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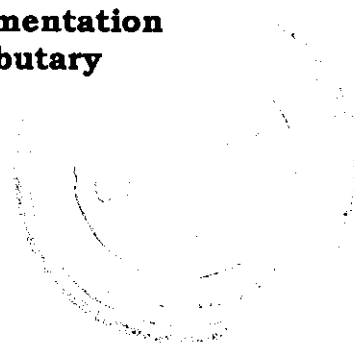
**MANAGING IRRIGATION FOR
ENVIRONMENTALLY SUSTAINABLE AGRICULTURE
IN PAKISTAN**

**IMPACTS OF FARMER PARTICIPATION
FOR WATER RESOURCES MANAGEMENT
IN THE PUNJAB PROVINCE, PAKISTAN**

**An Analysis of Process Documentation
For The Hakra 4-R Distributary**

By

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**International Water Management Institute (IWMI)
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FORWARD

The Indus Basin Irrigation System is of central importance to the economy of Pakistan, which is managed by Federal and Provincial agencies. Unfortunately, the quality of irrigation service has deteriorated over time, and the condition of infrastructure is deteriorating. Charges levied on farmers for irrigation services are inadequate to meet operation and maintenance expenses, in part because the charges and recovery rates are too low, in part because the irrigation departments are inefficient and over-staffed. As a result, productivity is far below potential, salinity and water-logging are spreading, over-exploitation of fresh aquifers is widespread, and excessive use is being made of poor quality groundwater – to the detriment of the soils and the long-term productivity of the sector.

The Government of Pakistan has recognized this and has made a commitment to reform irrigation management institutions. The search for solutions to the problems outlined has resulted in 1997 in the passage of the Provincial Irrigation and Drainage Authority (PIDA) Acts in the Punjab, Sindh, Baluchistan and Northwest Frontier Province. Under these acts, the present Provincial Irrigation Departments would become Irrigation and Drainage Authorities. Farmers would be organized to take over operation and maintenance of watercourses and distributaries. A new institution – the Area Water Board – would be the intermediary between these two levels, receiving water from the PIDAs and distributing water among the federated organizations of farmers. Farmers would be responsible for levying charges for irrigation and drainage services, with the proceeds divided among the PIDAs, AWBs and farmer organizations to reflect costs at each level.

In parallel with formulation and passage of these new laws, IIMI has formulated Farmer Organizations at secondary level in the Hakra 4R Distributary in the Punjab Province. Waheed uz Zaman documents impacts of this Farmer Organization in this report. This study was inspired by Prof. G.V. Skogerboe and financed by the Royal Netherlands Government.

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EXECUTIVE SUMMARY

The introduction of participatory reforms in the water resources sector in many countries of the world has now become a global movement. In Pakistan, large-scale institutional reforms to improve the declining performance of the irrigation system are also underway. The Provincial Irrigation Departments have been converted to autonomous irrigation and drainage authorities. Several ambitious farmers' participation programs have recently been launched in Pakistan. These include Area Water Boards (AWBs) and Farmers' Organizations (FOs) under the Provincial Irrigation and Drainage Authorities (PIDAs). Drainage Beneficiary Groups (DBGs) under National Drainage Program (NDP), FOs at the distributary level under the On-Farm Water Management-IV (OFWM-IV) and Punjab Farmer-Managed Irrigation Project under PIDA, funded by different International donor agencies are other initiatives. Impact assessment of farmers' participation will generate substantial interest and clarity for all the players involved in Pakistan's participatory reforms. International experience shows that farmers' participation in irrigation management has resulted in improved water distribution, cost effectiveness, mobilization of resources for O&M of the irrigation system and improved service delivery as a result of better communication between the agency and the users. These prepositions were tested at the Hakra 4-R Distributary FO's Pilot Project under the Fordwah Eastern Sadiqia (South) Irrigation and Drainage Project in Southern Punjab, Pakistan. The Royal Netherlands Government funded the project.

The Hakra 4-R Distributary is the largest pilot experiment relating to farmers' participation in South Asia. The impact assessment of farmers' participation under the Hakra 4-R Distributary pilot project will aid implementers to improve their strategies and approaches for social organization, planners to clear their concepts, and researchers to develop effective models and methodologies.

This research is the outcome of two years' process documentation on the activities of the Farmer Organization of the Hakra 4-R Distributary, covering the period from March 1997 to April 1999. Besides the process documentation, the information and data was also supplemented through the interview of key informants, FO's management records and technical surveys. The author has been the Team Leader of this pilot project for several years. The report has also been enriched by the author's own inferences on the FO's organizational activities and field observations. The two main objectives of this research were: 1) to delineate the potential activities from which the impacts of farmer participation can be assessed; and 2) to assess the management capacity of the FO.

The research has identified the following eleven areas of impact assessment: 1) Impact on irrigation management, which includes impacts on water availability and impacts on efforts to induce equitable distribution of irrigation water; 2) impacts on distributary maintenance, which includes assessment of O&M needs and maintenance campaign; 3) impacts on resources mobilization; 4) impacts on communication among water users; 5) impacts on organizational development activities; 6) impacts on farmer-agency interface; 7) impacts on farmer-farmer interface; 8) impacts on PIDA's Legal Framework; 9) impacts on joint management; 10) impacts on conflict management; and 11) negative impacts of farmer participation.

The impact on water availability shows that farmers' demands for water supplies since the formation of the FO have started reaching the PID quickly and the PID now considers the farmers' demands as part of the distributary operation. The general belief was that FOs would be controlled and monopolized by the 'influentials', leading to enhanced inequity rather than equity. Contrary to this belief, FO office bearers of the Hakra 4-R Distributary took many measures to induce water equity. Impacts that speak for themselves as a result of decisions taken by FO leaders, are to refrain from

installing seasonal pipes, to assist the Irrigation Department to correct outlets and to improve water equity at the tail reach.

The farmers were involved in all processes of assessment of O&M needs. These have been translated in terms of management and financial responsibilities by IIMI with active involvement of farmers. This is also a noteworthy impact of farmers' participation. Undertaking cost-effective and cheaper maintenance is another noticeable impact of FO-led farmers' participation. The financial analysis shows that maintenance undertaken by the Punjab Irrigation Department (PID) is three times more expensive than by the FO. A clear impact of the maintenance undertaken by FOs is that it is cheaper, efficient and based on needs. Participation of the downstream farmers to repair the initial section of the distributary is also visible evidence of impact. Another prominent area of the impact of farmer participation is the mobilization of the farmer's indigenous knowledge. They acted as resource persons in the capacity building activities.

For organizational networking, FO undertook a wide range of activities (from irrigation management to the environment) to solve problems inherent to the farming community. The impact was quite visible because these problems were solved by mobilizing organizational links and without the need of the informal payments.

Considerably improved interaction between FO and government agencies is a result of its interface with government agencies. A 24-point memorandum of understanding (MOU) was agreed upon. The ideal impact would have been for responsibilities to be transferred to the FOs. But, these interactions have still had a substantial impact because a limited role for the FO and PID to manage the distributary has been redefined. Later, the Secretary of Irrigation agreed to give the management responsibilities to the FO through two options: to sign the Joint Management Agreement under interim arrangements, or under the PIDA legal framework. The FO chose to wait for the PIDA framework. The second positive impact associated with these interactions is the increased commitment to participatory reforms observed at higher levels of the Irrigation Department. The third impact, as a result of farmer-agency interface, is that informal payments to agency field staff for additional supplies have reduced significantly.

A total of 20 disputes were submitted to WUOs for arbitration. Of the 20, 19 were settled by the WUOs. One dispute was under adjudication when this report was being finalized. Referring disputes to WUOs by the members is itself an important impact of farmer participation.

Private sector representatives delivered agro-chemicals on behalf of their companies through contact with FO leaders. Another encouraging impact is the potential of WUOs as delivery point for agro-chemical companies.

Besides this substantial impact, this report also identifies some weaknesses of farmers participation. The study shows the lack of purpose and cooperation between the grassroots and the leadership, and the lack of subsequent action on decisions taken. Friction among FO office bearers and increased competition for water supplies among two of the five sub-systems, was also observed. This situation suggests that the leadership needs to develop a regular information flow with the grassroots. Decisions also have to be conveyed to the grassroots.

