<td>NA</td>
<td>NA</td>
<td>102</td>
<td>96</td>
<td>162</td>
<td>148</td>
<td>210</td>
<td>127</td>
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<td>NA</td>
<td>NA</td>
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<td>12</td>
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<td>0</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>SD-24</td>
<td>6-L</td>
<td>Spinal</td>
<td>151</td>
<td>192</td>
<td>178</td>
<td>99</td>
<td>38</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>SD-22</td>
<td>8-L</td>
<td>Spinal</td>
<td>27</td>
<td>13</td>
<td>181</td>
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<td>NA</td>
<td>NA</td>
<td>87</td>
<td>159</td>
<td>134</td>
<td>189</td>
<td>7</td>
<td>18</td>
</tr>
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<td>Spinal</td>
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<td>149</td>
<td>265</td>
<td>262</td>
<td>712</td>
<td>506</td>
<td>157</td>
<td>103</td>
<td>119</td>
<td>309</td>
<td>94</td>
<td>31</td>
</tr>
</tbody>
</table>

In the case of Heran Distributary command, where saline tube wells have been operated from August 1999, the average operating time of tube wells is about 160 hours against the designed hours of 480, an operating efficiency of 33%. Our observations again show a highly inconsistent pattern of operation, with running hours ranging from 2 to more than 350 hours in one month. This type of operational practice has a lesser impact on water table lowering than running all wells for similar periods (Mangrio, 2000).

6.4.5 Depth to Watertable (1997-2000)

Water table depth monitored in the three pilot distributaries show mixed results. In Dhoro Naro there has been a drop in water table level but this can be attributed to the large number of private shallow tubewells installed during the past 10 years.

In the case of both Heran Distributary and Bareji Distributary no significant change in groundwater table has been observed. This can be attributed to a combination of low operational performance of tubewells and sump pumps, and the continued delivery of excess water at the distributary head. In Heran distributary discharges were reduced in February and March so that water tables dropped slightly, but in Bareji the canal continued to flow full irrespective of actual demand. In both cases there continue to be areas where water tables are within 2 feet of the surface and thus reduce crop production (Figure 6.5).

It is clear that in all distributaries the watertable rises during the cooler winter months when crop water demand is less. This implies that in all three locations there is an over-supply of irrigation water which leads to groundwater table rise.
6.5 Activities Relating to Canal Maintenance

6.5.1. Planning Maintenance Activities with Farmer Organizations

To desilt channels, and make them in proper alignment and shape, proper planning is needed so that the work can be done in the most efficient and effective manner. The planning needs to follow several steps: a pre-closure rapid appraisal and identification of problems, hydraulic survey during canal closure that will show which reaches will need silt clearance, and a walk-through of the canal during closure to identify maintenance needs and their relative priorities.

Following is the planning chart that describes the steps carried over for the maintenance activities.
Desilting Planning Chart

IIMI's Role

Information
- Identify Problems
- Categorize Problems

Activity

Pre Closure Survey of Distributary

Information
- Conduct Survey
- Draw X-Sections
- Draw L-Section
- Compare with design
- Identify Juck/Groyne work
- Identify reaches for desilting

Hydraulic Survey of Distributary
- X-Section
- L-Section

FOs Role

Discuss in general meeting
- Motivate members to participate in walk through
- Form Committee to collect funds etc.

Active participation of members
- Identification of main problems
- Discuss for solution
- Express their experience
- Information to WCAs

Walk-Through Survey Along Distributary

Prioritization of maintain

Call General Body meeting
- Discuss maintenance problems
- Assess need
- Identify methodology/process
- Discuss on resource mobilization and collection
- Decide time of desilting

Resource Mobilization
- Cash
- Labour
- Machinery

Provide labour
- Provide tractor
- Provide cash
- Collect funds

Disseminate Information
- Difference of existing and design X-Sections
- Need of desilting
- Need of Juck/Groyne work

Estimate quantity of material desilted
- Estimate cost incurred
- Feed back to FO
The farmer organizations formed before January 2000 were eager to desilt the channels as a joint activity so that effective and proper work could be carried out. The farmer organizations called a general body meetings at respective distributary channels where IWMI staff also joined these meetings. First they had an overview of the distributary condition and identified the need of maintenance work and desilting of the channel. That walk-through was followed by collection of technical information. Through graphs FO members were informed where desilting is required so that concentration to be focussed on those points without wasting energy and money that could not benefit to the over all objectives of this activity. The details of the farmers desilting activities are as under.

Table 6.10  Summary of input and output of desilting the distributary channels by farmer Organization.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Length</th>
<th>CCA Acres</th>
<th>Man Days</th>
<th>Tractor Hours</th>
<th>Excavat or Hours</th>
<th>Est. Cost</th>
<th>Vol. desilted</th>
<th>Cost per acre</th>
<th>Cost per ft³</th>
<th>Ft³ Per Man-day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rawtiani</td>
<td>27500</td>
<td>9036</td>
<td>586</td>
<td>35</td>
<td></td>
<td>64725</td>
<td>40766</td>
<td>7.16</td>
<td>1.59</td>
<td>69.57</td>
</tr>
<tr>
<td>Md. Ali</td>
<td>17000</td>
<td>3833</td>
<td>427</td>
<td>30</td>
<td></td>
<td>45750</td>
<td>142124</td>
<td>11.93</td>
<td>0.32</td>
<td>332.84</td>
</tr>
<tr>
<td>Heran</td>
<td>32000</td>
<td>12336</td>
<td>1157</td>
<td>58</td>
<td></td>
<td>125850</td>
<td>243148</td>
<td>10.20</td>
<td>0.52</td>
<td>210.16</td>
</tr>
<tr>
<td>Khadwari</td>
<td>17000</td>
<td>3074</td>
<td>301</td>
<td>16</td>
<td></td>
<td>32900</td>
<td></td>
<td>10.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bareji</td>
<td>39300</td>
<td>14318</td>
<td>1020</td>
<td>14</td>
<td></td>
<td>83273</td>
<td>147784</td>
<td>5.82</td>
<td>0.56</td>
<td>144.89</td>
</tr>
<tr>
<td>Mirpur</td>
<td>48000</td>
<td>16218</td>
<td>1260</td>
<td>128</td>
<td>32</td>
<td>174000</td>
<td>329565</td>
<td>10.73</td>
<td>0.53</td>
<td>261.56</td>
</tr>
<tr>
<td>Potho</td>
<td>33000</td>
<td>8063</td>
<td>630</td>
<td>17</td>
<td></td>
<td>70309</td>
<td>138796</td>
<td>8.72</td>
<td>0.51</td>
<td>220.31</td>
</tr>
<tr>
<td>Dhoro Naro</td>
<td>32270</td>
<td>13382</td>
<td>1027</td>
<td>192</td>
<td></td>
<td>131500</td>
<td>222520</td>
<td>9.83</td>
<td>0.59</td>
<td>216.67</td>
</tr>
</tbody>
</table>

The imputed cost of maintenance per acre of CCA was between Rs.7.00 and 12.00, on the basis that farmers' labor is valued at Rs.80 per day. In actual practice all of the labor and machinery was provided free except for the cost of the excavator used in desilting the head end portion of Mirpur Distributary.

Discharges measured before and after desilting indicated that there is noticeable difference in distribution between head and tail water availability in all the distributaries. Before desilting the head:tail ratio ranged 3.52 to 0.72. On average the head:tail ratio of all distributaries was 1.68 which means that head ends were receiving a great deal more than their fair share.

After desilting the results show significant improvement. The average head:tail ratio fell to 1.22 so that there is not a large difference in access to water between difference parts of the distributaries. The details are shown in Table given below.
Table 6.11  Delivery Performance Ratios before and After Desilting, Head and Tail Gauges of distributary channels.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Before Desilting, January 2000</th>
<th>After Desilting, January 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPR at Start Head Section</td>
<td>DPR at Start Tail Section</td>
<td>DPR Ratio Head:Tail</td>
</tr>
<tr>
<td>Heran</td>
<td>1.36</td>
<td>0.38</td>
</tr>
<tr>
<td>Rawtiani</td>
<td>1.71</td>
<td>1.71</td>
</tr>
<tr>
<td>Tail</td>
<td>1.49</td>
<td>1.20</td>
</tr>
<tr>
<td>Mirpur</td>
<td>1.02</td>
<td>0.39</td>
</tr>
<tr>
<td>Bareji</td>
<td>2.13</td>
<td>1.63</td>
</tr>
<tr>
<td>Sanrho</td>
<td>1.29</td>
<td>1.11</td>
</tr>
<tr>
<td>Belharo</td>
<td>1.11</td>
<td>0.36</td>
</tr>
<tr>
<td>Digri</td>
<td>1.17</td>
<td>1.12</td>
</tr>
<tr>
<td>Potho</td>
<td>1.02</td>
<td>1.28</td>
</tr>
<tr>
<td>Khatian</td>
<td>1.31</td>
<td>0.65</td>
</tr>
<tr>
<td>Bagi</td>
<td>0.58</td>
<td>0.80</td>
</tr>
<tr>
<td>Average</td>
<td>1.29</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Furthermore, the coefficient of variation (CV) has been determined for head-tail differences in discharge. The head:tail ratio before desilting was from 8.5 to 0.95, with an average of 2.21 for all the distributaries. After desilting it improved to 1.82, again showing a significant improvement after maintenance had been completed. The details are shown in Table 6.12 below.

Table 6.12  Coefficient of Variation of discharges at Head and Tail Gauges of Distributary channels.

<table>
<thead>
<tr>
<th>Distributary</th>
<th>Before Desilting, January 2000</th>
<th>After Desilting, January 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV at Start Head Section</td>
<td>CV at Start Tail Section</td>
<td>CV Ratio Tail:Head</td>
</tr>
<tr>
<td>Heran</td>
<td>0.15</td>
<td>0.22</td>
</tr>
<tr>
<td>Rawtiani</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Tail</td>
<td>0.21</td>
<td>0.28</td>
</tr>
<tr>
<td>Mirpur</td>
<td>0.21</td>
<td>0.23</td>
</tr>
<tr>
<td>Bareji</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>Sanrho</td>
<td>0.14</td>
<td>0.13</td>
</tr>
<tr>
<td>Belharo</td>
<td>0.03</td>
<td>0.22</td>
</tr>
<tr>
<td>Digri</td>
<td>0.08</td>
<td>0.15</td>
</tr>
<tr>
<td>Potho</td>
<td>0.07</td>
<td>0.17</td>
</tr>
<tr>
<td>Khatian</td>
<td>0.10</td>
<td>0.29</td>
</tr>
<tr>
<td>Bagi</td>
<td>0.25</td>
<td>0.39</td>
</tr>
<tr>
<td>Average</td>
<td>0.13</td>
<td>0.21</td>
</tr>
</tbody>
</table>
In this section we discuss the major achievements of the project. Although the ultimate goal of transfer of management responsibility for irrigation and drainage to FOs could not be accomplished due to the delays imposed by the Government of Sindh in developing and passing the enabling legislation, the project cannot be considered a failure. It has met all of the other goals laid down at the start of the project, and has in addition accomplished additional tasks that emerged during project initiation.

7.1 Social Organization

The project has demonstrated that it is possible to create strong and viable Farmer Organizations at Distributary/Minor level that are democratic, egalitarian and dynamic, and who can hold their own in discussions with officials from government agencies. This is no mean achievement, and the importance of this cannot be underestimated.

At the onset of the first phase of the project there was considerable resistance and skepticism from both water users and government officials, and there were many doubters who said it was impossible given the political and social economy of rural Sindh to get farmers together to work for a common cause in a cooperative and constructive manner.

Even at the end of the first phase when the proven success of the first three pilot Farmer Organizations was widely recognized, there remained doubters who said it had only been possible because of the intensity of the organization process. During the current phase of the project the intensity of organization was greatly reduced, with the workloads of organizers increasing by a factor of three to four times, but the same result occurred with the creation of an additional eleven Farmer Organizations in a wide range of physical, social and economic conditions.

It is clear that the approach adopted in this project is viable. Current critics complain that to date only thirteen FOs have been created, and there still remain another 1100 plus distributaries and minors to be organized. This is true, but it is unrealistic to expect a major social and cultural change to take place quickly and over wide areas and still remain strong and dynamic. There are too many cases in Pakistan and elsewhere where various types of local level organizations have been established through crash programs but have failed to stay the course.

No doubt the model adopted here can be modified and used to organize other canals more quickly, but the basic truth remains that for a pilot project it is important to proceed carefully so as to provide a viable and effective model for use on other locations. In this respect the project has been extremely successful and has shown the way for others to proceed in the future to achieve the goal of widespread, effective organizations that take responsibility for management of irrigation and drainage.
After the Formation of FOs all the people mobilized systematic and organized resources for common purposes particularly in desiltation of distributaries/minors. On the contrary, whenever irrigation officials advise people to desilt their distributaries, only few prominent land owners bring their labor for desiltation. This act is being done in unorganized manner.

The motivated organization take the credit that they have organized a successful Desiltation program along with maintenance activities in which majority of the farmers contributed. The organizational leaders contributed time, other farmers contributed money, equipment and machinery. The full participation of majority of the farmers created confidence in organizational activities.

The participation of all the farmers gave them access play their part in all other matters and issues. Seeking help in the problems and being treated as equal partner, became the basis of the organization. They were not paid for organizational activities. They attended several program and provided hundred of men-days without any compensation. This indicator of resource mobilization is enough to cite farmers capability to manage the part of irrigation system.

There were occasional meetings among farmers of the distributaries, but did not represented all the farmers covering entire command area before the formation of Farmers Organizations. The occasions were typically marriage party or funerals etc. But no meeting was called by any one for the specific purpose of solving common issues. There was totally ignorance of common goals. The farmers of same channel were concerned with their own individual purposes.

The formation of FOs and different meetings of FOs at both watercourse level and FO level brought a very positive change in the behavior of the farmers’ community, which lives in a highly exploited and close a circle. The knowledge and information base is too weak due to close rural society. The culture governs. But the untiring efforts for organizational development and numerous meetings nurtured the sense of responsibility, maturity and empowerment. The meetings with high officials boosted the moral as well as confidence of farmer leaders.

The frequent meetings within organization filled the big communication gap among the farmers of different reaches. They come close to each other. New friendships in the area developed. The organizational solidarity and unity came after understanding each other, which become possible due to the organizational meetings.
The farmers' links with line agencies remained weak. There is no proper lobbying for this group to maximize the business. Individual farmers can’t establish links with concerned agencies. The farmers access to government offices was very low and the services delivered were very poor.

The organization, with external assistance, established strong linkages between various governmental and non-governmental organizations. The mobilization of networking was very novel idea and was successfully implemented. The big commercial companies came close to the Farmers Organization, not individual big farmers. They offered their services to all the farmers: for example Engro chemicals offered free of cost soil testing, they trained farmers how to take sample, and explained why soil sampling is necessary. Both big and small farmers availed the opportunity.