Finally, the study provides several recommendations about farmers' potential to undertake irrigation management, the functioning of the Field Implementation Coordination Committee (FICC), the PIDA legal framework and the essential ingredients of the Joint Management Agreement (JMA).

1 INTRODUCTION

1.1 BACKGROUND

In the coming years, Pakistan will have major transformation in the reorientation of the government role in the management of the irrigation and drainage systems. This transformation aims at creating autonomous farmer organization (FOs) at distributary level. This devolution will take place in phased manner. Currently, the farmers participation is being pilot tested on several distributary systems of Pakistan. These experiments are new phenomena in the country.

The Hakra 4-R Distributary is one of the largest FO pilot Projects presently underway in Pakistan . Under the project mandate, among others, the few objectives were to: 1) learn how to organize farmers at distributary level, 2) test willingness of farmers to undertake O&M and, 3) ascertain their capacity to manage system. The project has demonstrated that farmers can easily be organized at distributary level. Also, through the series of negotiations and submitting different proposals/schemes for the joint management to the government, the farmers have shown willingness to undertake the management responsibilities. The Hakra 4-R Distributary Farmer Organization (FO) Pilot Project was designed to transfer the major irrigation management responsibilities to the water users.

So far their capacity to manage the distributary has not been tested. This capacity can not be tested unless farmers completely take over the distributary system. Nearly, two-and half years have passed but the major responsibilities have not been transferred to the FO. The FOs, however, have become operational since its formation. This pre-takeover period is already witnessing the FO in action, evidenced through significant impacts in several key areas of distributary management. The long-term impacts of the FO's ultimate goals, of improving agricultural productivity through improved equity and changed cropping patterns, can only be assessed after responsibilities have been transferred to the FO. During this period IIMI Pakistan helped FO to build their management capability through a series of capacity building and training activities. These activities led to several management functions and have shown substantial impacts of farmers participation in various important areas of system management. This research report documents these impacts.

1.2 NEED FOR IMPACT ASSESSMENT

The assessment of impact of FOs is required for implementers, planners and researchers for improving their strategies by suggesting measures to overcome organizational weaknesses, clarifying their concepts, and developing effective models and methodologies. Donors also want to witness the success of their investments (Abernethy, 1993). An impact assessment may also be useful to improve the feedback processes in organizational development activities.

1.3 OBJECTIVES

The following are the main objectives of this research report:

- to delineate the potential activities for which the impacts of farmer's participation can be assessed; and
- to assess the management capacity of the FO.

The investigation covers the impacts of farmer participation at the Hakra 4-R Distributary between March 1997 and April 1999.

1.4 FO REPRESENTATIVE STRUCTURE

The Farmer's Organization (FO) at the Hakra 4-R Distributary is a three-tier system in which 4,500 water users were organized (as the first-tier) into 121 Water Users' Associations (WUAs) (Figure 1). All the farmers in a watercourse command form a WUA. The membership of each WUA varies from 5 to 7 depending upon the number of factions (*baradaris*, the number of potential leaders) at a watercourse. Exceptions are found in 1 or 2 watercourses where the WUA comprises only one member because the entire watercourse command belongs to one farmer. Watercourse level water users nominated the WUA members. These 121 WUAs nominated 121 watercourse representatives who in most of the cases were nominated by the WUA executive bodies. In some cases, however, they were selected by general water users.

The Hakra 4-R Distributary system was grouped into 5 sub-systems according to social and physical divisions. Each sub-system comprises 15 to 33 WUAs, depending on the size of the hydrological unit. These Water Users' Associations were then organized (as the second-tier) into five water users' organizations (WUOs). The electoral body of each WUO comprises 15 to 33 watercourse representatives. Each WUO comprises 7 to 10 executive body members again depending on the social and hydrological units (villages, *baradaris* and watercourses). Each sub-system WUO nominated 5 members to the general assembly of the Water Users Federation (WUF). In most of the cases, presidents and general secretaries at the sub-system level WUO were also chosen for the WUF general assembly. The remaining three members were selected from the watercourse representative of each WUO. Thus, the general assembly of the Water Users Federation comprises 25 member who selected a five-member executive body on March 5 1997.

1.5 METHODOLOGY

The main source of the information for this report was the process documentation. For this research, information was not gathered through structured questionnaire. All the relevant documents of the social organization process, however, were analyzed. Besides the analysis of process documentation, three chief sources of data collection have enriched this report. These are: 1) interviews with key informants; 2) management records; and 3) technical surveys. Information collected from these sources is briefly enumerated below.

Irrigation management, through user participation at the distributary level, is a new experiment in Pakistan. In this context, the experiences of the Hakra 4-R Distributary WUO pilot project were of paramount importance, as this is the biggest experiment of its kind in South Asia. Donors, planners, policy makers and researchers have all set their sights on the results this pilot experiment will yield. Thus, the implementers of this project place a very high importance on process documentation. The following text sheds light on the main features of the methodology that has been employed for process documentation.

The members of the Social Organization Field Team (SOFT ware) were delegated to take notes of all the activities undertaken by the WUOs (e.g. periodic WUO meetings, meetings between WUO leaders and agency staff), or those organized by IIMI-Pakistan for capacity-building (e.g. training courses). Usually, three SOFT members were appointed to take notes. Of these three, one took detailed notes and the other two recorded only the main points. Sometimes, two members were involved in note taking. In these cases, both had to record detailed proceedings of the event. Special diaries were used for this note taking exercise. This technique prevented the loss of information.

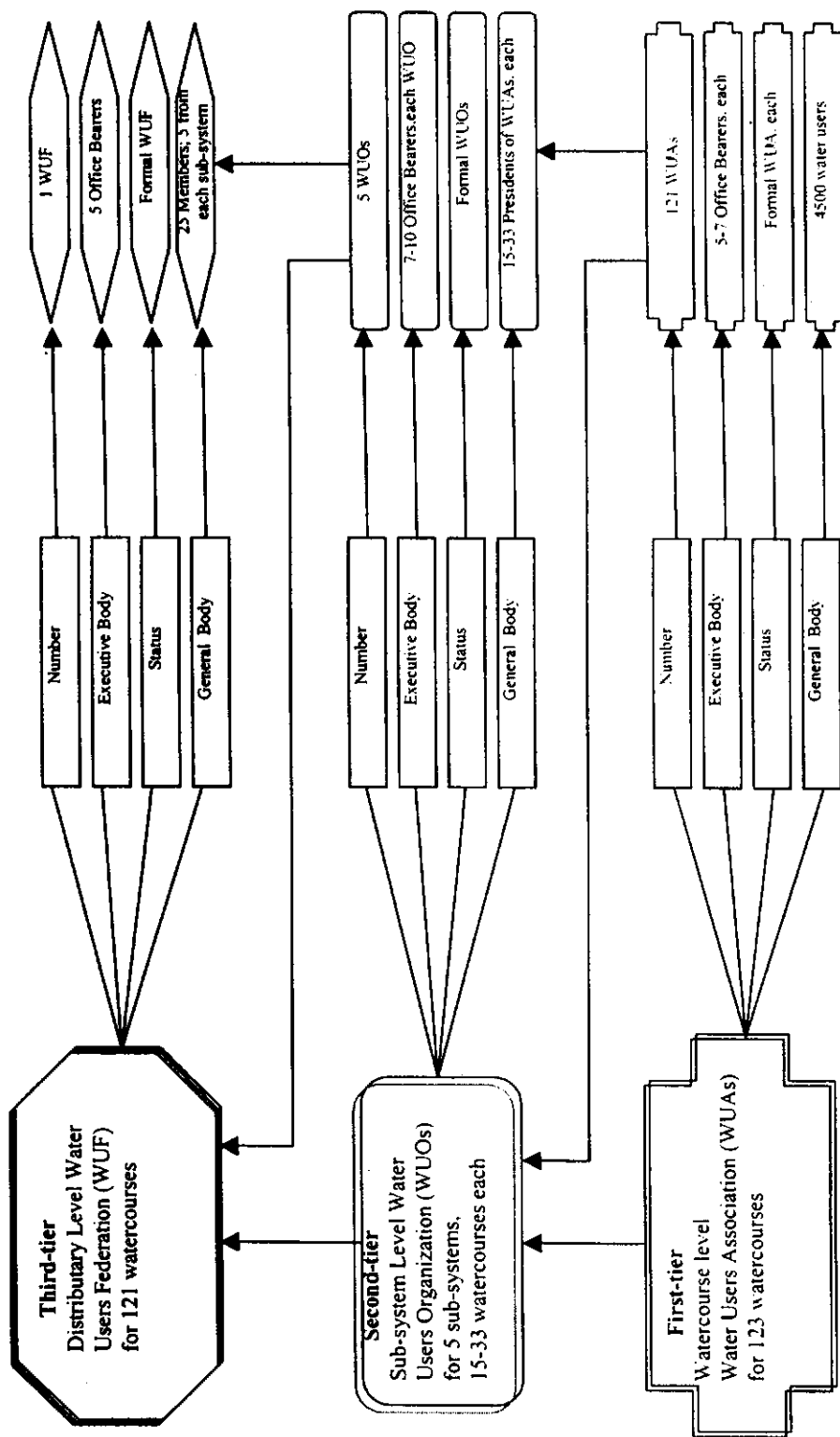


Figure 1. The organizational structure and nomenclature of the Hakra 4-R Distributary Water Users Federation.

On the same day, after recording the details of a particular activity, event or meeting, the members in attendance had to compile a summary based on the structure provided by the field team leader. Every important point was also discussed among all the members involved in note-taking and the field team leader. These discussions helped to collect sufficient evidence to draw significant conclusions about the related events.

For the documentation of special events, such as the WUO members forming a *panchayat* to resolve disputes, the social organizers were sent as observers. Later, they submitted a detailed report on the origin and history of the dispute, as well as the decisions taken. The field team as a routine task has been submitting monthly progress reports, documentation of important and unusual events, and half-yearly reports to the design team based at IIMI's national office in Lahore. This research report uses and analyzes all these documents.

A considerable amount of information related to some of the important indicators, such as conflict management and equity, were collected from the *interviews of the key informants* who were mostly the farmer leaders. In order to probe different areas of investigation, both, door-to-door and group interviews were conducted. The main features of the methodology adopted are discussed below.

Usually, like the method adopted for note taking, two members of the SOFT were sent into the field. One person conducted the interview and the other recorded responses in a diary or a notebook. Before the interviews, orientation on the conceptualization of the areas of investigation was provided to the members of the SOFT.

In a case, when only one person could attend an interview, a checklist system was followed. He was required to record the main points during the interview and complete notes later, before the next interview commenced. All these investigations were conducted by asking free-response questions. These "free-response" questions, however, are "easy-to-ask, difficult-to-answer", and still more "difficult-to-be-analyzed" (Oppenheim, 1966).

The information were also collected from FO's *management records*. The WUOs started maintaining their records, which include the finance, proceedings of meetings, register for monthly progress report, and records of applications on organizational and water management-related matters. These organizational records provided a wealth of information regarding most of the indicators required for the impact assessment.

Data on physical aspects of the distributary were collected through *technical surveys*. The collecting of profile data for the Hakra 4-R Distributary was initiated in November 1996. Before undertaking detailed profile surveys, the IIMI-Pakistan hydraulic survey team conducted a benchmark (BM) survey. The x-section and profile survey was undertaken after establishing benchmarks (BMs) along the Hakra 4-R Distributary during annual closure period of 1996-97, when the distributary had been closed for annual repairs and maintenance. This survey was carried out by the IIMI-Pakistan four-member team headed by the author based at Haroonabad. Cross-section and profile data were taken with reference to the permanent BMs already established along the distributary on all *pacca* structures. This data helped to identify the maintenance deficiencies of the channel. The results were used in the implementation of maintenance activities undertaken by WUOs in the annual closure of 1997-98. These maintenance activities were an important measure of WUO impact assessment.

2 IMPACT ASSESSMENT INDICATORS FOR FARMERS' PARTICIPATION

2.1 INDICATORS IN THEORY: INTERNATIONAL EXPERIENCES

Tapay (1988) discusses an evaluation of the impact of farmers' participation in the performance of large-scale irrigation systems in the Philippines. He used agricultural productivity, financial viability and efficiency as indicators.

Samad (1998) has studied the impact of participatory irrigation management (PIM) on the performance of irrigation schemes in Sri Lanka. He evaluated the Nachchaduwa and Hakwatuna Schemes for impact assessment. He assessed the impacts on: 1) government expenditure for O&M; 2) farmers' cost of irrigation; 3) quality of irrigation service; 4) agricultural production; 5) cropping intensity; and (6) impacts on per unit of land and water. The study concludes a substantial decline in government expenditure on irrigation, no appreciable increase in the cost of irrigation water to farmers, no significant change in the quality of irrigation services, and no significant change in agricultural production after IMT.

A collaborative study (Hinchcliffe et. al, 1995) conducted by the Sustainable Agriculture Program of IIED and partner institutions in Asia, Africa, Latin America and Australia provides details of processes and impacts of 22 watershed development projects from 1992 to 1994. The study has highlighted the economic, social and environmental impacts of participatory watershed development. The study reports that the principal economic impacts were an increase in land value and demand, an increase in crop and livestock production, and an increase in the diversity of crops grown. The report also describes the social benefits such as a greater confidence and sense of social cohesion in communities, reduced conflict over resources, reduced out-migration, attention to the needs of women's groups and an improved rapport between the local people and external professionals.

The summary of proceedings of an International workshop on "Farmer-managed Irrigation System Network" organized by the International Irrigation Management Institute (IIMI), Pakistan, and the Instituto Nacional de Cienciay Tecnical Hidricas (INCYTH), mentioned that universal indicators could not be defined for performance assessment, Manor and Chambouleyron (1993). They have, however, suggested the indicators that can be generalized to measure the performance of Farmer-Managed Irrigation Systems (FMIS). These are: 1) the extent of farmer participation; 2) the nature and mode of water distribution; 3) maintenance of the system; 4) water use efficiency; 5) the social and economic profitability of the system; 6) sustainability; 7) the method adopted for conflict management, and 8) equity, reliability and timeliness associated with water distribution.

Based upon the overview of the proceedings of above-mentioned international workshop, Abernethy (1993) has proposed eight predictors for organizational sustainability. These criteria of sustainability have been suggested with the empirical validation in the context of Nepal. These include:

- 1) clearly-defined boundaries;
- 2) fair balance between the benefits received and the contributions made by each irrigator-member;
- 3) collective decision-making arrangements;
- 4) accountable monitoring;
- 5) graduated sanctions against rule violations;
- 6) swift, low-cost, accessible conflict management processes;
- 7) government recognition of irrigators' rights to organize; and
- 8) nested and layered organization to address different functions.

Ambler (1993) emphasizes understanding management boundaries, as well as management practices, as a foremost requirement for the accurate performance measurement of the Farmer-managed Irrigation System. While comparing internal and external evaluations, he further suggests that yield, production, irrigated area and cost per unit of water are criteria for external performance measurements.

While describing the performance indicators for the newly developed FMIS in Bali in Indonesia, Pitana (1993) mentioned several indicators to assess performance. These include: 1) equity in water distribution; 2) equity in members' contributions for FMIS development; 3) social functions of irrigation water; 4) the relationship between FMIS and the broader society in which the FMIS exists (the village, in the present case); 5) economic productivity; 6) social productivity; and 7) the irrigated area.

2.2 INDICATORS SUITABLE TO THE LOCAL ENVIRONMENT

The literature review presented in the foregoing paragraph shows that there are no universal indicators that can be applied to every environment. Every irrigation environment is unique in terms of its social and physical boundaries. While selecting the impact assessment indicators for the WUOs in the case of Hakra 4-R Distributary, the following were the most important considerations:

- The WUOs are not legally recognized, therefore, the indicators selected should be suitable to examine the impact of volunteer organizations;
- The indicators should be tested in a typical local environment;
- The indicators consistent with users' perceptions as well as local, social and physical infrastructure; and
- Data and information should be gathered in the simplest and most cost-effective way in order to quantify these indicators.

2.3 AREAS OF IMPACT ASSESSMENT

The following impacts of farmer participation have been studied.