For the first time in the life of lot of farmers, they sat together with officials in the meetings. The forum established was field implementation coordination committee. They raised their issues, suggested solutions and demonstrated their willingness for contribution. These contacts, networking and meeting with officials created confidence among farmers.

7.2 Capacity Building

The project has focussed on the process of organization through creation of awareness of problems, the recognition of the value of collaborative efforts, and the provision of support for nascent organizations through a process of capacity building. In this capacity building approach the emphasis has consistently been on a careful hands-on approach that allows people to gain confidence in their own abilities to conduct the tasks at hand and therefore feel part of the process. The top-down approach whereby knowledge is disseminated but not fully understood was rejected from the outset for this project because it was firmly believed that only through participation would the skills and understanding remain with members of the community.

Capacity building in the project has addressed a wide number of topics, if for no other reason than the fact that irrigation and drainage management is a complex process that requires a wide range of organizational, technical and social skills.

7.2.1 Organizational Capacity Building

For the project to be successful it had to establish the concept of a democratic, egalitarian and professional organization within the minds of the potential members. Because water users were, for the first time, to be involved in more than water distribution and maintenance at watercourse level there were a whole range of other issues that they would have to be able to accomplish. Clearly the approach had to instill trust and confidence in the general membership that business was being conducted in an open, transparent where everyone was part of the process.
7.2.1.1 Clear Hierarchy of the Organizational Structure

One way to accomplish this was the establishment of a clear hierarchical relation between the basic Watercourse Associations (WCAs) and the wider Farmer Organization. Membership at watercourse level was open to all landowners and they were expected to elect a management tier for the WCA that represented all parts of the watercourse and, as far as actual land ownership conditions permitted, included both larger and smaller farmers. Further, the WCA was not considered viable until at least 80% of all eligible members had agreed to join and pay a token membership fee of Rs.100/-. While it would have been easy to short cut this process by establishing token organizations, project staff avoided this temptation because it would have undermined the credibility of the organization in the eyes of the general membership.

7.2.1.2 Representation of All Sectors of the Community

The same was true at the FO level: the Management committee was expected to include representatives from watercourses in head, middle and tail areas. Many of the meetings where officers were chosen were long, drawn-out and often noisy affairs because different factions within the distributary command area wanted to ensure that there interests would be properly represented. Even though these debates slowed the organization process, the end result was that all members, even in areas where there were long histories of enmity and feud, accepted the composition of the membership and continued to participate in the activities of the FO. This does not mean that the FO solved the factionalism, but that for the purposes of water management opposing factions agreed to exclude their differences for the greater benefit of the community as a whole.

7.2.1.3 Selection of Well-Educated and Trusted Office Bearers

The composition of the office bearers is not representative of the community as a whole. A high proportion of them are significantly better educated that the general membership (24% have post-graduate qualifications) and therefore have the background to enable them to take over the tasks of secretary, treasurer, etc where literacy and formal education are important attributes. But it would be unfair to say, that the office bearers represented an elite. Over 10% of all office bearers are illiterate with little or no formal education but were chosen because they are respected members of the community who can help participate in sensible decision-making.

This breadth of background of office bearers is fundamental to the long-term viability of the organizations. All too frequently in the past organizations have been led by the same oligarchy that has dominated rural life in Sindh for decades in an undemocratic and elitist manner. By establishing organizations that cover the full range of backgrounds of water users there is a much greater chance that a truly participatory organization has been established that can continue into the future.

7.2.2 Technical Capacity Building

In preparation for the expected role of the FOs once management transfer had been accomplished a series of technical training programs were offered to each FO. The delay of the
Government of Sindh in implementing management transfer makes it hard to assess the extent to which FOs can really undertake these tasks in the future.

### 7.2.2.1 Water Measurement Capacity

All FOs received some training in water measurement using a variety of different water measurement techniques. While all those who participated in these programs appear to have understood the basics of these procedures, it is unlikely that they will be able to maintain these skills into the future because of the long gap between training and management transfer. A technical skill such as water measurement requires practice and also the purpose for undertaking the measurements. Because management transfer was not granted during the life length of the project, FOs saw no reason to undertake the type of repetitive measurements of watercourse discharges required to determine if water distribution was equitable and where steps would be need to make it more equitable in the future.

Nevertheless, the training clearly indicated to FO members that it was feasible, often with fairly simple techniques, to determine whether the discharge in a watercourse was fair or unfair. Until this type of training had been given water users could only rely on subjective assessments of whether water was above or below the fair share for that watercourse.

Once management transfer occurs some form of refresher course will be required by FOs, together with training in determine what water requirements for each watercourse really are. The current Outlet Registers maintained by the Irrigation and Power Department and SIDA are hopelessly out of date as they have not adjusted CCA to account for loss of land to housing, roads, land abandonment, etc. FOs will need to reevaluate the functional CCA for each watercourse and determine new discharges. They have the basic skills for this process but will require additional assistance once transfer occurs.

### 7.2.2.2 Development of Maintenance Plans

During the annual closure of January 2000 all of the FOs that were functional at that time developed a systematic plan for maintenance activities prior to the closure period itself. As soon as closure occurred FO members conducted special walk-through surveys that identified problem locations for desilting, restoration of banks, repair of infrastructure and any other maintenance works.

No other canals in Sindh province were prepared for maintenance activities, either independently or with the assistance of IPD. Indeed the Minister of Irrigation strongly condemned his own engineers for their complete lack of any preparation for maintenance plans.

The closure of January 2000 was the first time when personnel from the Pakistan Army were asked to participate in canal clearing. It is to the credit of both the Army and the FOs that their canals were cleaned quickly and without any ill-feeling on either side because a plan already existed that could be quickly implemented, and the general membership of the FO was already prepared for full participation in maintenance activities. In other locations where there were no FOs created, farmers were required by the Army to contribute labor on the basis of one person per 16 acres in a largely involuntary manner.
The benefits of developing and implementing a systematic maintenance plan were not only that maintenance proceeded more efficiently and more rapidly, but also that all of the benefits could be clearly seen by the FO membership. In canals without FOs there was no mechanism for water users from different locations to see what benefits occurred, and their commitment was significantly lower as a consequence.

A summary of the inputs and imputed benefits of maintenance activities in canals that were fully organized at the time of maintenance is presented in Table 6.7. It is clear that participation went far beyond just labor. Water users contributed the use of tractors and excavators, provided lunch and other refreshments to colleagues, and it was clear that this had a major contribution to the spirit of cooperation and social cohesion intended as one of the main rationales of the FO program.

7.2.2.3 Revenue Assessment

One of the more innovative and challenging aspects of the proposed transfer process was that FOs would take responsibility for assessing water fees, collecting fees from members, and sharing the revenue with SIDA. Traditionally all revenue assessment and collection has been done by staff of the Revenue Department and has not involved water users in anything other than their payment of dues.

Revenue assessment in Pakistan is a complex procedure, perhaps unnecessarily so, which requires a particular set of skills. A survey must be made of the area under each crop for each landowner because water rates are assessed on the basis of crop and area irrigated. The field data must then be transferred into different registers and the appropriate fee assessed according to the water rate of each crop. Finally a bill must be prepared for each landowner, and records maintained of the actual payments made by each assessed person.

FO members were given training in the process. Because management transfer did not take place in the life length of the project it was not considered appropriate for FOs to assess the entire area under their potential jurisdiction. This was properly the work of the Revenue Department staff and it was felt that in the (likely) event of differences between FO and Revenue Department assessments this would create unnecessary complications prior to management transfer.

Training was therefore given on the basis of smaller sample areas. Like the water management training, it is not clear if the FO members will retain all of their assessment skills because they have not had a chance to practice them under real conditions. It is therefore likely that they will require some refresher courses at a later stage, but there is no doubt that the FOs showed themselves fully capable of assessing revenue from their own members as a result of this training program.

7.2.3 Business Management Capacity Building

From its inception the project recognized that the creation of FOs with water management responsibilities at Distributary level would entail much more than the technical aspects of water management and maintenance of canals and drains. Because FOs were to be financial self-supporting they needed to have training in a range of activities that would enable them to
function as an independent small business venture. They would need to have basic skills in keeping records of meetings and decisions, in bookkeeping, banking procedures, auditing and other elements of a proper commercial undertaking. The results of these different training programs are impressive. One of the examples is that all FOs got their accounts audited from the independent chartered accountants as per their regulations and by-laws.

7.2.3.1 Administrative Management

All FOs keep detailed records of their meetings with minutes of all matters discussed and the decisions that were taken. Meetings are held according to a prescribed schedule, and the names of all present are recorded.

There are detailed records of all members of each WCA as well as FO membership, including names, addresses and land holdings so that there is a complete database of the membership of the entire organization.

For each WCA and FO the names of all office bearers are clearly recorded together with the details of their election to office, including nominator and seconder.

As a result there is a professional approach to the organization that continues to instill trust and confidence in the general membership. Where possible FOs have obtained premises where they can conduct their regular membership, thereby reducing the risk of being dependent on a member of the oligarchy to provide facilities and refreshments in their own houses. While some of these premises are temporary, there is an expectation from all FOs that they will eventually have permanent premises, and membership is unanimous in agreeing that their own financial contributions should be used for such a purpose.

7.2.3.2 Financial Management

The record of FOs in financial matters is even more impressive. Revenues generated from membership fees of WCAs and FOs have been properly accounted for and banked, and not a single case of fraud, embezzlement or other financial irregularities have been reported by the independent auditors who have examined the books of all of the FOs. This is no mean achievement given the tradition of financial mismanagement practiced at higher levels in the country.

Admittedly the amount of revenue collected by the FOs to date is comparatively small compared with future expectations. Membership fees of Rs.100/- per member to the WCA total some Rs.445,000 altogether. From this each WCA has contributed Rs.1000/- per watercourse to their respective FO, for a total of Rs.324,000.

The strains on the organization will be significantly more when water fees are assessed and collected. Expectations are that revenues for each FO will often exceed Rs.1-2 million. Nevertheless, sound and proven financial procedures are in place and are being used by all of the FOs.
7.2.3.3 Business Plans

One area where the effects of the project cannot be assessed because of the delay of the Government of Sindh in implementing management transfer is in the development and implementation of Business Plans for each of the FOs. In the first phase of the project preliminary Business Plans were drawn up for the three pilot Distributaries and it was anticipated that similar plans would be drawn up for the other FOs. However, without management transfer the FOs correctly viewed this exercise as rather academic and preferred to wait until they had been given full control over their financial affairs and could expect water fee revenues to start to accrue in their bank accounts.

The Business Plans will reflect the way in which members of the FO believe they should allocate their resources. While some expenditures such as maintenance are fairly straightforward for members to agree upon, others are much more complex. For example, the business plan includes provision for hiring of technical staff to support the FO in operation and maintenance of irrigation and drainage facilities, and in conducting assessment procedures and development of water bills. These are not trivial issues and FOs recognize that the proof of their capacity to manage their own affairs really lies in the development of longer term Business Plans that are not only commercially viable but meet the approval and aspirations of their own membership.

7.3 External Relationships

The accomplishment discussed so far in this section focus primarily on the development and strengthening of the internal capacity of FOs and WCAs so that they will be dynamic, transparent and effective organizations that maintain the trust of their members into the future. However, an equally important role is the capacity of the FOs to act on the behalf of their members in dealing with outside organizations.

7.3.1 Representation on Area Water Boards

Under the Sindh Irrigation and Drainage Act there is provision for representatives of FOs to be full members of the Area Water Boards. Admittedly the quota of two representatives out of a total of at least seven means the views of the water users are underrepresented (in the Punjab case representation is equal between government officers and water users, showing considerably more commitment to the ideal of water user representation) but it is a start.

Despite the gross under-representation of water users at the AWB level, the two delegates have attended all of the AWB meetings and have been able to participate fully. Insofar as the AWB has yet to make any decisions of significance the FO representation may be seen more as symbolic than practical but it does represent the first time when water users can play a role in decisions that will directly affect their access to water and other resources.

The AWB has the responsibility to operate and maintain main canals down to the level of the Distributary/Minor head gate, and to monitor that discharges to each FO are at the intended level. In the likely event that discrepancy in intended and actual discharges occurs at distributary head gates, then the AWB is the body at which decisions must be taken to rectify
the inequities. It is therefore of considerable importance that water users are represented at this forum.

Insofar as management transfer has not occurred, there are no binding legal agreements in force between AWB and FOs concerning the discharge that will be delivered to a distributary: it is still an internal procedural affair for the AWB without any role for FOs. Once transfer occurs, however, agreements concerning discharges at the head gate serving each FO will come into force, and this means that the representation at AWB level is of paramount importance.

It is therefore a major project achievement that FOs, meeting in unison, have been able to identify two individuals who they trust to represent them at the AWB level. It is highly significant that the individuals come from different sub-divisions because this shows the FOs recognize the rights and abilities of all members irrespective of location. It is hard to appreciate the fact that such a democratic process can occur over such wide distances when it was only a short period ago that farmers in adjacent watercourses hardly recognized each other’s existence, let alone their rights.

7.3.2 Formation of the Farmer Organization Council (FOC)

By far the most significant development in the project has been the formation of the Farmers Organization Council. This is a federation of all of the FOs created under the project, where each FO has one or two representatives (normally the Chairman and Secretary).

The FOC is a spontaneous body. It has no place under the official SIDA structure but resulted from the recognition of various FOs that they would be even stronger and more powerful if they could show a united stand on major issues. Quite voluntarily they decided to establish the FOC, in July 2000, to look after the interests of the FOs as a single united body.

The importance of the FOC can be seen from two events: the presence of the FOC Chairman at the Project Steering Committee, and the attendance of the FOC Chairman at a meeting with the Chief Executive, General Pervaiz Musharraf, in Islamabad as well as in Karachi in October 2000 where issues of water management were discussed.

The FOC has selected a Chairman, a Secretary and a Press Secretary with the mandate to represent the FOs and to promote their activities to the public at large. The example has already been followed in Mardan AWB, NWFP and it is expected that eventually there will be a national federation of FOCs that fully represent water users at the highest level.

It is worth mentioning that FOC has been granted financial support initially for one year from Sindh Office OXFAM -Great Britain. From financial support, FOC is going to get the services of technical advisor specialized in water resources, a computer man, necessary equipment like computer and printer, and a rented office at Mirpurkhas. This support would certainly enhance the working capacity of FOC.

It is highly impressive that the FOC concept has been born from the pilot project in Sindh province, and it is to the full credit of the FOs and there general membership that they have been willing to create and fund an organization of this form that can represent their best interests.
7.4 Monitoring and Evaluation

In addition to the direct involvement of project staff in the creation and development of farmer organizations IWMI was also mandated to undertake a series of monitoring and evaluation studies that enabled the impact of management transfer to be assessed in terms of improved irrigation and drainage management.

In one sense this element of the project has not been successful because the delay of the Government of Sindh in transferring management to responsibility to FOs meant that a before and after evaluation has not been possible.

Because management transfer was expected to occur at some point in the project life length, the monitoring program continued, as described in section 6 above. From these data is has been possible to obtain a much better understanding of the water conditions that have been in place before any management transfer has occurred.