- Impact on Irrigation Management
 - Water availability; and
 - Efforts to induce equitable distribution of irrigation water.
- Impacts on Distributary Maintenance
 - Assessment of O&M needs; and
 - Maintenance campaign.
- Impact on resources Mobilization
- Impacts on Communication among Water Users
- Impacts on Organizational Development Activities
- Impacts on Farmer-Agency Interface
- Impacts on farmer-farmer interface
- Impacts on PIDA's Legal Framework
- Impacts on Joint Management
- Impacts on Conflict Management
- Negative Impacts of Farmer's Participation

3 IMPACTS OF FARMER PARTICIPATION

3.1 IMPACTS ON IRRIGATION MANAGEMENT

The impact of farmers' participation is very significant on the operational activities, which include: the impact on water availability in rotational closure, regulation at transfer points, warabandi adjustment at the FO recommendation and monitoring daily water levels at strategic locations. Managing water refusal and efforts to induce equity of water are other areas of irrigation management, the detail of the impacts of these activities is given below.

3.1.1 Water Availability

Issuance of Water in the Rotational Closure

The farmers along the distributary's tail section were consistently being deprived of their water turn due to the disorganization of the rotational system. There are 17 distributaries offtaking from the Hakra Branch Canal and the Hakra 4-R is one of them. These distributaries are divided into three groups. These groups are then rotated among each other with first, second and third preference on weekly rotation. The distributaries in first preference get always-full supply discharge. The channels in second preference may not get full supply discharge all the time. The distributaries in third preference usually remain closed or get very little discharge. Thus, the rotation is two-week-on and one-week-off basis. Sub-system 3's WUO executive body appointed a WUO member who is also a school teacher, to contact the WUF president to issue a special *wara* during the third preference of the distributary. Once contact had been made, the president approached the XEN of the PID. At the request of the president, the XEN ordered the issuance of the water into the distributary for three consecutive days.

Regulation at the Transfer Points

During August 1997 some parts of the Hakra 4-R Distributary received high rainfall. The farmers from the tail end of Minor 1-R contacted the PID to inform them that they did not need water, and requested that the distributary be closed. The tail end farmers of the Hakra 4-R Distributary, however, were in need of water, and asked the WUF leaders to provide that water to the tail section. In view of the "demand" along the Hakra 4-R Distributary and "no demand" along Minor 1-R, the WUF president requested the PID officials to place *karies* (wooden logs) in Minor 1-R's head regulator. The WUO leaders placed *karies* in the head regulator to feed the tail of the Hakra 4-R Distributary for three days. This was the first time that regulation, using *karies*, was affected at this structure. The tail end farmers were very happy with this arrangement. But, later, due to frictions among WUO office bearers, the regulation at this bifurcation structure is done without the consent of the respective WUOs. The detail of this problem will be discussed elsewhere in this report.

Warabandi Adjustments at the WUF's Recommendation

Since its formation, farmers have been referring cases of warabandi to the WUF. For example, one such case from Sub-system 4 related to adjusting the CCA between two farmers was referred to FO. The case was referred for the WUF's recommendation to adjust the *warabandi*.

Monitoring Daily Water Levels at Strategic Locations

The flow measurement training aimed at imparting the necessary training to leaders of each of the five water users' organizations; 95 percent of the farmer leaders learned how to measure water levels with a staff gauge and convert these readings into a discharge using the discharge table accurately. After these training courses, the WUF started monitoring daily water supplies at strategic locations of

the distributary. They recorded these gauges for a few weeks, but perceiving delay in transfer of management responsibilities from the PID, farmers abandoned this activity.

Later, however, it is observed that some WUO leaders informally read the staff gauges at the bifurcation structure at RD 72+00 at regular intervals, which is the transfer point of Sub-systems 3 and 4. In the case of an unusual situation after reading the gauges, they approach the PID.

Managing Water Refusal

In the second week of February 1998, heavy rains played havoc in the region. Many farmers, including those from the tail end, contacted the president of the Water Users Federation to request closing the distributary.

In a WUF's meeting on February 24, the WUF president submitted a written request to the PID's Superintendent Engineer (SE) asking for a two-week distributary closure. Following these requests, the distributary was closed on February 26, 1998, initially for two weeks. The distributary closure was extended until March 16, 1998, and the canal reopened on March 17, 1998.

These measures show that farmers' demands for water supplies have started reaching the PID quickly. Furthermore, the farmers express that after gaining flow measurement knowledge, they interact with the Irrigation Department staff with more confidence, especially on issues related to water supply. The contractor of the distributary lining wanted to modify head regulator of I-R Minor. After the distributary closure, the WUF allowed contractors to modify it. Otherwise there would have been special closure for this modification. This was one of the associated short-term-impacts of the management of water refusal (distributary closure).

3.1.2 Efforts to Induce Equitable Distribution of Irrigation Water

The most significant task of farmer's participation is the equitable distribution of irrigation water. The WUO took many measures to induce equity. Whether there have been improvements in water supplies or not, needs yet to be measured. The steps taken by the WUOs in this regard were, however, very remarkable which include:

- Leaders' abstinence from installing seasonal pipes;
- Prevention of outlet tampering;
- Correction of faulty outlets;
- Measures to check water theft;
- Inspection of the tail ends;
- *Warabandi* adjustments; and
- Monitoring of water supplies.

Of the many initiatives that WUOs took to induce water equity, three examples are quoted here.

Three WUF members who had installed seasonal pipes regularly each year announced in a public meeting that they would never install seasonal pipes to ensure that the tail enders receive an equitable share of irrigation supplies to feed the tail ends in the future. The reports from the field confirm that that they are following up their promises.

During 1997, nearly 50 farmers contacted the WUF General Secretary to complain about water theft through illegal pipes in the initial section of the I-R Minor. The General Secretary himself led a

procession to remove all the illegal five pipes including one belonging to an influential farmer and neighbor of the General Secretary.

A group of farmers from Sub-system 3 complained that some outlets of the sub-system drew unusually high discharges promotionally. A ten-member committee was formed which identified all the sub-system's defective outlets. On the basis of its report, the WUO of subsystem 3 recommended to the Irrigation Department that the outlets be rectified, which it did.

The common belief about participatory irrigation management (PIM) reforms is that the influential farmers will hijack the WUOs, and water theft and inequity will increase. Contrary to this belief, the WUOs took a range of different steps to induce equity of irrigation water (mentioned in the preceding section).

3.2 IMPACTS ON DISTRIBUTARY MAINTENANCE

3.2.1 Assessment of O&M Needs

The assessment of O&M needs was another area where the impacts of farmer participation can be witnessed. The farmers have been involved in the following O&M needs assessment activities:

Walk-thru Survey to Assess Maintenance Deficiencies

The walk-thru survey proceeded from the point of view that for the water user, irrigation management is an organized and interlocking system of social and technical activities. Specifically, the survey was designed to discover the maintenance deficiencies through farmers' perceptions using their local knowledge, and with the perception that decisions made without the farmers' involvement when undertaking management activities may be confronted with social disapproval. A total of 105 farmers participated in the walk-thru survey. The survey gave an interesting history of structure damages. These damages relates to the crests of the drop structures, protection walls, lined section and bridges.

Calculation of Costs and Quantities

After the walk-thru surveys, the required cost of repair and maintenance activities was calculated with technical assistance from IIMI. The estimates show that nearly Rs. 5 million are needed to do the major repair and maintenance works. This estimate however covers the pre-lining conditions of the distributary (Waheed-uz-Zaman, 1998). Later, three main reaches of the distributary were lined.

Business Plan

After assessing maintenance needs and calculating costs, a preliminary business plan was prepared. This business plan has translated the O&M needs into management responsibilities, and estimates the farmers' financial liabilities. These include both, the cost of distributary O&M and the farmers' share to maintain the upstream system. Farmers' total financial obligation has been calculated to be around Rs 112 per acre per annum, of this about Rs 56 are to be allocated to the distributary maintenance (Hassan and Khatri, 1997). Currently, a farmer leader is translating this business plan from English to Urdu.

3.2.2 Maintenance Campaigns

Maintenance Campaign During the Annual Closure (1997-98)

The Water Users Federation (WUF) of the Hakra 4-R Distributary undertook a five-day maintenance campaign with the technical assistance from IIMI-Pakistan from January 18 to 22, 1998. The main objectives of the campaign were:

- To repair the damaged banks, berms and service road;
- To put to test the WUF's credibility among lower tier organizations; and
- To ascertain the extent to which the WUF could mobilize resources for distributary maintenance. (Waheed-uz-Zaman, 1998a).