From the data a number of observations can be made concerning water distribution, operation and maintenance of drainage facilities, water table depth fluctuations and salinity levels. It is clear that, for whatever reasons, the FOs when they eventually get full operation and maintenance responsibility will face a number of severe challenges to meet the goals of equitable water distribution and sustainable irrigated agriculture.

7.4.1 Water Distribution Equity

Current water distribution equity is poor. Evaluation of water delivery conditions at main, secondary and tertiary level, was undertaken as part of the project with additional information provided from the IWMI study of water distribution equity in Mirpurkhas Sub-division (Khan et. al 1998). The results clearly show that much of the root cause of inequity starts at levels higher up in the system before the secondary head gates at which FOs will ultimately take water distribution responsibility. Full details are provided in the project report entitled "Equity of water distribution in Sindh Province, Pakistan".

Typical causes of inequity are that with fluctuating discharges in main canals different secondary canals get differential access to water. Also, the implementation of rotations at secondary level is highly uneven, with some canals being closed up to four times more frequently than others. Both of these cause inequity of water distribution to different distributary canals and are actions that will remain the responsibility of the SIDA and AWB even after management transfer occurs.

Finally, and perhaps most telling, is that there is virtually no discharge measurement undertaken at secondary level. This means it is going to be very difficult for AWBs to implement a fair distribution of water between the different distributary canals because they do not know what discharges are.

The detailed measurements taken at Heran, Bareji and Dboro Naro, started in the first phase of the pilot project and continued into the second phase, show that in two of the three canals the incoming discharge delivered to the FO area is so much higher than design that there is no water shortage evident in any part of the command area. Only in Dboro Naro, where incoming discharges are close to designed levels, is there a marked head-tail difference.
As long as all watercourses have more than their design discharge there is little incentive for them to spend much time measuring watercourse discharges and trying to implement a program of rigid equity of water distribution. They are also insulated from fluctuations in supply because of the generally favorable water supply conditions.

In the canals included in the current phase of the pilot project detailed watercourse measurements were not taken because staff were required to spend more time on organizing new FOs. However, special gauges established in head, middle and tail portions of all distributaries and minors showed that by and large there was reasonably equity of water distribution between the head, middle and tail reaches. Only when incoming discharges were below design discharge were there difficulties in achieving equitable water distribution.

The lack of advance warning on when water conditions were likely to be above or below design means that farmer organizations have a difficult management task. They are forced to act retroactively rather than being able to develop contingency plans pro-actively based on information provided from AWB officials.

### 7.4.2 Monitoring of Tubewell Drainage

In the three initial pilot sites observations were made of the operational performance of tubewells installed specifically for lowering high watertables.

Analyses of these data show that in the early stages of the project tubewells were grossly underutilized. This was at least in part a reflection of the lack of drainage disposal channels to remove the saline effluent. In the last year or so there has been an improvement in the operational hours of many tubewells and this appears to have had some benefit on watertable levels in parts of the command areas.

However, three main issues arise from this monitoring program that may require additional attention in the future.

**Firstly**, it is clear that tubewells are not operated in a coordinated manner. If only a subset of tubewells operates for a part of the time, and then they are switched off and another subset turned on, the effect of lowering the watertable is reduced. A more systematic operational policy is required to get maximum effect of tubewell drainage.

**Secondly**, the unlined disposal channels from saline tubewells means that highly saline water seeps into adjacent soils and groundwater, adding to the problem rather than alleviating it. In several instances the drainage disposal channel is clogged at its lower end, or discharge into canals is otherwise partially impeded, so that stagnant saline water is sitting adjacent to productive land. This may be further aggravated by up-coning of saline water but there are no data from this project to verify this assumption.

**Finally**, the issue of payment for continued maintenance of tubewell operations remains unclear. The costs are substantial, and if tubewells cease to function once the current performance-oriented contracts expire then water tables will inevitably rise once more.
7.4.3 Groundwater Depth Monitoring

The project has continued to monitor groundwater tables in the initial three canals using the roughly 200 piezometers installed in the first phase of the project.

In all three locations it is clear that there is marked cyclical fluctuation of groundwater, with higher levels in the winter season and lower levels in the summer. This reflects two different trends.

In the summer crop water requirements and evaporation are higher, and so shallow groundwater can be utilized. In winter when demand is low and temperatures cooler the utilization of shallow groundwater is greatly reduced.

However, there is also a management dimension. In both Heran and especially in Bareji winter discharges remain at high levels, far above the accepted requirements. This means there is a net inflow of unwanted water during the cooler months that seeps into the groundwater and is not readily disposed of. It is clear that if there were a more integrated approach to both irrigation and drainage management then the pressure on tubewells could be reduced, operating costs could be lowered, and water tables kept below dangerous levels.

7.5 Remodeling of Outlets

The final technical input from IWMI was concerned with remodeling of outlets. In order to achieve equitable water distribution between watercourses it is clearly necessary to have the correct dimension of outlet so that when design discharge is delivered to the head of the distributary water will be equally distributed.

In all of the canals included in the first phase of the project there was considerable discrepancy between designed conditions of outlets as well as of the cross-section and bed elevation of the distributary/minor. As a result equitable water distribution was proving elusive, at best.

There are several issues relating to redesign of outlets. One, referred to above, is that the original CCA included in the Outlet Register is no longer valid due to changes in land use and loss of land to non-agricultural purposes. It is therefore not automatically valid to return to the conditions, which were designed in 1932.

A second is that actual discharges at the distributary head are not always close to the original design because main canals may be able to draw more water than originally intended. Discussions with IPD officials resulted in an understanding that canals would get their design discharge as originally intended plus any surplus available from the head of the AWB, the surplus to be equally distributed among all secondaries and their associated watercourses.

The third is more complicated. The original 1932 design criteria assumed homogenous agricultural conditions and equal demand for water for all areas. But it is clear that there are differences in soil type, depth to groundwater, salinity and other factors that could be used as a basis for modifying the water allowances among watercourses along a distributary. To implement any revision of the 1932 criteria would, of course, require the full participation of the FO membership. The project TOR for IWMI therefore included a component that asked IWMI to
draw up revised outlet dimensions and, following management transfer, to get the FOs to agree to these revised conditions and participate in the remodeling of the outlets.

The delay by the Government of Sindh in handing over management responsibilities to FOs during the life length of the project meant that this component of the project could be only partially completed. Based on survey data collected in Heran, Bareji and Dhoro Naro the proposed outlet dimensions for different discharge criteria were drawn up and submitted to the Project Steering Committee “Remodeling at Outlets in Three Pilot Distributary under Farmer Managed Irrigated Agriculture Project”. The second part, which involved the concurrence and participation of FOs could not be undertaken because the FOs had no legal mandate to touch their outlets until management transfer had occurred.

In the report submitted to the Project Steering Committee each canal had two difference discharge levels considered: the original design discharge of 1932 and the actual discharge received over the past three years as measured by the IWMI field teams. For each watercourse the designed outlet conditions have been presented and can, when management transfer occurs, be discussed with FOs (Lashari and Murray-Rust, 2000).

7.6 Steering the Project

In order to monitor the project activities, the Provincial Development Working Party when approving the project, constituted the Project Steering Committee, comprised of the following:

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<td>1</td>
<td>Coordinator, National Drainage Program (NDP) Sindh</td>
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<td>2</td>
<td>Secretary Irrigation &amp; Power Department, Government of Sindh</td>
</tr>
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<td>3</td>
<td>Secretary Agriculture Department, Government of Sindh</td>
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<td>4</td>
<td>Managing Director, Sindh Irrigation &amp; Drainage Authority (SIDA)</td>
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<td>5</td>
<td>Resident Engineer, Pakistan Drainage Consultants (PDC)</td>
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<td>6</td>
<td>Director, Nara Canal Area Water Board*</td>
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<td>7</td>
<td>Team Leader, International Water Management Institute (IWMI)</td>
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* Included in the committee from second meeting.

In all seven (7) meetings of the project steering committee were convened. Interestingly, almost all members or their representatives participated in the meetings. Their contribution towards decisions on variety of the items was commendable. Some of the decisions are presented briefly here:

- Approved the criteria for FO registration under SIDA.
- Committee was constituted to prepare and submit draft agreement for irrigation and drainage management transfer to the farmer organizations.
- Director, Nara Canal Area Water Board was advised to announce the allocation of discharges for all thirteen channels, before IDMT is transferred to FOs.
- Bye-laws for FOs be finalized and notified after approval by the SIDA Board.
- IWMI would organize one-week training for at least six officials from each IPD and OFWM departments.
• MD SIDA and Director NCAWB would take into account the recommendations of the study on " Achieving Stable Canal Conditions following Remodeling: The Case Study of Bareji Distributary, Mirpurkhas" and ensure the availability of design discharge of 109 cusecs to the distributary.
• MD SIDA would look into the matter of representation of FOs in SIDA Board and Area Water Board and proceed with the proposal accordingly.
• SIDA and AWB would come up with the proposal and follow the action plan when IIMI leaves after the project period ends.
• The committee expressed its satisfaction over the achievements of the project.

7.7 Project Documents

As per the terms of reference, all the required documents have been completed. It is worth mentioning that few additional documents have also been produced. The list of the documents are mentioned in the table below:

<table>
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<tr>
<th>S#</th>
<th>Title</th>
<th>Author</th>
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<tbody>
<tr>
<td>1</td>
<td>Quarterly Progress Reports</td>
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<tr>
<td>2</td>
<td>Water Distribution Equity in Sindh Province, Pakistan</td>
<td>Hammond Murray Rust, Bakhsah Lashari and Yameen Memon</td>
</tr>
<tr>
<td>3</td>
<td>Remodeling of Outlets in three Pilot Distributaries under &quot;Farmer Managed Irrigated Agriculture&quot; Project in Sindh Province Pakistan</td>
<td>Hammond Murray Rust, Bakhsah Lashari</td>
</tr>
<tr>
<td>4</td>
<td>Proposed Business Plan for Pilot Farmer Organizations</td>
<td>Saeed ur Rehman, Mehmood ul Hassan, Bakhsah Lashari, Yameen Memon</td>
</tr>
<tr>
<td>5</td>
<td>Capacity Building for Participatory Irrigation Management in Sindh Province of Pakistan</td>
<td>Yameen Memon, Mustafa Talpur, Hammond Murray Rust</td>
</tr>
<tr>
<td>6</td>
<td>Empowerment of Farmer Organizations: The case of the &quot;Farmer Managed Irrigated Agriculture&quot; Project, Sindh Province of Pakistan</td>
<td>Hammond Murray Rust, Yameen Memon, Mustafa Talpur</td>
</tr>
<tr>
<td>7</td>
<td>Achieving Stable Canal Conditions Following Remodeling: The Case Study of Bareji Distributary, Mirpurkhas, Sindh</td>
<td>Hammond Murray Rust, Bakhsah Lashari</td>
</tr>
<tr>
<td>8</td>
<td>An assessment of Water Supply and Demand in Command area of Heran Distributary, Sanghar</td>
<td>Rubina Siddiqui</td>
</tr>
<tr>
<td>9</td>
<td>Groundwater Balance in the Command Area of Heran Distributary, Sanghar</td>
<td>Munir Mangrio</td>
</tr>
<tr>
<td>10</td>
<td>Conjunctive Use of Canal and Ground Water in Dhoro Naro Minor, Nawabshah, Pakistan</td>
<td>Koos, De Voogt</td>
</tr>
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</table>

As per the agreements the project documents have been submitted to the following officials.

- Additional Chief Secretary (Dev.), Planning and Development Department, Karachi
- Secretary Irrigation and Power Department, Government of Sindh
- Secretary Agriculture Department, Government of Sindh
- Provincial Coordinator NDP, Government of Sindh
7.8 Other Project Achievements

As is natural in a project of this nature there are opportunities for undertaking parallel studies that complement the core project activities. This project has been no exception and there have been a number of achievements that can be reported here.

7.8.1 Remodeling of Bareji Distributary

Within the pilot project there are several canals which were remodeled under the LBOD project in anticipation of the commissioning of the Twin Jamrao Main Canal which was to increase water deliveries to Mirpurkhas Sub-Division. The increased main canal discharge meant that new distributary head regulators had to be constructed, outlets had to be increased in size, and in fact were completely changed in design to a pre-cast structure, and the distributary dimensions completely changed. The changes at distributary level were completed by 1995 although the Twin Jamrao Main Canal as only commissioned in February 2000 and will not reach full supply until 2001.

At the request of the Project Steering Committee, IWMI carried out a study to determine what should happen at Bareji Distributary. Originally designed to carry 62 cusecs, the canal was modified in 1984 to have a design discharge of 42 cusecs. Under LBOD the design discharge was to be increased to 109 cusecs. In practice it has been operated average close to 70 cusecs for the past three years.

Some of the original outlets remain, others have been replaced by the new pre-cast outlet structures, while the berms of the distributary were shaped to meet the new design discharge. IWMI was specifically requested to undertake a study that would indicate the dimensions of the channel required for it to flow in regime conditions under the new discharge conditions.

This report was submitted to the Project Steering Committee in February 2000, and accepted by them as an example of how the various secondary canals in the LBOD expansion area could be remodeled to perform under regime conditions “Achieving Stable Canal Conditions Following Remodeling: The case study of Bareji Distributary, Mirpurkhas (Lashari and Murray-Rust 2000).

7.8.2 Additional Investigations

Four additional studies have been conducted by IWMI staff and research associates that are based on project-related information and supplemented by additional fieldwork not paid for using project funds.
Mr. Munir Ahmed has submitted an M.Sc. thesis to the Institute of Irrigation and Drainage Engineering, Mehran University of Engineering and Technology, Jamshoro entitled “Groundwater Balance in the Command Area of Heran Distributary, Sanghar”. The study finds that there is significant groundwater recharge in November, December and February when water deliveries remain high and crop water demand is low. At least one third of the command area has watertables within 3.0 feet the surface, a condition that will limit crop production. Operational efficiency of tubewells, the time actually pumped compared to designed pumping hours, was only 31% indicating considerable reserve in drainage capability. However, reducing inflows into the distributary could reduce pumping costs by as much as Rs.23/- per acre (Mangrio 2000).

Ms. Rubina Siddiqui has submitted an M.Sc. thesis to the Institute of Irrigation and Drainage Engineering, Mehran University of Engineering and Technology, Jamshoro entitled “An Assessment of Water Supply and Demand in Command Area of Heran Distributary, Sanghar. The study finds that water deliveries are 1.8 times actual field level requirements, with the balance being lost to drains and augmentation of groundwater. While water distribution equity is not very high, all watercourses are able to obtain more than their design discharge. There is clearly a need for better, integrated water management that includes better control of water at the distributary head, between watercourses and at farm level (Siddiqui 2000).