Extent of Maintenance Activities

Five sub-system level water users' organizations (WUOs), participated separately for one day each in the maintenance campaign. A total of 794 farmers, their leaders, and 120 tractors, mostly with rear-mounted-scrappers were mobilized. The sub-system-wise participation of workforce and machinery is given in Table 1.

Table 1. Participation of Farmers and Tractors.

Item	WUO1	WUO2	WUO3	WUO 4	WUO 5	Total
W/course	23	23	27	15	33	123
Farmers	95	107	215	117	260	794
Tractors	10	19	38	11	42	120

The maintenance efforts were concentrated in the head reach from RD 0+000 to 46+000, which is prone to breaches. A total of 93 damaged points, related to banks, berms and the service road, were repaired. The senior staff of district management and local members of the Provincial and National Assemblies participated in these maintenance activities.

The identification of maintenance needs with the help of the WUF maintenance committee, and evaluating maintenance works by forming a WUF Evaluation Committee, have proved that farmers have the potential for the management of maintenance tasks.

The total cost of resources mobilized, including tractor traveling costs, man hours and tractor hours at the site, is equivalent to Rs 124,000/= (or US\$ 2,800/=). The estimated cost of the WUOs' maintenance activities was Rs 400,000/= (or US \$ 9,032/=). This comparative estimate of the maintenance work was provided by the Sub-divisional Officer (SDO) of Haroonabad Irrigation Sub-division of the Punjab Irrigation Department in the presence of an Asian Development Bank Consultant during his visit to the Haroonabad area. The farmers now believe that they can undertake cost-effective maintenance activities.

Maintenance Campaign During the Annual Closure 1998-99

In the subsequent year, the WUF organized another one-day maintenance campaign to repair the head reach of the distributary. Before undertaking the maintenance operations, the WUF formed a five-member Maintenance Committee to assess the maintenance needs. This time, 625 farmers with 75 tractors participated in the campaign. The participation of the water users and machinery was significantly lower than the first year's campaign. However, this campaign achieved more visible impacts than the previous year. The first is that PID senior officials also participated. The second is

that facilitation by the IIMI social organizers was reduced compared to the previous year. This time the WUF achieved more self-reliance.

3.3 IMPACTS ON RESOURCE MOBILIZATION

Resource mobilization was the most significant area in which the impacts of farmers' participation were observed. Some researchers have defined resource mobilization as the ability to mobilize labor, cash and material (Rana, J. 1991). Others (Waheed-uz-Zaman and Hamid, 1998), however, have defined it as the mobilization of funds, manpower, tools (machinery and equipment), and knowledge and networking. Resource mobilization, however, is the most visible organizational activity for both construction and maintenance activities (Uphoff, 1986)

Mobilization of Manpower

Labor is the resource most extensively mobilized in irrigation management (Uphoff, 1986). This was proved by the FO of the Hakra 4-R Distributary. As described in the preceding sections, the WUOs mobilized 794 and 626 farmers for maintenance of the distributary in the annual closure of 1997-98 and 1998-99, respectively.

Mobilization of Funds

General funds were not procured for any specific purpose, but were intended to meet the overhead expenditures of the WUF. The WUF decided to collect a fixed amount from the five WUOs to meet expenditures under this head. The level of contribution ranges from 60 to 75 of all the members of the general bodies among the WUOs. The WUF decided to collect a fixed amount from the five WUOs for specific purpose such as organizational development and capacity-building expenditures. At the time of writing of this report, the WUOs had raised contingency funds in only two categories; one for the study tours, and second for establishment of offices.

Mobilization of Tools

As described in the previous section, a total of 120 tractors were mobilized in the five-day maintenance campaign. The number of tractors varies from 11 to 35 per 25 watercourses among the sub-systems. To undertake the five-day maintenance operations, five WUOs mobilized 384 spades, 78 rear-mounted blades, 30 trolleys and 9 cultivators. The WUOs also mobilized transport to facilitate the flow measurement activities at their respective sub-systems. The farmers in this campaign provided a total of 27 motorbikes and 2 cars. The amount of volunteer transport provided by the WUOs varied from one to eleven among the WUOs.

Mobilization of Knowledge

Farmers information and knowledge should also be regarded as a major available resource (Uphoff, 1986). In the WUOs' context, this is defined as the dissemination of the leadership and organizational skills, indigenous knowledge and experiences related to agriculture. This indicator will be measured by the number of occasions at which WUO leaders delivered lectures in other sub-systems, as resource persons, and applied skills and techniques. The higher tier WUO leaders disseminated knowledge to the lower tiers. They delivered lectures and speeches on organizational and technical aspects in other sub-systems. Thirteen WUO leaders made 21 speeches and lectures in different sub-systems.

Mobilization of Networking

In the literature networking is defined as "making potentially useful contacts and building relationships with individuals, groups and organizations (Davidson, 1993). Two other definitions adopted by Waheed-uz-Zaman and Hamid (1998) are:

"The ability of WUO members to acquire support by themselves using organizational linkages to explore avenues to handle their day-to-day problems related to irrigated agriculture"; and

"The capability of the WUO members to solve their problems related to irrigated agriculture using contacts, and without the necessity for informal payments"

The WUOs demonstrated their ability to mobilize linkages through organizational networking for the betterment of the farming community to address the following outcomes.

- 1) irrigation management;
- 2) agricultural loans;
- 3) inputs and marketing;
- 4) environment;
- 5) drinking supply and electrification;
- 6) promoting collective action for maintenance;
- 7) providing jobs to farmers' families; and
- 8) solving problems related to irrigation management.

A few examples of their problem solving are given below.

Networking to Solve Problems Related to Irrigation Management

During May 1998, the PID Sub-engineer reduced the size of an outlet of *Chak* 58/4-R for which informal payment had been made. Nearly 15 people contacted the WUO president of Sub-system 5, requesting that the outlet be brought to its original size. The WUO president met the Sub-engineer and conveyed the request of the farmers. This action resulted in the outlet being adjusted to its original size.

On September 24, 1997, a farmer from Sub-system 4 reported to the Secretary of Information, WUO-4, that a *beldar* (a member of the PID field staff) had demanded grain from the farmers to increase the water supplies of a watercourse into their village. The Secretary of Information arranged for an announcement from the mosque loud speakers, and advised farmers not to pay the special charges to the *beldar*. The complied with their leader's advice.

Networking to Solve Problems Related to Agricultural Loans, and Inputs and Marketing

Acquiring loans from the Agricultural Development Bank of Pakistan (ADBP) involves a long process, which test the patience of farmers and involves rent seeking. The WUF general secretary has helped many farmers to acquire agricultural loans without informal payments. He announced in a WUF meeting that anybody could approach him for such assistance.

In *Kharif* 1997, Muhammad Amin, WUF general secretary, procured certified seed and distributed it to the farmers. Moreover, he also information collected material (leaflets, etc.) on the methods of sowing, quantities, rates, timings of agricultural inputs, to share with farmers in the area.

Besides solving water-related problems, the general secretary also assisted farmers to purchase certified seed from the market at discount rates, using his contacts.

Networking to Solve Problems Related to the Environment, Drinking Water Supply and Electrification

In a Field Implementation Coordination Committee (FICC) meeting presided over by the Assistant Commissioner, Haroonabad, the President of the sub-system 5 WUO raised the issue of loud music at night when tractors worked in the farmers' fields. As a result, residents in surrounding villages find it difficult to sleep. He requested the AC to ban loud music at night. Later, he gave the AC a written application narrating the problem. Upon his request, the noise at night was banned.

The residents of *Chak* 66/4-R were in need of a water delivery pipe to feed their drinking water pond. The villagers contacted the WUF Secretary of Information to request him to use his influence to acquire a pipe from CBC. Upon the request of the Secretary of Information, the Project Manager of CBC granted a pipe, free of cost, to the villagers for their drinking pond.

The president of the Sub-system 5 WUO helped many farmers to solve problems involving the WAPDA office. This includes the correction of over-billing, and faulty meters as well as the installation of electric meters.