Mr. Koos de Voogt, M.Sc. student from Wageningen Agricultural University, the Netherlands, has undertaken a study on conjunctive use of groundwater and canal water in the Dhoro Naro command area. The study indicates that over 100 private tubewells have been installed since 1989 to tap a shallow lens of fresh groundwater resulting from seepage from Gajrah Branch and Dhoro Naro Minor. Because many tubewells have been installed too deep they penetrate the fresh aquifer and bring more saline water to the surface. As a result the area of fresh water has shrunk significantly between 1996 and 2000, and the quality of the freshwater lens has declined. Current water management practices using conjunctive groundwater and canal water are probably not sustainable as good quality water is being reduced in volume while soil salinity levels are rising (Voogt 2000).

Dr. Hammond Murray-Rust and Dr. Bakhshal Lashari completed a study entitled “Farmer Response to Water Availability and Environmental Conditions in three Secondary Canals in Sindh Province, Pakistan” which has been submitted for publication as an IWMI Research Report. The study shows that farmers are sensitive to water availability, groundwater depth and salinity when they choose which crops to grow so that if groundwater conditions improve they should be able to quickly switch to higher value crops. Only in Dhoro Naro are there significant head-tail differences in cropping patterns, caused by inequity in water distribution between head-end and tail-end watercourses. In Heran and Bareji distributaries differences in cropping patterns are determined by depth of water table and quality of shallow groundwater (Murray-Rust and Lashari, 2000).
One of the main benefits of a pilot project of this nature is that it provides the opportunity to learn lessons that can be applied in other projects in the future. This project has proved no exception and there are many lessons that have been learned as a consequence of our involvement. For the sake of clarity the lessons have been divided into several different categories: project design issues, Farmer Organization issues, technical issues and policy issues. However, many of the categories overlap, and in future projects the inter linkages should be carefully considered in terms of design and implementation of the intended project.

8.1 Project Design Lessons and Issues

There are several issues relating to the design of the pilot project that, in retrospect, should have been more carefully considered when the project was conceived.

8.1.1 Imbalance in Focus Between SIDA and FOs in Project Design

The project was designed to foster a relationship between SIDA on one hand and incipient FOs on the other. But it appears that in many respects there was a genuine imbalance in emphasis.

While it is easy to understand the expected benefits to FOs from a program of management transfer whereby they obtain greater control over their own affairs and participate in decision-making at higher levels for the first time, the benefits to SIDA are far less obvious. Under this project SIDA has been expected to give up considerable portions of their power and authority to an untried and diverse group of FOs, thereby eroding a century-old tradition of a strong, technically oriented institution, and yet SIDA received almost no benefit as a consequence.

The project gave nothing to SIDA in terms of capital investment. It included no formal capacity building so that SIDA officials would be better prepared to try to communicate with their new partners. It did not address any issues of how SIDA was to monitor the progress of the FOs once transfer had occurred. As a consequence, and quite understandably, there was little or no motivation to move ahead speedily with the management transfer process.

Had there been more rewards for SIDA staff they might have been more sympathetic to the project. Instead they saw a not inconsiderable sum of money passing through their own organization to IWMI with no benefits accruing to themselves.

8.1.2 Failure to Understand Deep-Rooted Elements of Institutional Culture

Experience in other projects in other countries has shown that in the process of management transfer, the people involved in the government agency which is transferring assets and responsibilities to water users need to be fully sensitized to the issues, to the process that will occur, and to the way in which they will have to interact with water users once transfer has occurred.
Yet in the project design this was neglected. Somehow there was the assumption that people who had been associated for many years with the traditions and regulations of a well-established organization would be able to deal in an equal manner with the very community that they have been distanced from for generations. Further, these same officials would be expected to embrace the changes willingly without creating difficulties or erecting barriers to progress.

Instead the project almost fostered the continuation of a deep-rooted mistrust on both sides. SIOA officials were constantly cast in the role of prevaricators, sometimes fairly, sometimes unfairly, and this becomes a heavy burden to carry day in and day out. The way the project was designed meant the onus on SIDA was always to make concessions to FOs with little benefit in return.

Under such conditions it is hardly surprising that the highly conservative institutional culture of SIDA, and the supporting elements in other branches of government, opted for the path of most resistance because they perceived the project design as a win:lose situation.

8.1.3 Guiding SIDA Officials Towards Their New, Changed Responsibilities

In another project involving organization of farmers and devolution of authority over local operation and maintenance to water users, post-project evaluations showed that engineers felt happier after the project because they spent less time on resolving disputes and more time on matters of engineering. This lesson was lost on the designers of this project: no efforts seem to have been made to show SIDA officials how and why they could benefit from transfer of management responsibilities to water users.

This lesson does seem to have been learned by the Punjab Irrigation and Drainage Authority (PIDA). By establishing a special cell that will help in training the organizers and will have responsibility for monitoring and evaluating the progress of the project and its impacts means that the PIDA staff have a far greater involvement that SIDA staff were ever given.

In this project IWMI was given the responsibility to organize farmers more or less unilaterally, to monitor the progress of organization and to report on progress to the Project Steering Committee. Apart from the secondment of three SIDA members (one of whom was only associated with the project for a brief period) meant that there was no involvement and no stake for SIDA. How then were they expected to learn how to deal with the FOs and learn their new responsibilities for the future? Again, this lesson appears to have been learned in PIDA where IWMI will provide technical assistance to PIDA officers and their trainers, not to the FOs.

8.1.4 Assumptions About SIDA and Government of Sindh Commitment to IDMT

The final element of project design that merits comment is that there was no stick to force the Government of Sindh to bring management transfer into being. We have already seen that there was no incentive in the form of perceived benefits to SIDA.

The project designers assumed all along that there would be steady progress towards management transfer, but again lessons had not been learned from the past. In the first phase of the project a joint management agreement was signed but was almost immediately withdrawn.
for technical and legal reasons. In retrospect this was probably a correct (albeit highly unpopular) move because the complexities of management transfer had not really been fully worked out. Further, the withdrawal of management transfer was as much about commitment to the ideal than about details.

Given the clear cut evidence of continued mistrust and suspicion of SIDA and other government officials to the very concept of IDMT it is highly unfortunate that no safeguards were built in to protect the newly created organizations.

It is unfair to the very community who is the focus of organization to leave them unsatisfied because of administrative delays. Through out the project FOs were created on the promise and understanding that they would obtain management transfer. After intense efforts by FOs and by IWMI to get the government to pass the enabling legislation management transfer has not occurred.

As a result farmers confidence in the government is low and probably than if there had been no project at all. Project designers including the Government and the World Bank did not safeguard the interests of the intended beneficiaries. Government officials opposed to the very concept of water user control over operation and maintenance, revenue collection and other tasks long the preserve of the engineering fraternity were fully aware that nobody was going to punish them in the event of any delay. They knew full well that through procrastination and obfuscation they could outlive the life length of this project and through so doing they will be able to resist other similar projects for some time into the future.

8.2 Issues and Lessons at Farmer Organization level

8.2.1 Strong, Viable FOs can be Formed

The project has proved beyond any shadow of doubt that it is possible to establish strong, viable and capable Farmer Organizations at distributary and minor level. That it could do so in areas long viewed as being particular difficult and resistance to outside influences is a major achievement.

While the process of formation may have been longer than some would have liked, the result is a set of stronger, more vibrant organizations than almost anyone would have predicted at the outset. The groups are democratic, factionalism is more or less absent and certainly shelved for the benefit of the community as a whole, and the members participate fully in all activities.

8.2.2 Sustainability of FOs

Despite the enthusiasm of organizers and the vast majority of FO members it is by no means assured that all FOs will all remain active and viable into the foreseeable. This has been made doubly difficult by their perceived failure to achieve management transfer within the life length of the project because many FO members have staked their reputations on being to deliver this to their general membership.
FO sustainability will depend on two factors: the response to internal pressures that threaten to divide membership into factions, and their capacity to deal with outside threats.

8.2.2.1 Internal Factionalism

So far all of the FOs have put aside factionalism but it would be naïve to assume it had been laid to rest. Access to water is a potent force in the water-short communities of rural Sindh, and no doubt at some point in time one faction or another may try to exploit the FOs so that they gain an undue share of water. Most FOs appreciate the benefits that they have gained even without management transfer: a strong organization to represent their interests, better communication and understanding among members and even between different FOs, full participation in communal tasks such as maintenance, and greater concern for water distribution equity. Nevertheless, the risk of division within the community remains. This has not occurred yet because of the desire of membership to achieve the goal of management transfer, but if management transfer is delayed indefinitely, internal divisions may arise.

The end of the project means the withdrawal of IWMI and the organizational teams. There is nothing in place to help FOs when they, inevitably, face internal divisions. No mechanism exists within the SIDA set-up to help FOs (even if there were current mistrust might rule that option out anyway), and so FOs are being forced to survive on their own. Only time will tell if FOs can cope with these internal threats to their viability.

8.2.2.2 External Threats

One lesson learned from the project is that there are also external threats to FO viability. There is certainly anecdotal evidence from FOs that efforts have been made to sabotage their integrity by such activities as attempting to form alternative organizations, by reducing water supplies and by imposing additional “dikka” on watercourse outlets. Whether all these threats are real or merely perceived hardly matters because they will test the strength of cohesion of the FOs whether they are true or not.

At one level external threats can act as integrating mechanisms but they also can act as destabilizing ones. It is by no means beyond the realm of possibility that efforts will be made to destabilize existing FOs now that IWMI and the organizing teams are a thing of the past, and there is no alternative mechanism to protect their best interests.

8.2.3 The Desire and Need for Federation

A major lesson learned from the project is that federation to FOC is perceived not only as a desirable thing but a necessary one. While it may have been in some peoples minds that eventually federation might be a good thing to pursue, the speed at which federation has occurred is quite remarkable.

There is often a feeling that the primary function of a water management organization is to manage its own internal affairs. Yet in many cases the water users have been undertaking this internal function perfectly happily without any form of formal organization. This is certainly true at watercourse level and in many cases is observed at secondary level, where water users have
got together for purposes of maintenance and water distribution whether or not they have the authority to do so.

The upward-looking function of water user organizations is far less commonly promoted as a benefit and yet in the eyes of many water users this is actually the primary function of the organization. Watercourse groups want to make sure their watercourse gets its fair share of water and so want to federate, while FOs want to federate to ensure they get the correct supply into their distributary or minor. At each level water user groups say that if they are given their fair entitlement of water they can manage their own internal affairs perfectly well.

The speed at which the Sindh FOs have moved towards federation is an indication of their feeling that they need a strong and broadly based coalition in order to obtain their due rights. In this they are probably true. SIDA is has to support to the FOC established as a consequence of this project because it has potential to become a really powerful force not just at AWB level but provincially and nationally. It will be interesting to see how this particular chain of events works out.

8.3 Technical Lessons Learned or Unresolved

The lack of management of transfer to FOs during the life length of this project means that a number of technical issues remained unresolved. Based on a combination of discussions with FOs and observations undertaken as a result of fieldwork a number of these issues can be elaborated in detail and are discussed below.

8.3.1 Issues of Equity and Equality

The standard thinking that prevailed in 1932, when the systems below Sukkur Barrage were commissioned, must be questioned in light of the greater amount of information now available to managers and water users alike.

The allocation principle in force is widely referred to as equity, when in reality is one of equality: water was allocated in equal shares per unit area irrespective of soil or other conditions that might exist at field level. This approach is widely used in the initial establishment of irrigation systems when there is a paucity of available information.

Management transfer includes the capacity of water users to make decisions about how and where to allocate water. It becomes their right to decide what to do. Equality of water allocation only reaches down to the head regulator: below that gate the water users are free, through their democratic and participatory approach, to choose alternative water sharing arrangements. They may, of course, decide to continue the existing equality-based allocation, but they might equally well decide to follow an alternative path if the general membership understands precisely what is being discussed and if they all agree.

The principle involved in this is fundamental to management transfer: if water users do not have the right to change allocation principles among their own membership then they are merely the pawns of SIDA, forced to follow rules and regulations that are imposed on them from above. This is not management transfer, but a shift in administrative responsibility with no change in ownership or rights.
8.3.2 Record-Keeping in Respect of Water Delivery and Other Hydraulic Conditions

In precisely the same vein, FOs should be free to decide what records they choose to maintain. Presumably they will, all other things being equal, choose to maintain only those records that they find useful in implementing their agreed patterns of water distribution.

At present IPO is mandated to maintain a whole range of registers pertaining to outlets, CCA, canal conditions, periodic discharge measurements, depth of sediment, tail gauge readings. Under the provisions of the draft management transfer agreements IPO has to hand over all of the current and past registers to the FO. In practice few if any of these records are maintained, which is in itself an indication of their current utility to IPO. If they are of no apparent use to IPO, then why should they be of use to FOs?

Actually some of the registers should be useful to an organization interested in assessing hydraulic performance at secondary canal level but with the decline in performance-related management the purpose of some of the registers is lost in history. But again it is not merely a transfer of administrative procedure that it involved but the opportunity to provide FOs with the wherewithal to manage their own water resources effectively in accordance with their agreed operational objectives.

Should management transfer suddenly occur the FOs will be left in a difficult position. They will feel pressure to collect a whole lot of data that IPO itself has not been collecting, but they will not have any guidance available as to what it likely to be useful for them and what is not.

8.3.3 Performance Assessment and Monitoring and Evaluation

The lack of management transfer means that FOs have not had any opportunity to determine what it is they really need to monitor, and how they should assess their own performance.

Clearly there are two types of information that they absolutely have to collect under any circumstances: discharges at the head of their secondary canal, and irrigated areas by crop for revenue assessment purposes.

8.3.3.1 Head Regulator Discharges

The discharge at the head of the secondary canal is the single most important piece of information required for dealing with AWBs over the amount and timing of water deliveries to each FO group. This information forms the basis for all negotiations over water deliveries, and it needs to be mutually verifiable by both the FO and the AWB. Without this information it is easy to foresee that there will be endless squabbles and disputes about how much water was actually delivered, when and to which canal.

The pilot canals (with the exception of Mohd. Ali minor where there is no head regulator in operation) all have measurement capacity that can be used to verify discharges on a mutual basis between AWBs and FOs. Few other of the 1100+ distributaries have this capacity to measure discharge. It remains a matter of some conjecture as to how the remaining
distributaries will be able to have a frank and fair discussion over water deliveries without some form of mutually acceptable water measurement capacity.

8.3.3.2 Records for Assessment of Abiyana

The current three-fold register system for assessment of abiyana will probably have to remain until an alternative assessment system is derived and brought into practice. It is the accepted, if cumbersome, method of assessing water fees and carries with it legal obligations on water users to pay on the basis of information included in the registers.

However, for simplicity sake, the FOs should not follow the Deh (village) as the basis for assessment but keep their records according to watercourse and cumulate this to distributary level. Insofar as fees payable from FO to AWB are based on canal command, not village areas, this makes sense.

8.3.4 Maintenance Issues

FOs have proved themselves very successful in undertaking basic annual maintenance tasks. They have been actively involved in the planning of annual maintenance as well as in its implementation, and the imputed value of their contributions is substantial.