Networking to Promote Collective Action in Maintenance at the Watercourse Level

The water users of a watercourse belonging to *Chak* 66/4-R undertake periodic maintenance and cleaning operations. A faction of the shareholders of this watercourse was constantly absent from the cleaning operations. The other group, who performs desilting periodically, complained to the WUF Secretary of Information about this lack of cooperation. The Secretary of Information met those people personally, and at his motivation, they started participating in the maintenance operations (Waheed-uz-Zaman and Abdul Hamid, 1999).

3.4 IMPACTS ON COMMUNICATION AMONG WATER USERS

Communication relates to conveying information about decision made, resources mobilized and disputes to be resolved. Another purpose of communication may be coordination (Uphoff, 1986).

Communication among the water users has also improved. This improvement was however, within the members of leadership forums at different levels. Three criteria have been used to observe the impacts on the communication among farmers: frequency, regularity and participation in the meetings. The level of improvement varies among the WUOs. For regularity, the average spread from the mean interval of meetings varies from 7-9 days. The duration of meetings, exceeding planned times, varies between 120 and 231 minutes because of discussion on organizational and irrigation related issues. All the WUOs followed strict meeting agendas. With regard to regularity, the WUO meetings were conducted at intervals ranging from 1 to 6 months. This shows the varying degree of improvement among the WUOs. Despite the absence of any incentives (lack of legal cover and responsibilities) for WUOs, the frequency and regularity of meetings was quite satisfactory. Meeting attendance displays very good participation, which was always above 61 percent. There were 26 to 40 percent of vocal members, which is very encouraging. Deadbeats vary from 9 to 21 percent, which is not too much. The impact on communication among the sub-system level WUO was substantial. There was, however, very weak communication between the higher tiers and grassroots level WUAs.

3.5 IMPACTS ON ORGANIZATIONAL DEVELOPMENT ACTIVITIES

Organizational development activities are one of the important areas in which impacts were very significant, i.e.:

Enactment of WUO Rules, Decision-Making and Punitive Measures

The impacts, of socio-organizational activities, such as formulation and adherence to WUO rules, decision-making, and punitive measures taken by the WUOs, have been examined. The six WUOs (one WUF and five sub-system level WUOs) formulated 42 elements to establish a code of conduct. Of the 42, 38 relate to organizational development and only 4 to irrigation management. The elements of the code of conduct vary from 4 to 12 among the WUOs. These rules were formal (approved by WUOs in the meetings) but were unwritten.

Decisions made vary from 4 to 36 among the WUOs. Based on critical analysis of the decisions taken by all 6 WUOs, these can be broadly classified into five main areas, i.e.:

- 1) organizational development activities;
- 2) resource mobilization;
- 3) improvement works;
- 4) agricultural inputs; and
- 5) capacity building.

Almost 50 percent of the decisions taken pertained to organizational development activities. Resource mobilization, with respect to the importance of decisions taken, follows. Capacity building ranks third, and irrigation management and improvement works, at the lowest order. This analysis clearly shows that the WUOs focused their efforts mainly on organizational affairs, and less on irrigation management that may be expected because the responsibilities for irrigation management had not been transferred until the time this paper was prepared.

The analysis of the 6 WUOs' rules for punitive measures indicates that sanctions enacted cover the following areas:

- 1) discipline;
- 2) organizational development;
- 3) irrigation management; and
- 4) fund raising.

Enactment of Bylaws

The WUF of the Hakra 4-R Distributary developed its own bylaws. The process was slow and they were approved nearly two years after the formation of the WUF. The important achievement is that the members of the WUF, in view of functions, organizational performance and difficulties experienced by the WUF, developed on their own. The WUF, however, provided an *Urdu* translation of model bylaws developed by an IIMI consultant. To complete this important task, the WUF formed a ten-member Committee on Bylaws. After two meetings to formulate bylaws, these were eventually approved in the WUF meeting of December 22, 1998. These bylaws were formulated for the functioning of the apex body (distributary level WUF). The Hakra 4-R is a three-tier organization. The bylaws for the remaining two tiers (sub-system and watercourse level WUOs and WUAs, respectively) were being enacted when this research report was being finalized. The committee completed the task of enacting bylaws satisfactorily because they were approved unanimously by the bylaws committee. But, the performance of the committee itself was not very encouraging. Fifty

percent of the members have not been participating in the committee meetings (IIMI, 1998C). Seeing this less encouraging performance of the committee, the WUF continued to take organizational development decisions. In the meeting of December 22, 1999 the WUF replaced all the non-functional members of the Committee on Bylaws. After its revival, the committee was asked to continue the enactment of bylaws for lower tier organizations.

Selection of Office Bearers for the Higher Tier

The Hakra 4-R Distributary is a three-tier organization. After forming WUAs at the watercourse level, the users selected their higher tier organizations at the sub-system level. Later, they chose their representatives for the apex body, five office bearers representing one from each sub-system. All representatives for the higher tier federation were selected with farmer-consensus.

Formalization of WUAs

In the initial organization phase, 121 informal watercourse associations (WUAs) were created at the watercourse level. To make them a legal entity, these associations were formalized to entitle legal registration under the OFWM WUA Act, 1981. The main feature of the formalization process was that farmers leaders were used as the facilitators. This was an important impact achieved in context of the organizational development activities. In the 1st phase, there were 615 office bearers; in the 2nd phase, a significant number of the office bearers were added, replaced and subtracted, totaling 710. These types of changes in the office bearers affected all 5 sub-systems. There were several reasons for changes, i.e.

1. Illiteracy;
2. Disinterest in organizational affairs;
3. Migration of the share holders from the area;
4. Changes in tenancy status;
5. Death of an actual share holder; and
6. Holding offices in more than one watercourse command.

The change in the leadership was based on genuine reasons. This was also an encouraging impact on organizational development activities.

Formation of Sub-committees

The WUOs formed sub-committees to form part of the organizational structure so that specific responsibilities could be delegated. A total of 12 sub-committees were formed to perform special functions, i.e.:

- 1) a committee to tackle no-confidence moves;
- 2) a sub-committee for information;
- 3) an accountable committee;
- 4) a committee to establish WUO offices;
- 5) a committee to recover imposed funds from defaulters;
- 6) a discipline committee;
- 7) a maintenance committee;
- 8) a maintenance evaluation committee;
- 9) a committee on WUF bylaws;
- 10) a committee on agriculture implements.
- 11) a committee to handle problems related to canal lining; and
- 12) water courts to handle water disputes (3 water courts: each at WUF, and WUO's of subsystems 4 & 5).

All the committees achieved some degree of performance. But, the performance of some committees, such as the maintenance committee, and bylaws, yielded marvelous impacts.

Addition of Joint Secretaries to the Executive Bodies

Initially, the sub-system level WUOs selected five-member executive bodies, comprising President, Vice President, General Secretary, Information Secretary and Treasurer. Later, the WUOs felt the need to add joint secretaries to their executive bodies. Of the 5 WUOs, 3 added this office to their executive bodies (Waheed-uz-Zaman and Hamid, 1998).

These organizational development activities have significant impacts on the management capacity of the WUOs. It provided strength and capacity to the functioning of water users' organizations in many ways. First, regularity and participation in the meetings increased. Second, with the help of these activities, some WUOs established their offices. Third, some organizational development activities, such as the formation of sub-committees, helped towards implementing organizational decisions and resource mobilization activities. Finally, the WUOs were able to develop their bylaws despite the lack of incentives pertaining to the transfer of management responsibilities.

3.6 IMPACTS ON FARMER-AGENCY INTERFACE

One of the chief advantages of social intervention in irrigation management is the extent that interaction between users and government officials has improved. This is another important area of impacts of farmer participation. The users' interaction has improved with the following agencies.

1. Government agencies;
2. Private companies; and
3. NGOs.

The following presents evidence of improved interaction:

3.6.1 Interface with Government Agencies

In the initial organization phase of the WUF at the Hakra 4-R Distributary, the support from government agencies was not very encouraging, clear lack of trust among the water users and the Irrigation Department's local staff. Despite the support at the policy level and clear directives from the Irrigation Secretary to the PID local staff to cooperate with pilot action research, there was a visible dearth of local level interaction. The project, however, witnessed a gradual improvement in confidence among users and the Department staff. The following forums, facilitation and activities helped towards improved interactions among the users and the Department.