However, there remain concerns about the capacity of FOs to undertake more periodic maintenance tasks, such as repairs to structures that require not only manual labor and the donation of machinery but also the purchase of materials, the involvement of skilled laborers and supervision to ensure that work is carried out to meet minimum quality and safety standards.

This is not merely a concern over recurrent or deferred maintenance. Legally FOs, when management transfer occurs, will take over assets on a temporary not permanent basis. In the event that they fail to meet certain performance criteria SIDA could (at least in theory) withdraw the management responsibilities from FOs and demand to have their assets returned in the same condition as it was at the time of hand-over.

8.3.5 Capital Investment and Improvement in Irrigation and Drainage Facilities

An even more complex situation arises if FOs should make capital improvements to the irrigation and drainage infrastructure. These assets do not come under the lease arrangements inherent in current versions of the proposed management transfer agreements, and should remain as the property of the FO. However, if the FO should collapse or some other type of problem arise, there is no current provision for compensation to the FO for their investment.

Under such conditions it is hard to see why FOs would risk making serious investments to improve their irrigation and drainage infrastructure. The result may well be a gentle decline in the condition of existing infrastructure, and no opportunity for significant efforts to modernize facilities from their current conditions.
8.3.6 Drainage

To date there has been little or no serious debate over what is really going to happen to drainage infrastructure. A few basic rules appear to have been laid down. Drains under 15 cusecs capacity will be the responsibility of FOs to maintain, and if the drain serves two adjoining FOs then they have to develop joint activities to keep the drains in good condition. FOs appear to have been given the responsibility to provide the watchers for drainage tubewells but it is not clear who has long term responsibility to pay for operating costs.

Further, the issues of payment of a separate drainage cess seems to be unresolved. The expectation of government is that not only should water users pay a charge for water deliveries, based on abiyana, but also should pay a separate drainage cess that will help defray the costs of cleaning of drainage canal maintenance, tubewell operations, and other costs associated with drainage.

8.3.7 Abiyana and Cost Recovery

The current plans for division of abiyana between FOs and AWBs contain a potentially serious flaw and either AWB or FO could suffer as a consequence.

At present there has been an agreement made, based on existing cropping patterns and abiyana rates that fees collected should be split 60:40 between AWB and the each FO.

In the event that an FO becomes more efficient in water use and is able to increase its cropped area using the same amount of water, then the total abiyana collection should increase. However, because of the flat rate nature of the split of the revenue, the FO will be paying an additional amount to the AWB solely because it has improved its internal water management practices.

Conversely, if an FO becomes sloppy in its management and the cropped area declines, then theoretically the AWB will receive a lower overall payment from the FO because the split is based on the total amount.

One potential solution to this problem is to establish the current rate of payment due to the AWB based on current cropping patterns and assessment rates. This can be viewed as a flat rate payment, with an escalator clause to allow for inflationary costs within the AWB according to some national yardstick.

Using this flat rate approach, then an FO that improves its management will have the incentive to collect the increased abiyana because all of the additional benefit will accrue to the FO and its members. Conversely, a poor FO will lose income because it still has to pay a flat rate to the AWB, and the membership may start to demand explanations as to why the total income available to the FO is dropping.

The AWB also benefits because its income is steady and assured. It knows exactly how much money is due each year, it does not have to try to check the revenue assessments of individual FOs in the event of disputes, and it has a clear indication of whether or not each FO has paid exactly what it should have done without AWB staff even having to leave the office.
There is, hidden within this flat rate approach, an even bigger advantage to the FOs should they wish to pursue it. The present method of abiyana collection is long-winded, slow and cumbersome. It requires a lot of effort to assess the actually cropped area as well as the crops grown on each person's farm, calculate the amount owing from each farmer, prepare a bill and try to get him to pay it.

If the flat rate of payment to the AWB is known ahead of time, then the FO can consider alternative and potentially simpler ways of assessing the water charge. It could be by current land ownership, a per capita payment, or whatever system the FO membership thinks to be fair and equitable. The amount assessed would therefore have to cover the known payment to the AWB and the proposed budget for the next year. If the AWB has a sound business plan that identifies probable expenses for the next year, the collection rate can be adjusted to reflect this.
9. RECOMMENDATIONS

Based on the experiences of the two phases of the pilot project on Farmer Managed Irrigated Agriculture, we have drawn up the following list of recommendations. They are grouped by issue so the order is not necessarily indicative of the relative priority given to the recommendation, with the exception of the first recommendation which if it is not carried out will render all other recommendations completely meaningless.

Some of the recommendations presented below have financial implications. They are based on the belief that some form of follow-up activity will be required to help establish within the SIDA/AWB structure a greater capacity to support organizational efforts, to monitor their progress, and to monitor the performance consequences of IDMT. It is considered highly improbable that the full benefits of IDMT will attained if additional support for the process is not made available.

The pilot project proposed for Punjab contains such support for PIDA as well as for FO formation structure and makes the entire process easier and more attractive for the staff involved. If, and only if, the Government of Sindh agrees to pass the final legislation concerning IDMT then the follow-up project should be pursued with vigor and enthusiasm.

9.1 Irrigation and Drainage Management Transfer (IDMT)

Recommendation 1

The Government of Sindh must with no further delay approve the Irrigation and Drainage Management Transfer regulation and enable the first 14 Farmer Organizations to take over their agreed responsibilities.

The delays that have been encountered to date have made the entire process of IDMT in Sindh an exercise in futility. It is not merely that money has been wasted by having project activities predicated on the premise that IDMT will occur, nor that considerable time of government officials was been wasted through endless prevarication and delay. The delays have furthered soured relationships between water users and government officials.

The Government of Pakistan has adopted IDMT as its policy, and the other three Provinces have either signed or are in the process of signing such agreements. It is inconceivable that the Government of Sindh wishes to be viewed as the only one that will not implement the policies of the Federal Government and yet which is willing to accept loans from the World Bank on promise of implementing IDMT.

The Government of Punjab has passed IDMT legislation and transfer has occurred in several distributaries and minors in the province. If the officials of the Government of Sindh are unwilling to set precedents, then they have a perfectly acceptable alternative in the Punjab legislation which they can amend to suit local conditions.

The Government of Sindh would therefore be well advised to either pass their own legislation which has been ready for several months and requires only one further signature, or straightaway adopt the basic elements of the Punjab legislation.
9.2 Formal Recognition of the Farmer Organization Council (FOC)

The establishment of the FOC has come from the belief of FOs that they need a federated structure at the AWB level. Tacit acceptance of this has been given insofar as the FOC Chairman has already been permitted as observer on the AWB and the Project Steering Committee. However, the FOC has no legal standing.

**Recommendation 2**

The Farmer Organization Council be recognized as an integral part of the IDMT process, allowed to participate as a full member of the AWB, to be represented on the SIDA Board, and to have representation on the Steering Committee of any Project that may be established in future dealing with IDMT activities. Where necessary, existing legislation or regulations should be modified to accommodate the FOC as a legitimate representative of FOs.

There seems little doubt that in all provinces there will be establishment of federated FOCs at AWB level. The rapid establishment of such an organization in the Nara Canal AWB indicates the importance that FO members place on it. It is therefore felt that rather than pretend for administrative or procedural reasons that this organization does not exist, it be accommodated as soon as possible into the legal structure of SIDA.

9.3 Changes to the SIDA Structure

The experience of the project indicates that there are some ways in which the overall SIDA structure could be strengthened to bring benefits both to SIDA and to FOs.

**Recommendation 3**

The representation of FOs on the AWB Boards and the SIDA board be increased from their currently low level to one that is similar to their counterparts in Punjab PIDA Board and AWBs.

The current allocation of representatives of FOs at AWB level does not give them sufficient voice in decision-making, nor does it allow FOs to represent the geographical element of their membership. In Punjab FOs are given approximately equal representation at AWB, and this philosophy should be adopted in SIDA as well.

9.4 Notifying Standard By-laws for FOs

**Recommendation 4**

For the sake of simplicity and to speed up the organization process, the by-laws for FOs and their constituent WCAs should be made uniform.

It is unsatisfactory to have different by-laws for organizations that have the same function and purpose, and has the potential to lead to confusion and misunderstanding. If the basic by-laws
are made uniform it does not prevent FOs from adopting special regulations to deal with local
issues, but those which affect relationships with SIDA and AWB should be the same for all.

9.5 The Organizational Process

Recommendation 5

The organizational process developed and tested by IWMI should with minor changes, be
adopted as the standard approach to organization of water users at watercourse and
distributary/minor level.

The establishment of water user organizations for the purpose of transfer of irrigation and
drainage operation and maintenance activities is not a short-term or stopgap activity. Rather, it
represents the first change to a new way of managing water resources for irrigated agriculture.

Organizational efforts that are too quick and too superficial rarely last for a long time, with the
result that the overall objectives associated with the organizational effort are greatly diminished.

While the IWMI approach in the first phase of the project was slow, this was a deliberate
strategy to modify and refine the organizational process itself. The second phase has shown
that with committed and tireless staff the process can be greatly speeded up. In any
continuation of the organizational process it can be speeded up further so that over time there
will be a large number of strong organizations. The exact pace of organization is of secondary
importance to the development of strong and sustainable organizations.

Recommendation 6

Organization of Distributaries and Minors should be concentrated geographically so that
transfer occurs in contiguous areas.

The present approach of spreading organizational efforts over a wide geographical area has
three distinct disadvantages.

Firstly it spreads the organizational teams over too wide an area, diminishing their capacity to
organize more canals. If less time were spent on travel and more on organizing the progress of
organization would be speeded up.

Secondly, organization all of the canals in a single area at the same time provides potential
synergies where organized water users can assist in the process of getting neighboring canals
to join in the process. This has happened to a limited extent in Dighri and is a trend that can be
exploited to good advantage.

Thirdly, by having all canals along a single reach of main or branch canal organized in unison
gives a better test of the developing relationships between AWB staff and the organized water
users. It will be easier to arrange for all canals to have similar water supply conditions, to
monitor progress and to strengthen the linkages that must inevitably occur.
**Recommendation 7**

Experienced organizers should be used to help train up other organizers, whether they be under the auspices of SIDA, On-Farm Water Management, or NGOs.

It is important, as far as possible, to have a similar philosophy when organizing different canals. It will weaken the program if water users from different canals have different perspectives on their objectives, tasks, responsibilities and commitments. By utilizing people who have already been involved in the success of the pilot project as trainers of the next cadre of organizers it will be possible to maintain these successes into the future.

**Recommendation 8**

The organizational efforts should be treated as a priority crash program so that there is as little disadvantage as possible to FOs in areas which will be among the last to be organized.

Inevitably there will be a period when some areas are fully organized and are obtaining significant benefits from IDMT, while others remain unorganized and cannot take full responsibility for operation and maintenance. Arranging organization as a crash program, but without compromising the need to build strong, viable organizations, should be a priority of the Government of Sindh.

**9.6 Support for AWB/SID Actiavities**

Elsewhere in this report the view has been expressed that there has been insufficient attention paid to the support that should be given to the AWBs in particular and SIDA in general so that they have a clearer understanding of their future role and a better capacity to carry it out.

**Recommendation 9**

AWBs be given additional resources to establish internal capacity to provide a centralized resource for organizational activities that will include a cell capable of arranging training and workshops for FOs and AWB staff.

Current arrangements for the AWB do not make any efforts to assist the AWB in dealing with its tasks, particularly in the interaction with the different FOs in their command area.

There needs to be capacity to coordinate, assist, and monitor the organization activities along the lines of the special cell proposed in the Punjab pilot area. This does not mean the AWB needs to do the organizing itself, but it has to keep track of the activities of different organization efforts, provide training facilities and materials, and offer whatever technical and institutional support is required. At present no such capacity exists with the AWB/SIDA structure and there is no way that AWBs can effectively monitor the progress of organization.

A proposal should therefore be developed that assesses the monitoring and evaluation needs of the AWBs and determines the technical resources, capital equipment and other resources that will be required.
Recommendation 10

AWBs be given additional resources to establish internal capacity to conduct monitoring and evaluation activities, with the establishment of a specific cell for this purpose that would include FO participation.

The AWB needs to be able to monitor and evaluate various performance criteria associated with the IDMT transfer program. To do this it will inevitably need additional resources to establish a viable monitoring and evaluation cell, and where feasible use new and up-to-date technology to do this.

A proposal should therefore be developed that assesses the monitoring and evaluation needs of the AWBs and determines the technical resources, capital equipment and other resources that will be required.

The cell should make provision for participation of FO members because there will need to be clear agreement between AWBs and FOs about what performance criteria are to be adopted, how they will be measured, and what steps should be taken if performance levels do not meet the expected levels.

9.7 Crash Program in Re-Establishing Water Measurement Capacity

A critical element of the IDMT process is that there is a capacity for mutually verifiable discharge measurement at the point of transfer of water from AWB to FO. If this does not exist there will inevitable be squabbles over the terms of service of water delivery that will undermine the entire process.

Recommendation 11

A crash program be developed that re-establishes discharge measurement capacity at the point of transfer of water between AWBs and FOs

At present there is only very limited capacity to measure discharge at the head of distributaries where FOs will take over operation and maintenance responsibilities. It is not appropriate at this juncture to determine why this situation has arisen, merely to acknowledge it exists and something needs to be done to rectify it.

The pilot project showed that it was possible to establish suitable gauges at or close to distributary head regulators, and that because the FOs had been convinced that this information was useful to them the gauges were not damaged, removed or defaced.

A proposal should be developed that determines the technical requirements to re-establish this measurement capacity, and install such gauges prior to the signing of IDMT agreements with the FO.

9.8 Policy Review of Water Allocations

The project experience is that water allocations to canal commands and distributaries below Sukkur Barrage have not been reviewed since they were brought into force in 1932. Since that
time additional storage has been constructed that has changed overall water availability throughout the Indus Basin and link canals have been constructed to divert water in different ways. The reassessment of design discharge is therefore required anyway, and the FO program provides a suitable reason for addressing this issue immediately.

**Recommendation 12**

A policy review be held that reassesses water availability at the main barrages in Sindh and determines revised water allocations for all canal commands, and for their constituent distributaries and minors.

9.9 Drainage Issues

The project experience is that far more attention has been paid to issues relating to irrigation management and revenue collection than to drainage issues. There appear to be several outstanding matters that have not been fully resolved and which will need to be fully addressed before the end of the current phase of the LBOD Project.

**Recommendation 13**

A full review of current policies and plans for transfer of drainage management be held so that a revised set of policies concerning the rights and responsibilities of both SIDA and FOs be established.

9.10 Policy Regarding Water and Drainage Charges

**Recommendation 14**

A research project should be commissioned to evaluate the opportunity for the provision of flat-rate billing for both irrigation and drainage charges.

The current procedures for assessing water charges are archaic, cumbersome and largely irrelevant to the issue of saving water at farm level. It would in principle be considerably easier for FOs to assess and collect water charges if they were on some form of flat-rate basis. As long as the rate was properly set there would be no loss of income for SIDA and water users would have to spend a great deal less time following the current procedures.