Interaction with Government Agencies through the Field Implementation Coordination Committee (FICC)

In order to obtain field level collaboration from the operating agencies, a Field Implementation Coordination Committee (FICC) was established at the outset of the project. The anticipation was that the FICC would help both, IIMI staff and field staff of operating agencies to collaborate and cooperate closely. In addition, they also had to monitor and steer the process of the WUO formations on a regular basis (Social Organization Field Teamwork Plan 1995-7). The Field Teamwork Plan had the following two main objectives:

1. To mobilize the necessary institutional support to assist water users and catalyze their interests to establish appropriate Water Users Organization (WUOs); and

2. To facilitate interactions between water users and operating agencies.

These FICC objectives laid down by the Social Organization Field Team were to secure the full participation of the partners and formulate detailed objectives, possible activities, modes of technical support and the task of the Committee.

Formation of FICC, Process Composition and Membership

Initially the FICC comprised 5 members. The FICC first met in February 1996, with its membership drawn from the Provincial Irrigation Department (PID) from both, its lining and operations wings, the OFWM and Agricultural Extension Directorates and IIMI. The original intention of the project to hold fortnightly meetings did not materialize due to the disinterest of the members, especially from the PID representatives. Only two meetings could be held during the period from March to April 1996. The project's attempts to mobilize the support of local PID staff for the WUO yielded only a poor response from the Irrigation Department. This was the time when false rumors were being spread against the project by the field staff of the PID and by some anti project farmers i.e.:

1. the Hakra 4-R Distributary was to be sold to a foreign company; and
2. the water was to be sold on a volumetric basis.

It was then necessary to seek support from all possible quarters of the PID to arrest this situation. In order to establish a pilot scale coordinating mechanism to promote between farmers and operating agencies, the committee was refueled by the team in mid-1997.

FFICC Composition, Membership Process and Impact

The idea was that the FICC would represent the field staff of several agencies involved in irrigated agriculture in the project area. Another decision was that the FICC would represent ex-officio members from the operating agencies. The IIMI Field Team formulated the following selection criteria for FICC members:

1. Working at the field level in the Hakra 4-R Distributary command area;
2. Members should have some degree of autonomy in decision making/activities; and
3. Commitment towards collaboration at higher levels in the organization.

With these initial efforts, the FICC only met twice in March and April 1996. Besides all the efforts, regular meetings could not be held and the input from the agency staff was not as expected. Until the end of 1996, the FICC remained operative only on paper because of the consistent lack of involvement by the agency staff. The reason for the lack of involvement was because they were skeptical about the success of this pilot experiment. Later, however, when they saw that the impossible became possible and that the WUF had become operative at the distributary level, their response improved. This was a very obvious impact of the farmers' participation, which features the attitudinal change into the collaboration pattern. Grasping this behavioral change in the operating agencies, the field team took the initiative to revitalize the FICC in May 1997. Initially, it comprised 15 members. With the increased interest in the FICC by both, farmers and agency staff, it became a problem-solving forum for the farming community. Farmer-leaders started presenting their problems openly and frankly in periodic meetings. Later, the membership gradually reached 20 members; 15 from agencies and five from the WUF (Annex-I).

As result of improved interaction with local district management and other operating agencies, a wide range of tasks was performed through the FICC platform. Particularly, the FICC harnessed the

support of field level officials from the District Management, Agriculture, Veterinary, PASCO and Lining Wing of the Irrigation Department. These include.

1. Since the land records maintained by the administration are of enormous importance for the farmers and loopholes in the record foster several compilations, its updating usually involved special charges. The Assistant Commissioner agreed to instruct his staff to update land records by mid-August 1997;
2. The District Management provided the WUF with office accommodation during the interim period (before the Joint Management Agreement);
3. A joint meeting with the Food Department and PASCO to negotiate better price for the wheat crop for the farmers of the area;
4. Decisions were taken to implement improved rotational irrigation schedules among the distributaries of the Hakra Branch Canal;
5. The local agriculture extension office promised to implement strict measures against adulterated agriculture chemicals; and
6. Agency staff from the OFWM, PAD, Public Health and Veterinary Departments agreed to participate in a series of periodic meetings in various villages to deliver lectures on improved agriculture practices, drinking water pollution and livestock protection measures.

The agency staff involved in these activities for financial gain was due to the many farmers who benefited by paying necessary informal payments.

Apart from these achievements, other impacts are also very visible. The first is the increased interface between the farmers and the agencies due to this field level institutional platform. The second is that representatives of the operating agencies come prepared for the meeting and appear to be ready to extend any help within their jurisdiction. This increased interface is a major impact that will be helpful for farmers to improve their irrigated agriculture, and will lead to better living standards, and thus, poverty alleviation.

Suggestions for Improving FICC Functions

In the initial FICC meetings, members proposed that the nomination criterion for membership to the FICC was not enough. Members should become responsible to report FICC activities to their senior officials. Otherwise, they would not receive adequate support from higher officials for various FICC tasks because it involves the allocation of time. The representative of the Agriculture Department commented that the Agriculture Extension Department visualizes the role of the FICC beyond irrigation management problems. They see it as a platform to address the problems of agriculture in general.

3.6.2 Farmer-Private Company Interface

Different agro-chemical companies have provided free technical advice to WUF members. The representatives of Fluid Machinery Corporation (FMC) delivered lectures on improved agriculture practices and sponsored many sub-system level WUO programs. Engro Private Limited sponsored a Farmer's Day organized by the WUF on September 16, 1998. This program was attended by nearly 230 farmers, including from adjoining distributaries. The demonstration impact is quite visible in the initiatives taken by the farmers themselves. Cynamids Pakistan sponsored the WUF oath ceremony, in which over 1,000 farmers participated. One of these companies also provided free chemicals for a few Bed-and-Furrow sample fields selected as demonstration plots. Sub-system 4's WUO inaugurated its office in March. The Deputy Commissioner, Bahawalnagar, was the chief guest.

Nearly 250 farmers participated in this program, which was co-sponsored by Engro-Chemical Pakistan.

3.6.3 Farmer-NGO Interface

Another visible impact is that interaction between farmers and Non-governmental Organizations (NGOs) has improved. The National Rural Support Program (NRSP) and ActionAid have contacted the WUF to undertake some community projects in the region through the WUOs. The NRSP has offered the provision of loans for agricultural inputs to WUO members. Community Organizations have been established in these three villages (*Chaks* 54/4-R, 66/4-R and 67/4-R) of Sub-system 5. Each CO comprises 15 to 20 members. The NRSP provided Rs 0.10 million and Rs. 0.70 million to the Community Organizations established under the WUO of Subsystem 5 in Villages 66/4-R and 54/4-R, respectively. The members of these COs can acquire loans to purchase agricultural inputs by depositing 25 percent of the value as "guarantee" funds, and repaying the amount in six months. One of these COs also established a voluntary savings community fund, and collected Rs 26,000 in only two months.

ActionAid contacted the WUO to start the adult education program. The WUO of Sub-system 4 formed a four-member committee to assess the need for adult education and identify potential candidates from among males and females. Upon the recommendation of the WUO committee, ActionAid has started the adult education program through the WUF. Twenty schools (11 for females and 9 for males) will be established in the region under the WUOs. Training to nine female teachers of Sub-system 4's WUO has already been provided. ActionAid will provide a small monetary compensation (Rs. 500) to female teachers. A WUO member will supervise this education project. Appointing males to supervise the female adult educational project was considered socially sensitive.

3.7 IMPACTS ON FARMER-FARMER INTERFACE

A farmer can learn better when he interacts with another farmer because there are no barriers of language and technical jargon when he interact with his fellow colleague. The impact in the farmer-farmer interface is also significant. There were four important events in which the farmers of the Hakra 4-R Distributary interacted with farmers from other regions, including farmers from abroad. These events are discussed below.

Study Tour to Nepal

A group of 25 member farmer-leaders from the Punjab and Sindh Provinces visited Nepal to study its irrigation system. The objective was to experience a diverse environment of irrigation systems comparable with distributary management systems of Pakistan. Nepal was selected because of its various modes of irrigation systems. Farmers visited two farmer-managed, two agency-managed and one joint-managed (both old and recently transferred) sites. Another objective was the similarities in the hierarchies of the system, although the system sizes are different. In addition, there was not a language barrier and the farmers of Pakistan could interact in *Urdu* with the farmers of Nepal.