9.11 Proposal for an Appeals Procedure

The present institutional set-up places the AWBs and SIDA in an awkward position. They are responsible for both regulation and implementation. Thus, for example, they determine design discharges and they have the operational responsibility to ensure that these design discharges are achieved at the head regulator of each FO. It is difficult under these conditions to be
impartial in the event that there are complaints over water deliveries, or indeed any matter where there is mandated interaction between AWBs and FOs.

**Recommendation 15**

A person should be appointed as a mediator to resolve disputes between AWB and FO so that both sides will be able to feel there is an unbiased and neutral arbiter available to them when required.

The IDMT agreements specify certain conditions about water, fee payments and other matters where there is an exchange between AWBs and FOs. If a neutral person is available to decide the merits of complainants it will help avoid the current potential conflict of interest facing AWB staff, who currently have to be both jury and judge in such disputes.

The person would need to be able to understand the technical, legal and financial issues involved but should be accepted as a neutral person of good faith and good standing by both AWBs and the FOC.
REFERENCES


ANNEXES
DRAFT

IRRIGATION AND DRAINAGE MANAGEMENT TRANSFER (IDMT) AGREEMENT MADE ON ___ 2000 BETWEEN CANAL AREA WATER BOARD(AWB)/SINDH IRRIGATION AND DRAINAGE AUTHORITY (SIDA) WHICH INCLUDES ITS SUCCESSORS IN OFFICE, AND ADMINISTRATORS ACTING THROUGH _____ AND THE FARMERS ORGANIZATION (FO) WHICH INCLUDES ITS SUCCESSORS IN OFFICE, AND ADMINISTRATORS _________ DISTRIBUTARY/MINOR /LIFT CHANNELS THROUGH ________

Whereas, the SIDA Act 1997, Sindh Irrigation and Drainage Authority Rules, 1999 and Sindh Irrigation and Drainage Authority (Pilot Farmer Organization) Regulations 1999 framed thereon envisage the transfer of irrigation and drainage management to the Farmers Organization at the distributary/minor lift channel level.

Whereas, the said Rules and regulations provide for the transfer of management to the Farmers Organizations under a scheme enabling these Farmers Organizations to become financially self sustainable within manageable period as early as possible but not later than seven years;

Whereas, a Farmers Organization has been formed and registered with Registrar, SIDA at _________ Distributary/Minor/lift Channel off-taking from _________ sub-canal of _________ canal and its Management Committee has been elected under the said rules and regulations;

Whereas, the said Management Committee of the said Farmers Organization and the AWB/SIDA have decided to enter into an Agreement under which the management of the said Distributary/Minor/Lift Channel and Drainage System will be transferred to the Farmers Organization through its Management Committee.

NOW THEREFORE, in pursuance thereof, the parties agree as under:

1. This Agreement shall be called Transfer of Irrigation and Drainage Management Agreement, hereinafter referred to as the Agreement. For all purposes the Farmers Organization shall be identified as "FO" and the Area Water Board as "AWB", and Sindh Irrigation and Drainage Authority as "SIDA".

2. This Agreement shall be valid for a period (20) years and may be revised every year, with effect from the date of handing over the distributary/minor/lift channel/drainage and its management; provided that the agreement may be terminated earlier than or extended beyond the said period of twenty (20) years by the consent of the parties.

3. From the operative date, the possession of the distributary/minor/lift irrigation channel/drainage infrastructure system along with other properties of the AWB/SIDA as given in the inventory (Annex-1) mutually prepared by the parties, shall be handed over to the FO. In case any property transferred to FO is under illegal occupation by a third party, joint efforts will be made to get it vacated.

4. From the operative date, the AWB/SIDA shall provide the copies of all official record related to distributary/minor/lift channel and drainage infrastructure.

5. The FO shall perform its duties and functions according to the said rules, regulations and byelaws and instructions given from time to time by the AWB/SIDA.

6. (a) Subject to para 5 above the FO shall look after and use the distributary/minor/lift channel and drainage infrastructure and other properties handed-over to it as a reasonable prudent person looks after, maintain and use his own property/interest.

(b) The FO shall not sell or transfer such property. The property may, however, be leased out on suitable conditions.
7. The FO shall employ necessary staff and the salary and allowances of such staff and other expenses shall be borne by the FO.

8. (a) The FO shall assess and collect the abiyana, drainae cess, charges from non-agriculture uses and lease/rent of the land buildings.
(b) The FO shall pay sixty percent (60%) of the assessed abiyana, drainae cess, charges of non-agriculture use and lease/rent for Kharif season in the month of January/February and for Rabi season in the month of July/August to the AWB/SIDA.
(c) The electricity charges of lift channel/saline tubewells will be paid by the AWB/SIDA. Adjustment to this sum will be made each year.
(d) The rates of the abiyana, drainage cess, non-agriculture use and lease/rent may be recommended by the FO and AWB/SIDA before the commencement of each year to the Government.

9. The AWB/SIDA shall provide the assured supply of not less than design discharge of water at the Head Regulator of the distributary/lift channel. In case of excess discharge available in the parent canal, it shall be made available to FOs proportionately.

10. Subject to the availability the FO shall equitable distribute the water to the water users as per their share. Abiyana shall be subject to the following conditions.

11. The supply of water to the distributary/minor lift channel shall be closed for annual canal closure period or as the AWB/SIDA decides for maintenance of the main canal system. The AWB/SIDA shall inform the FO of the precise dates of the closure at least two weeks before water supplies are cut off.

12. If due to unavoidable circumstances there is a shortage of water at the barrage, canal breaches, their repairs, alternation or additions, the AWB/SIDA shall not be liable to provide the assured supplies. It will however attempt to provide as much water supplies to the FO as possible. If water supplies to the FO are reduced under avoidable circumstances. The AWB/SIDA shall, however, award compensation to the FO as mutually determined.

13. When under unavoidable circumstances discharge in the canal is less, the AWB/SIDA shall supply water in rotation to serve the legitimate demands of the water users on different distributaries and minors. For the purpose the AWB/SIDA shall:
   a) obtain the consent of the FO while making rotation schedule;
   b) assure that rotation schedule is formulated in such a way that rotation is allocated proportionally to the different distributaries; and
   c) provide to the FO with a detailed plan and time table for the rotational period, indicating any possible changes in the discharge of water.

14. The AWB/SIDA shall install measuring gauges at upstream and downstream of regulator along gate openings, and calibrate the same before transfer occurs. The parties shall certify that the gauges are properly calibrated. The AWB/SIDA and FO shall monitor the gauges to measure the discharges delivered at the head regulator.

15. The AWB/SIDA and the FO monitor the ground water-table and maintain it at the designed level suitable for crops where drainage facilities are available.

16. If there occurs heavy losses due to natural calamities like heavy rains, drought etc. the AWB/SIDA may given remission in abiyana, drainage cess, non-agriculture use charges and lease/rent. The damage caused to the system due to that reason will jointly be repaired.

17. The AWB/SIDA shall suspend/stop the supplies of water and other services to the FO, in case of non payment of abiyana, drainage cess, non-agriculture use charges and lease/rent after prior notice, but not before the commencement of next season. Similarly the FO can suspend/stop the water and other services to water users in case of non-payment of abiyana, drainage cess, non-agriculture use charges and lease/rent of water after prior notice, but not before the commencement of next season.
18. The AWS/SIDA shall from time to time provide technical guidance at the request of the FO. In case of higher discharges in the canal caused by heavy rains, the AWS/SIDA with the consent of the FO shall allow more discharge to the distributary/minor up to safe limits to save the canal.

19. The FO will constitute the drainage committee(s) which shall be responsible for the operation and maintenance of drians up to 15 cusecs, security of sump houses/tubewells and maintenance the disposal channels.

20. All disputes relating to this Agreement shall be resolved without recourse to the courts. The said disputes shall be resolved in accordance with the said rules and regulations. Any dispute falling beyond the ambit of the Rules and Regulations shall be referred for Arbitration to the Secretary, Irrigation and Power Department, Government of Sindh whose decision shall be final and binding on the parties.

21. All communications between the parties shall be addressed to the following representatives:

AWB/SIDA: 
__________________________________________
__________________________________________

FO: President/Secretary Farmers Organizations
__________________________________________
__________________________________________

IN WITNESS WHEREOF the parties hereto have signed this Agreement at ______ on ___ day ______

Authorized by AWB/SIDA
Farmers Organization
Chairman, (Name) __________________
(2) __________________
Secretary (Name) __________
(3) __________________
Treasurer,(Name) __________
(4) __________________
Member Management Committee, (Name)_______
(5) __________________
Member Management Committee, (Name)_______
(6) __________________
Member Management Committee, (Name)_______
(7) Member Management Committee, (Name)_______
# INVENTORY PROFORMA OF SECONDARY CHANNEL

Inventory list of ___________ Distributary/Minor Ex ___________ Branch Canal/Main Canal ___________ Main Canal, Sub Division ___________ Division ___________

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## Action Plan for Farmers Organization (FO) to Operate and Maintain Irrigation and Drainage System

It is assumed that the Irrigation Management Transfer (IMT) will take place during the month of March 2000.

<table>
<thead>
<tr>
<th>S#</th>
<th>Action</th>
<th>How to Do</th>
<th>When to Do</th>
<th>Who Will Do</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acquire legal status (Registration of FOs)</td>
<td>Apply for registration to SIDA</td>
<td>January/February 2000</td>
<td>FOs¹, with T.S² by IIMI</td>
<td>Legal empowerment of the FOs</td>
</tr>
<tr>
<td>2</td>
<td>Obtain needed data from AWB about distributaries/drainage</td>
<td>Personal visits to various Offices of IPD &amp; Revenue</td>
<td>To start from first week of April 2000</td>
<td>FOs with T.S by IIMI</td>
<td>Relevant data available with the FO</td>
</tr>
<tr>
<td>3</td>
<td>FO Sub-committees for preparation of draft agreement of Irrigation Management Transfer</td>
<td>Constitution of Sub-committee with consensus among FO management committee members/ general body members</td>
<td>January/February 2000</td>
<td>FOs</td>
<td>Responsibility shared by different members, organizational structures within FO available for appropriate decision making</td>
</tr>
<tr>
<td>4</td>
<td>Prepare and negotiate draft agreement on Irrigation Management Transfer</td>
<td>Discussion between Management Committee &amp; General body by Sub-committees as well as with AWBs.</td>
<td>February 2000</td>
<td>FO, with T.S by IIMI</td>
<td>Transfer of management responsibilities for operation and maintenance of pilot distributaries/minors</td>
</tr>
<tr>
<td>5</td>
<td>Staff arrangement for FO as agreed in the management transfer document</td>
<td>By proper advertisement, personal contacts, interviewing and then selection of candidates</td>
<td>April, May 2000</td>
<td>FO, with T.S by IIMI</td>
<td>Appropriate staff available, and recruited</td>
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### Capacity Building

<table>
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<tr>
<th>S#</th>
<th>Action</th>
<th>How to Do</th>
<th>When to Do</th>
<th>Who Will Do</th>
<th>Expected Outcome</th>
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<tbody>
<tr>
<td>6</td>
<td>Training courses on organizational management and technical know how:</td>
<td>Participation in training, seminars, workshops, meetings, discussions, walk-thru survey etc.</td>
<td>April 1999</td>
<td>FO, with T.S by IIMI</td>
<td>Enhanced capacity of FO members and staff. Trained manpower, gradual improvement in organization/ management, improved record and book keeping</td>
</tr>
<tr>
<td></td>
<td>✓ FO/WCA bylaws</td>
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<td>Continue</td>
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<td></td>
<td>✓ Record keeping</td>
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<td>✓ Accounting procedures (finance)</td>
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<td>✓ Discharge measurements (system management)</td>
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<td>✓ Institutional reforms awareness</td>
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<td>✓ Advises on agricultural production practices</td>
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<td></td>
<td>✓ Maintenance of distributaries/minors (system management)</td>
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<td></td>
<td>✓ Ground water measurement (system management)</td>
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<td>7</td>
<td>Training on assessment and collection of abiyana</td>
<td>Participation in training,</td>
<td>March – April 2000</td>
<td>FO, with T.S by IIMI &amp; AWB</td>
<td>Trained manpower in the field of assessment and collection of abiyana.</td>
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¹ Members of Farmer Organization (FO), Members of Sub-Committee of FO and Employee of FO
² Technical Support
<table>
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<tr>
<th>No.</th>
<th>Task Description</th>
<th>Budget Year</th>
<th>Implementing Body</th>
<th>Resource Analysis</th>
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<tr>
<td>8</td>
<td>Decision making through FO general body/ and management committee meetings</td>
<td>May 1999 – Continue</td>
<td>FO</td>
<td>Better decision making</td>
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<tr>
<td>9</td>
<td>Assess the basic costs for management of the system for one year</td>
<td>April-May 2000</td>
<td>FO, with T.S. by IIMI</td>
<td>Understanding the costs needed for functioning of the organization, approval of the budget for the first year.</td>
</tr>
<tr>
<td>10</td>
<td>Estimation of possible income &amp; resource mobilization capacity</td>
<td>July-August 2000</td>
<td>FO, with T.S. by IIMI</td>
<td>Availability of needed funds with FO</td>
</tr>
<tr>
<td>11</td>
<td>Conduct hydraulic and physical surveys</td>
<td>January 2000 continue</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Identification of maintenance problems and causes</td>
</tr>
<tr>
<td>12</td>
<td>Assessment of equity within the distributaries</td>
<td>March 2000</td>
<td>FOs with T.S. from IIMI and AWB</td>
<td>Availability of information to improve equity</td>
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<tr>
<td>13</td>
<td>Discussions on the redesigning outlets and information to the AWB</td>
<td>April 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Equitable water distribution, less conflict,</td>
</tr>
<tr>
<td>14</td>
<td>Redesign of outlets</td>
<td>January 2001 (during canal closure)</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Equitable water distribution</td>
</tr>
<tr>
<td>15</td>
<td>Rectification of outlets</td>
<td>April-May 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Move towards equity</td>
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<tr>
<td>16</td>
<td>Align distributary (i) removal of silt (ii) maintenance of IP &amp; NIP (iii) removal of grass, shrubs and bushes, etc (iii) tightening of widened cross sections</td>
<td>May 2000 Continue</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Equitable water distribution, less silt deposition, maintenance at reasonable cost</td>
</tr>
<tr>
<td>17</td>
<td>Monitoring of the performance of the system with regard to equity</td>
<td>April-May 2000</td>
<td>AWB and FO with T.S. by IIMI</td>
<td>Knowledge about the proper water flow and distribution.</td>
</tr>
<tr>
<td>18</td>
<td>Calibrate and develop rating curves at head &amp; cross regulators and outlet structures</td>
<td>May 2000 Continue</td>
<td>AWB and FO with T.S. by IIMI</td>
<td>Knowledge available about water delivery and water distribution</td>
</tr>
<tr>
<td>19</td>
<td>Monitor and record head and cross regulators and outlet structures</td>
<td>June 2000 Continue</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Information of water discharge, knowledge of discrepancy if any.</td>
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<tr>
<td>20</td>
<td>Disseminate monitoring record for members</td>
<td>June 2000 Continue</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Members understand the water flow in the system.</td>
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<td>21</td>
<td>Measure seepage losses</td>
<td>June-July 2000</td>
<td>IIMI, AWB &amp; FO</td>
<td>Knowledge about water losses</td>
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<td>22</td>
<td>Notify irrigation scheduling, water shortage etc.</td>
<td>June 2000</td>
<td>FO with T.S. by IIMI</td>
<td>Adequacy, and reliability of water is ensured</td>
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<td>23</td>
<td>Assess water demand</td>
<td>September 2000</td>
<td>FO with T.S. by IIMI</td>
<td>Adequacy, and reliability of water is ensured</td>
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<td>Details</td>
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<td>24</td>
<td>Conduct physical survey of drainage system</td>
<td>Walk along the drains, check condition of sump houses and tubewells</td>
<td>September 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
</tr>
<tr>
<td>25</td>
<td>Monitor water table depth in the command area of three pilot distributaries</td>
<td>Using piezometers</td>
<td>May 1999</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
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<tr>
<td>26</td>
<td>Monitor performance of tubewells, sump houses of three pilot distributaries</td>
<td>Inspecting the sites</td>
<td>May 1999</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
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<td>27</td>
<td>Record monitoring parameters and display for members</td>
<td>Daily record keeping and observations taken</td>
<td>October 2000</td>
<td>FO, with T.S. by AWB</td>
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<tr>
<td>28</td>
<td>Install Gauges on surface drains at three pilot distributaries command area</td>
<td>Observing bed elevation of the distributaries/minors</td>
<td>April 2000</td>
<td>IIMI with FO</td>
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<tr>
<td>29</td>
<td>Monitor water quality in surface drains, tubewells and sump houses at three pilot distributaries command area</td>
<td>Taking water samples and laboratory tested</td>
<td>May 1999</td>
<td>IIMI, FO, &amp; AWB</td>
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**Assessment of Abiyana and Drainage Cess**

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<th>Date</th>
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<th>Notes</th>
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<tr>
<td>30</td>
<td>Collect information: area map, share lists, assessment figures of last few years.</td>
<td>Visiting concerned offices of IPD and Revenue</td>
<td>May 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Information available</td>
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<td>31</td>
<td>Amend the share lists</td>
<td>Field survey</td>
<td>July-August 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Proper maintenance of share lists</td>
</tr>
<tr>
<td>32</td>
<td>Modify Deh maps (culturable and unculturable lands)</td>
<td>Field survey and consultation with Revenue/ Barrage officials</td>
<td>July-August 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Proper record for assessment of abiyana</td>
</tr>
<tr>
<td>33</td>
<td>Assess the crops and properly maintain the record.</td>
<td>Field survey through field book and use computer for data sheet</td>
<td>July-August 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Assessment record available</td>
</tr>
<tr>
<td>34</td>
<td>Verify crop assessment</td>
<td>Field survey randomly block-wise</td>
<td>September 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
<td>Minimize the errors and proper assessment ensured</td>
</tr>
<tr>
<td>35</td>
<td>Reconcile assessment with other department(s)</td>
<td>Exchange the data with Revenue Department &amp; AWB</td>
<td>December 2000</td>
<td>FO, with T.S. by AWB</td>
<td>Proper assessment ensured</td>
</tr>
<tr>
<td>36</td>
<td>Disseminate assessment information for farmers’ knowledge</td>
<td>Notice boards, presentation in meetings</td>
<td>December, 2000</td>
<td>FO, with T.S. by AWB</td>
<td>Information shared</td>
</tr>
<tr>
<td>37</td>
<td>Assess drainage cess and record maintain.</td>
<td>Field survey and assess drainage beneficiaries.</td>
<td>December, 2000</td>
<td>FO</td>
<td>Fund collection for operation and maintenance of drainage system</td>
</tr>
</tbody>
</table>

**Collection of Abiyana and Drainage Cess**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
<th>Details</th>
<th>Date</th>
<th>Responsible</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Calculate the abiyana and drainage cess and prepare bills.</td>
<td>Through computer computation process</td>
<td>December, 2000 - January, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Bills prepared</td>
</tr>
<tr>
<td>39</td>
<td>Impose the surcharge for late payment</td>
<td>Consensus of the members in their meetings</td>
<td>February, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Ensure the water users pay the bills on time.</td>
</tr>
<tr>
<td>No.</td>
<td>Task Description</td>
<td>Responsible Parties</td>
<td>Date(s)</td>
<td>Remarks</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>40</td>
<td>Bill for individuals signed, verified and issued.</td>
<td>Prescribed bill proforma prepared by concerned FO official and send to individuals.</td>
<td>January, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Bills issued for payment</td>
</tr>
<tr>
<td>41</td>
<td>Deposit bills in bank</td>
<td>Individuals will be motivated to deposit bills in the account of FO in bank</td>
<td>January, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Payment of bills are directly deposited in the bank account</td>
</tr>
<tr>
<td>42</td>
<td>Receive and verify bank statement</td>
<td>Collection bank statement from bank</td>
<td>February, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Ensure payment received</td>
</tr>
<tr>
<td>43</td>
<td>Report progress of abiyana collection to FO general body.</td>
<td>Statement prepared and presented</td>
<td>March, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Information dissemination</td>
</tr>
<tr>
<td>44</td>
<td>Payment to AWB</td>
<td>Portion of the agreed water charges</td>
<td>March, 2001</td>
<td>FO, with T.S. by AWB</td>
<td>Clear liability of payment</td>
</tr>
</tbody>
</table>

**Financial Management**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
<th>Responsible Parties</th>
<th>Date(s)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>Raise equipment procurement fund</td>
<td>Discussion in general body of FO.</td>
<td>January, 2001</td>
<td>FO, with T.S. by AWB</td>
</tr>
<tr>
<td>46</td>
<td>Prepare annual budget</td>
<td>Implement preliminary business plan and revise business plan</td>
<td>June, 2001</td>
<td>FO, with T.S. by AWB</td>
</tr>
<tr>
<td>47</td>
<td>Conduct annual audit of accounts</td>
<td>Through Chartered Accountants</td>
<td>August-September, 2001</td>
<td>FO, with T.S. by AWB</td>
</tr>
<tr>
<td>48</td>
<td>Present annual audit in the general body of FO.</td>
<td>Presentation of audit report</td>
<td>September, 2001</td>
<td>FO, with T.S. by AWB</td>
</tr>
<tr>
<td>49</td>
<td>Submit audit report</td>
<td>Present audit report and observations to AWB</td>
<td>November, 2001</td>
<td>FO, with T.S. by AWB</td>
</tr>
<tr>
<td>50</td>
<td>Queries from AWB</td>
<td>Seek information on audit report</td>
<td>December, 2001</td>
<td>AWB</td>
</tr>
<tr>
<td>51</td>
<td>Response of FO to AWB on audit report</td>
<td>Send information on the queries on audit report</td>
<td>January, 2002</td>
<td>FO</td>
</tr>
</tbody>
</table>

**Conflict Resolution**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
<th>Responsible Parties</th>
<th>Date(s)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>Constitute Nehri Panchayat Committee for conflict resolution</td>
<td>Selection of respectable and honest members by consensus</td>
<td>May 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
</tr>
</tbody>
</table>

**Other Supporting Activities**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
<th>Responsible Parties</th>
<th>Date(s)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>Arrange collaborative activities</td>
<td>Establish contacts between FO and other organizations.</td>
<td>May 1999 Continue</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
</tr>
<tr>
<td>54</td>
<td>Introduce practices to improve irrigation efficiency</td>
<td>Training and demonstration</td>
<td>July 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
</tr>
<tr>
<td>55</td>
<td>Conduct tree plantation program</td>
<td>Survey of the area</td>
<td>April 2000</td>
<td>FO, with T.S. by IIMI &amp; AWB</td>
</tr>
</tbody>
</table>
Registration Criteria for FO registration

- Minimum 67% membership should be covered at watercourse level subject to covering minimum 67% command area of watercourse.

- Minimum 67% watercourses should be covered subject to the covering of minimum 67% of command area of the distributary.

- FO should have formed according to the SIDA (Pilot Farmer Organization) Regulations, 1999 notified by SIDA on 5 January 2000.

- Application for registration to the registrar SIDA by the chairman of FO, should go through Director, AWB/SIDA with the following documents:
  - Names of management committee members including their ID cards
  - Minutes of the selection process of FO
  - Proof of bank account
  - Proof of FO membership fee received from WCAs
  - Membership fee may be fixed Rs.100/- from each member at the watercourse level. Whereas each watercourse would pay Rs.1000/- to FO. This should be provisional and may be revised when deem fit.
  - Proof of joint signatories of bank account.

- All documents be attested by the chairman FO or at least B-17 officer.

- Record maintained by FO, can be verified by the officials of the AWB/SIDA or registrar SIDA which include:
  - Minutes Book
  - Cash Book
  - Receipt Book
  - Membership register
  - Visitor book (if any) and Membership form

- Establishment of FO office at some common place accessible to all members
Specimen Certificate of Registration

CERTIFICATE OF REGISTRATION

No. NC/FO-3

Certified that Farmers Organization __ Bareji ______
Distributary/Minor, Mirpurkhas _______ District of taking
from Jamrao _______ Canal with its office (address) _______
Council, Balochabad ____________

has been registered as a Farmers Organization (FO) under the Sindh Irrigation &
Drainage Authority (SIDA) Act 1997.

Given under my hand and seal this 25th day of Jan 2000.

Registrar
Sindh Irrigation & Drainage Authority.

WAPDA Offices, Hussainabad,
Hyderabad, Sindh, Pakistan.
By-laws of Farmer Organizations

In pursuance of Section 26-A of Sindh Irrigation Drainage Authority (SIDA) Act, 1997 and Farmers Organization (FO) Regulations 1999 notified vide No. MD/SIDA/NDP Rules 19/2000 dated 05 January 20000, the Organization named Farmers Organization of ____________ Distributary/Minor with jurisdiction of command area of ____________Distributary/Minor off taking from _______________Canal/Sub-Canal with its registered office at ____________adopts following bylaws for carrying out its activities in its jurisdiction.

1. Establishment, Status and Area of Jurisdiction of Farmers Organizations.

I. Farmer Organizations (FOs) established pursuant to Section 26 of the Act and to the provisions of the regulations these shall be bodies corporate, having perpetual succession and common seal, with powers, subject to the provisions of the regulations, to hold property both moveable and immovable, and may by the said name sue and be sued.

II. The Farmers Organization may be formed at a Distributary Minor Level: Provided that in special cases, a FO may be formed on a part of a distributary.

III. To facilitate the management of the watercourses or of other surface or underground water sources or drainage facilitates, Watercourse Associations (WCAs) may be established on each watercourse command area or joint watercourses.

IV. No FO shall be established at the level of Distributary or Minor canal without the prior establishment of WCAs on at least 67% of the watercourses subject to cover the command area of that FO.

V. FO established pursuant to the act and the provisions of the regulations shall be registered with the Registrar of Authority on the recommendation of concerned AWB/SIDA.

VI. FO may, on decision of their members, form sub-Farmer Organizations, associations, federations other associative forms of organizations on a part of distributary, canal, sub-minor for management of shared irrigation, drainage or other water related infrastructure and such associations or federations shall enjoy the status and exercise the powers of FOs as prescribed in act and regulations.

VII. The area of jurisdiction of a WCA, FO or association/federation thereof shall be constituted by the area commanded by the irrigation system at that respective level, together with the drainage catchment area hydraulically associated with that level of the irrigation system.

2. Functions and Powers of FOs

Pursuant to the provisions of sections 26C of the act and of these regulations and depending on the nature of the irrigation and drainage or other system (s) of water management in its area of jurisdiction, FO shall:

(a) operate, manage, maintain and improve the infrastructure of that system within the terms and conditions of Irrigation and Drainage Management Transfer (IDMT) agreement.

(b) Establish contracts for supply of irrigation water or disposal of drainage effluent;

(c) In the case of an FO, distribute its authorized allocation of water to its members in accordance with agreed schedules and with the allocation determined in its agreement for each off-taking structure in the hydraulic system of its area of jurisdiction;

(d) Receive drainage effluent from its members and convey this to nodal points designated by the AWB within whose jurisdiction it is located;

(e) Determine the basis of assessment of and the rates applicable for irrigation, drainage or other service charges to be levied on its members and the modalities of payment, and collect such charges;
(f) Determine as required the contribution of its members (in cash or in kind) to maintenance or development works, or to share capital, special funds or other levies, and organize or collect such contributions;

(g) Agree with the AWB or other supplier the basis for assessment of and the rates applicable for the supply of irrigation, drainage or other services to that FO and remit the due amount to the AWB/Supplier;

(h) Impose surcharges on its members for late/non-repayment of charges or dues, and recover arrears from defaulters as arrears of land revenue under the West Pakistan Land Revenue (Sindh Amendment) Act, 1974

Provided that the surcharge shall be fixed by the FO at a level no lower than the current overdraft rate prevailing in the commercial banking sector.

Provided further that where any member of an FO incurs a financial obligation to his FO and fails fully to acquit that obligation within a period of three months from the date at which that obligation becomes overdue, and notwithstanding any proceedings in course under the West Pakistan Land Revenue (Sindh Amendment) Act, 1974, for recovery of such sums, the FO may, in accordance with the provisions of these bylaws, issue to that defaulting member a written notice of its intention to suspend irrigation or other services to the defaulter with effect from the commencement of following cropping season, and where such sums remain outstanding on expiry of the prescribed period, shall so proceed.

(i) Manage and utilize its financial resources in accordance with provision of the Act and regulations of FO, and with such rules or regulations as may be issued by the competent authorities;

(j) Enter into all contracts as required for the conduct of its operations;

(k) Seek to resolve dispute arising among its members in relation to the management of irrigation and drainage in its area of jurisdiction, and to this end establish water committee;

(l) Employ such personnel as required for its operations on such conditions as it deems fit;

(m) Form sections, as it deems necessary, for management of irrigation and drainage operations;

(n) Promote new irrigation technologies and all such other activities as may promote the development of agriculture in its area of jurisdiction;

(o) Training program for its office-bearers, members and employees

3. Membership

I. The membership of a WCA shall be comprised of all persons with a formal or customary title to usage of land in the area of jurisdiction of that WCA to which is attached title to use water from that watercourse duly and correctly registered with the competent authority.

II. No person shall be excluded from membership of a WCA on grounds of creed, social group, occupation or gender.

III. The FO shall comprise members equal to number of watercourses in the area constituting the FO and the from each watercourse Association shall elect one such member from amongst the office bearers of WCA.

IV. The minimum age requirement for the members is 18 years as per regulations.

V. In case of association or federation of FOs established at a higher level of the canal system, its membership shall be comprised of those lower level FOs in its area of jurisdiction of canal.
VI. Each member at WCA level will pay Rs. 100 as a membership fee in the account of Chairman of WCA.

VII. Each WCA will pay Rs. 1000 as a membership fee to the FO.

4. General Body of FO

I. The highest authority of a FO shall be the general body.

II. The general body of the WCA comprise all the members at watercourse level, who have a legal water right on that watercourse.

III. The general body of the FO comprises of the members of the FO mentioned in sub-clause (III) of clause (3).

IV. The general body of association or federation/ council of FOs thereof shall be composed of the representatives elected by the general body of its constituent members.

V. The general body shall meet at least twice a year, or more often as prescribed in the by-laws. A quorum shall be constituted by at least half of the number of individual members. Where a such quorum is not attained, a further general body meeting shall be convoked within the following seven days, whose decisions shall be valid whatever the number of members/representatives in attendance.

VI. Where as the decisions in the general body can't be taken by consensus, simple majority voting shall prevail. Each member/representative shall have one vote.

VII. Where a simple majority of the members/representatives or at least forty thereof (whichever shall be the lesser) so request in writing, the chairman of the FO shall within two weeks of such request convoke an Extra ordinary general body meeting for consideration of such matters as requested by the members/representatives.

VIII. The general body may:

(a) Elect the management committee and delegate to it the powers necessary for the performance of its tasks;
(b) Dismiss any member of management committee for proven dereliction of duty;
(c) Decide to form or to seek membership of a higher level FO and elect such representatives as may be required;
(d) Approve the annual accounts and financial statements, the seasonal/annual schedule of water and other service charges, any general or special contributions by members, and the annual projected maintenance and expenditure plans;
(e) Approve the seasonal/annual maintenance plan;
(f) Approve the seasonal/annual water distribution schedules;
(g) Appoint any sub-committee as may be required to supervise the affairs of the FO;
(h) Constitute the water committee for resolving the disputes
(i) Propose and approve any changes to the bye-laws as it considers necessary;
(j) Approve the schedule of fines or penalties proposed by the management committee;
(k) Draw the attention of management committee to any matter it considers necessary;
(l) By vote of two-thirds of its members, decide to go into voluntary liquidation and, having acquitted all its outstanding obligations, determine the basis for distribution of its assets.

5. Composition of Management Committee

1) The management committee of FO shall be composed of a three office bearers including chairman, secretary and treasurer and not more than four such other members as shall be elected by general body.
2) The management committee shall be elected for a period of three years by the general body of the FO, renewable for one further term, after such members shall be ineligible for re-election for a further full period of three year.

3) The management committee shall meet once in a month or as often as required by the affairs of the FO. Its decisions shall be taken by simple majority vote. A quorum shall be constituted by not less than three members which should include one of the office bearers from amongst the Chairman, Secretary and Treasurer.

4) No remuneration, allowance or salary in any form shall be paid to any member of management committee for the performance of his duties. Members may however claim reimbursement of any legitimate expenses incurred in the performance of such duties, within limits determined by the general body.

5) The composition of Management Committee shall in every case include at least:
   - Composition of management committee should cover 1/3 from tail portion of the distributary.
   - One member in the management committee should be taken from small farmers having minimum land of ten acres or what ever the least land owner is.

   Provided that at least one of the office bearers will belong to one of the above two categories.

6) No person may be a member of a Management Committee if he:
   (a) Is below the age of 18 years on the date of his nomination;
   (b) Has not paid his water charges within a period of three months after these charges become due for payment;
   (c) Has been declared insolvent
   (d) Has ceased to be a member of the FO;
   (e) Is of unsound mind;
   (f) Has been convicted of an offence which involves moral turpitude unless a period of three years elapsed from the date of his conviction;
   (g) Has been dismissed or removed from any public service unless a period of three years has elapsed since the said dismissal or removal;
   (h) Is serving member of the security, police or armed forces;
   (i) Is the holder of any elected public office at national, provincial level, or a declared candidate for election thereto;
   (j) Is or has been in last five years, a declared bankrupt;

6. Powers and Function of Management Committee

The Management Committee shall:

I. Represent the FO and the interests of its members in law and vis-à-vis SIDA or other agencies;
II. Manage the financial resources of the organizations and exercise rights of signature on its bank accounts in accordance with the provisions of these by-laws;
III. Enter into contracts in the name of the organizations;
IV. Ensure the timely recovery of all water and services charges and financial dues, and remit the agreed amounts to the supplier;
V. Prepare annual budgets for income and expenditure and the schedule of members' contribution for management, operation and maintenance of the irrigation and drainage system for approval by the general body;

VI. Prepare detailed maintenance plans and collect/organize members' contribution in cash or kind;
VII. Organize and supervise water distribution schedules and adjudicate fairly any disputes arising therefrom;
VIII. Maintain the funds and accounts of the organization in the required form, provide all financial information as may reasonably be requested to any member or to any authorized person, and present the annual accounts for approval by the general body;
IX. Maintain register of members
X. Employ such staff as may be required, within the provisions of the bye-laws and the budget approved by the general body;
XI. Impose fines or other sanctions on defaulting members, in accordance with the provisions of the bye-laws and the agreed schedule of rates, and undertake all necessary actions to ensure the recovery of arrears in accordance with these bye-laws;
XII. Actively promote measures aimed at greater efficiency in water use;
XIII. Convoke the general body meetings as prescribed in the bye-laws and such other general body meetings as required, and faithfully execute the decisions of such general body meetings;
XIV. Meet monthly or more often as required by the affairs of the FO, and keep minutes of its decisions;
XV. Undertake any other activity required promoting the interests of the organization.

7. Duties of Office Bearers

(1) Chairman

(a) The chairman shall be the Chief Executive Officer of the FO. He shall have the general powers and duties which are vested in the office of the chairman of FO including but not limited to the powers to appoint various committee and sub-committee from among the members of the FO from time to time as he may in his discretion decide to be appropriate to assist in the conduct of the affairs of the FO.

(b) He shall preside over the meetings of the General Body, Management Committee and all other meetings of the FO and conduct the proceedings.

(c) If there by any legal dispute, the Chairman will handle such cases on behalf of the FO.

(2) Secretary

(a) He shall convene all meetings and shall maintain the minutes of all meetings. He shall issue general circulars and notices and carry on all correspondences on behalf of the FO. He shall remain in charge of such books and papers as the General Body/Management Committee may direct and shall in general perform all duties incidental to the office of Secretary, i.e. execution of orders and resolutions of Management Committee.

All suits and matters instituted by or on behalf of the FO shall be instituted in the name of the Secretary and all pleadings, warrants, power of attorney, vakaltanama, petitions, statements, etc. shall be signed by the secretary and like wise in all suits and matters against the FO, the Secretary shall represent the FO.

(3) Treasurer

(a) The treasurer shall be responsible for receipt of all subscriptions, fees, rates, and charges, donations, grants and money, etc. from different sources as provided in the bye-laws and issue receipts for the same. He shall receive, disburse and maintain daily accounts and shall at the end of the financial year get the same audited by the authorized auditor and furnish an audited statement of all receipts and expenditures to the Management Committee.

8. Vacancies

I. Any of the office bearers of Member of the Management Committee may resign at any time on notice in writing to the Management Committee.

II. Any member of the Management Committee failing to attend three consecutive meetings of the Management Committee without sufficient reason given in writing to the Management Committee will retire from office.

III. Any vacancy arising in any of the offices shall be filled up by the Management Committee by co-option to hold office for the unexpired term of the person ceasing to hold office. Such nomination will be put to vote for confirmation in the next General Body Meeting. In case the General Body does not approve the nomination, it may elect another member to serve for the un-expired term of the concerned member.
9. Removal of Office Bearers

Upon an affirmative vote by an absolute majority i.e two third of the members of the General Body of the FO, any of the office bearers may be removed and his successor elected for the duration of un-finished term of office bearer so removed.

10. Resolving Disputes

(a) The FO will constitute the water committee to resolve all the disputes.
(b) The water committee will comprise of three members of the FO and other person not exceeding than two which shall decide the disputes.
(c) All disputes arising among the farmers or other water users shall be resolved preferably through mediation by the water committee of the FO concerned.
(d) Where the water committee is unable to settle the dispute through mediation, it shall proceed to decide the case and, after such inquiry, which it may deem necessary, give its decision.
(e) The decision of water committee, shall be by majority of the members present and voting and in case of a tie the case shall be referred of the FO whose decision shall be final.
(f) A person aggrieved by the decision under the preceding sub-clause may appeal to the general body of FO

11. Notice of Meeting

It shall be the duty of the Secretary to inform or send notice of each General Body/special meetings stating the purpose thereof as well as the time and place of meetings to each member at least seven days prior to such meetings.

12. Order of the Meeting of General Body/Management Committee

The order of business at all general body/Management Committee meetings of the FO shall be as follows:

(a) Recitation from holy Quran
(b) Signature/Thumb impression of all members present
(c) Proof of notice of meeting
(d) Reading out the minutes of the preceding meeting and ratification thereof.
(e) Progress/performance review in light of the last decisions
(f) Report, if any, committees set up.
(g) Unfinished business, if any,
(h) Vote of thanks.

13. Financial Resources

1) The FO may establish a fund to which shall be credited all sums received by the FO.
2) The FO will open the bank account jointly operated by the Chairman and treasurer on behalf of FO.
3) The funds of FO may consist of:

I. All sums receivable in respect of water charges for the supply of water and drainage services to agricultural and non-agricultural users in its area of jurisdiction, including those charges know as abiana, development cess, drainage cess etc.
II. All sums receivable by the FO in respect of other service fee, charges, commissions and financial penalties imposed on members;
III. Contributions, membership fees or share capital subscribed by members;
IV. Proceeds arising from agricultural or other enterprises, renting/leasing or hypothecating or sale property of the FO, provided always that such renting/leasing, hypothecating or sale shall be consistent with the purposes of the Act, the Rules and the bye-laws;
V. Sale of water allocations surplus to the requirements of the members of the FO;
VI. Grants or loans obtained from the Authority or Government;
VII. Commercial loans;
VIII. Foreign assistance grants or loans obtained with the sanction of, and such terms and conditions as may be approved by, the Federal and Provincial Governments in consultation with the Authority and/or the AWB of the area where the FO is located;

IX. Revenue from any activity not inconsistent with the bye-laws;

X. Any other source of funds related to its functions which the FO may from time to time identify.

4) The funds of the FO shall be employed for:

(a) Meeting its operating and service costs, including its pro rata share of supplier costs;
(b) Servicing its debt obligations;
(c) Meeting its capital replacement and improvement charges;
(d) Constitution of reserves

14. Investment and operation of funds

The FO may keep both its operating and reserve funds under interest bearing fixed deposits in a Bank authorized by the Management Committee in joint account of Chairman and Treasurer. The interest accrued from the fixed deposits amount shall be spent on operation and maintenance of the system and other allied activities as decided by the Management Committee. Any amount in excess of the operational requirements in a financial year will be transferred to reserve fund.

The Secretary may retain in his personal custody an amount not exceeding Rs. 3,000 (Three thousand) for petty expenses. All payments above Rs. 3,000 shall be made by cheque signed by the Secretary and the Chairman or Treasurer.

15. Apportionment of costs payable to the supplier

I. The FO shall periodically remit to the AWB, or higher level FO as the case may be, the sums required to meet the justified pro rata costs for the management and operation of the canal system supplying the area of jurisdiction of the FO, together with the FO’s justified pro rata share of operating and maintenance costs pertaining to the drainage system which it delivers its effluent, as well as its pro rata share (if any) of the Authority or the AWB’s costs of maintaining flood protection infrastructure benefiting the area of jurisdiction of that FO.

Provided that the FO’s pro rata share of the costs of maintaining such flood protection infrastructure shall not include the proportion of costs imputable to non-agricultural beneficiaries of that infrastructure.

II. In case of disagreement over the apportionment of costs, the issue shall be referred to the SIDA whose decision the matter shall be final.

16. Financial year, accounts, statements and audit

(a) The financial year of the FO shall be from the 1st of July to the 30th of June.
(b) The FO shall maintain proper books of accounts and financial records on a commercial basis, and will prepare following financial statements as per the standards of the Pakistan Institute of Chartered Accountants, in which shall be consolidated the accounts and financial statements of its member.
(c) The FO will maintain following registers and present same to the appropriate officer for inspection.

1) Daily cash transaction account
2) Receipt book
3) Member and Non-Member register
4) Farmers Demand for water register and irrigation schedule
5) Minutes book
6) Monthly cash transaction amount
7) Assets account
8) Bank account
9) Visit Book
10) Complaint register
The FO shall not later than three months from the close of the relevant financial year cause its accounts to be audited by commercial auditors according to the standards prescribed by the Pakistan Institute of Chartered Accountants. The audited financial statements shall be approved by the General Body, and submitted to SIDA at a date not later than 6 months from the close of the financial year.

(d) The FO shall provide SIDA with detailed information and explanation in regard to any observation, reservation, qualification or adverse remarks contained in the auditors' report. The FO shall carry out all directives issued by SIDA for compliance with any observation, reservation, qualification or adverse remarks in the audit report.

(e) The FO shall cause to be conducted by external auditors such periodic or special audits of maintenance or construction works as necessary to ensure the proper utilization of its financial resources.

17. Publication of Accounts and Reports

A copy of the last financial statement and of the report of the Auditor, if any, shall be kept in a conspicuous place in the office of the FO and will be available for inspection by members.

Receipt and expenditure accounts, balance sheet, together with a report shall be placed before the General Body after the expiration of each financial year.

18. Suits and Legal Proceedings

The FO shall sue and shall be sued in the name of the Secretary of the FO.

19. Amendment of Bye-laws

The Bye-laws may be amended by the FO in a duly constituted meeting for such purpose and no amendment shall take effect unless approved by absolute majority i.e two thirds of the members of the FO and the modified bye-laws will be effective only after approval by the Registrar of FOs.

20. Liquidation/Dissolution

The FO may by special resolution determine that it shall be dissolved and for that purpose two thirds of the members of the General Body Meeting shall confirm in writing. Upon such liquidation/Dissolution the property of the FO will be handed over to the AWB or the Authority after satisfaction of all its debits and liabilities.

21. Interpretation

In case of conflict arising out of the reading of the bye-laws of the FO the interpretation as given by the Act or the SIDA and AWB FO regulation shall be applicable.

22. Copy of Bye-Laws

A copy of bye-laws in Urdu and its Sindhi translation shall be made by the Management Committee and will be available for consultation by members.
## Summary Farmer Organizations (FOs) Audit Report 1999-2000

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<th>Particulars</th>
<th>Distributaries/Minors</th>
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<th>Rawtiani</th>
<th>Mohd Ali</th>
<th>Tail Minor</th>
<th>Bareji</th>
<th>Mirpur</th>
<th>Sanhro</th>
<th>Belharo</th>
<th>Dighri</th>
<th>Potho</th>
<th>Bagi</th>
<th>Khatian</th>
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* Three pilot distributaries (Heran, Bareji and Dhoro Naro) were formed earlier.

Note: Audits have made during the month of July 2000.
FARMER ORGANIZATIONS (FOs) ACTIVITIES