Study Tour to Khanpur

A one-day study tour for 37 WUO and WUF leaders was organized on a cost-sharing basis. The objective was to demonstrate the results of improved agricultural practices (Bed-and-Furrow) initiated by a progressive farmer in Khanpur.

Study Tour within the Distributary Commands

AWVF's member experimented bed-and-furrow technique for wheat crop. Seven leaders from Sub-systems 1 and 2, headed by WUF leaders, visited his farm. The objective was to witness newly-adopted improved irrigation practices in the local environment.

Study Tour to Swabi SCARP

A study tour to the Swabi SCARP in North West Frontier Province (NWFP) was funded by the NRSP, in which a 21-member delegation participated. The objective was to facilitate farmer-interaction in a diverse irrigation environment. The soil and ground water conditions are different than the Hakra 4-R area. The farmers found this tour useful for their knowledge on agriculture and irrigation practices.

After visiting Nepal, farmers became enthusiastic about managing the distributary system. They were also motivated to undertake repair and maintenance activities without support from the PID, which contributed to confidence building in accepting management responsibilities. After the Khanpur visit, farmer-leaders requested IIMI to assist them to adopt the bed-and-furrow technology in the area. Nearly 40 farmers experimented bed-and-furrow technique for cotton crop on 200 acres. Experimentation for adoption of improved agricultural technology was itself an important impact of farmer-to-farmer study tours. Other farmer-to-farmer study tours also helped dissemination of knowledge about improved agriculture practices.

3.8 FO IMPACTS ON THE PIDA'S LEGAL FRAMEWORK

3.8.1 Existing Legal Provisions for Distributary Level FOs in Pakistan

At present, the provinces are experiencing many inconsistencies in the laws that constitute the legal framework of the Water Users Federation. The NWFP, Baluchistan and Sindh Cooperatives, and WUA ordinances, provide for the formation of associations at the distributary and canal levels, and mention the participation of farmers' federations in water distribution and the construction of hydraulic structures at the distributary level. However, the Punjab ordinance does not provide legislation for the creation of farmers' federations at the distributary and main canal levels. The Canal and Drainage Act (GOP, 1873), under Section 4-A, however, provides for irrigation/canal committees to play a limited role in assisting the management of irrigation offences. Now there is no legal recognition of water users' federations at the distributary level. Hence, there is no detail of sharing responsibilities for the O&M of the distributary channels in the Punjab Province.

After the formation of the Water Users Federation at the Hakra 4-R Distributary, several issues such as the legal framework, power sharing, and financial and technical support need to be addressed in order to make the Water Users' Federation viable and sustainable. Legal recognition has emerged as the most important issue.

3.8.2 Meeting Between Legal Consultant And FO Members

A legal consultant commissioned by IIMI visited the field area and met various zonal organizations and the members of the WUF. His discussions with the farmers were mainly centered around power-sharing, water disputes, water allocation procedures, maintenance of the system, assessment and collection of *abiana*, organizational structures at the watercourse, sub-system and distributary canal levels, the powers of WUF members and fund-raising for distributary management.

WUF members express that the PID should respond to WUF requests. Participants were of the view that they were not looking for a complete turnover, but rather preferred joint management of the

system with certain tasks to be shared between the parties. WUF members gave many suggestions that cover aspects related to:

1. administrative control;
2. legal;
3. operation;
4. maintenance;
5. Assessment and collection of *abiana*; and
6. dispute resolution.

3.8.3 Important Suggestions by Farmers

Administrative control

- The *beldars*, mates and the sub-engineer should work under the WUF and be paid only if the WUF certifies their performance as satisfactory and up-to-the-mark;
- If breaches are caused through PID staff negligence, the losses should be compensated by the PID;
- The WUF should report free-riders, upon whom the PID should take action;
- The PID and WUF should be jointly responsible for checking outlet discharges, and those drawing more or less water should be remodeled;
- Local farmers should report on the performance of the department employees;
- Financial allocations / expenditures should be shown to the WUF;
- WUOs should have powers to summon and inspect official records; and
- The WUF should be aware of expenditures incurred on the distributary.

Legal

The WUF, WUOs and WUAs should be registered and officially recognized. Otherwise, an administrative order should bind PID staff to share responsibilities and funds with the WUF. Once registered and farmer-colleagues become familiar with investment procedures in O&M to improve the irrigation service, they can collect funds to undertake the responsibility themselves.

Operation

- Additions to the outlet discharges should be accompanied by additions to distributary sub-system level discharges;
- WUOs should be entitled to sanction amendments in the *warabandi* at the local level and disagreements should be appealed at higher levels of the organization. The department should only vet decisions suggested by the WUOs; and
- In consultation with farmers, the rotation among distributaries should be amended urgently, as several farmers miss two or more consecutive turns in the 8-day rotation.

Maintenance

- Farmers should conduct earthwork-type repairs and supervise the remaining activities jointly;
- Farmers should establish a direct labor system for the annual desiltation and the department should transfer necessary funds to the WUF; and
- The WUF should consent to planned development / repair and improvement works along the distributary.

Abiana

- The *numberdar* should still collect *abiana*, but deposit a portion with the WUF as agreed between the department and the WUF; and
- The details of *abiana*, assessment, collection, and its usage for the last two years should be made available to the WUF.

Irrigation Mmisbehavior

- The WUF should be enabled to register, investigate, and decide penalties related to irrigation crimes, including defaulters, and disputes should be referred and solved at the WUA level rapidly;
- Disputes on water turns and *warabandi* violations that require fresh evidence should be solved by the watercourse committee;
- Disputes among watercourses of the same sub-system should be solved by the zonal organizations;
- Irrigation offenses such as stealing water through siphons, *mogha* tampering, etc. should be investigated by the department with the involvement of the WC committee, and sanctions upon the investigation team's recommendations should be effected; and
- A fine payable in cash for office bearers involved in such crimes should be imposed, and funds thus collected should be considered as an *abiana* payment.

Participants expressed that they did not want the responsibility of all the powers and functions of the department, but only some power-sharing to implement O&M activities more efficiently and economically.

3.8.4 PIDA Sought FO Insight for Legal Framework

The existing irrigation laws in the Punjab Province do not provide for the establishment of farmers' organizations at the distributary and canal command levels, but do provide nominal professions to farmers in irrigation management at both, the watercourse and distributary levels. Towards this end, the PIDA Legal Consultant developed a Legal Framework (LF) to increase the farmer organization role at higher tiers of the system, which was sent to the Hakra 4-R Distributary WUF for comments. Following comments on the LF were made by the farmers.

- The tenant should only have the right to vote, not to contest elections. Only the permanent landowner should be entitled to contest elections. The LF does not provide a clarification;
- The age entitlement for irrigators to vote should be 18 years. The LF does not propose an age limit;
- A farmer owning less than 1 acre of land should not be allowed to contest elections. The LF does not propose a qualification;
- Individual membership to the WUF may be cancelled if two consecutive meetings are not attended without providing a genuine reason. The LF does not propose punitive measures;
- Where it is not feasible to have one representative from each watercourse, the authority should make necessary alterations in any one or group of watercourses in consultation with FOs in the area. The LF does not propose FO consultation;
- The WUF General Body should fill the remaining period of any vacancy arising in the management committee. The LF does not mention an appointing authority;

- A person cannot serve on the WUF management committee if he is in government or semi-government employ. The LF mentions certain specific government departments for disqualification;
- A member shall be dismissed from office if he is proved involved in criminal activities/corruption and should not be eligible to contest elections in the FO for the following three years. The LF does not stipulate a related disqualification;
- A no-confidence vote against management committee members requires a simple majority of 51 percent. The LF does not specify a necessary majority;
- Management committee members should avoid complexities when votes become equal. The LF proposes 8 votes;
- The FO higher authority settles disputes relating to the election of office bearers. If not resolved, disputes are then referred to the AWB Tribunal. The LF proposes settling disputes directly through the AWB Tribunal;
- When 50 percent of the management committee members request a meeting, the chairman should convene it within three days. The LF proposes 7 days; and
- The secretary maintains an up-to-date record of FO general body members and their addresses. The LF does not propose this duty.

The hope is that the PIDA will consider farmers' suggestions and opinions when finalizing the legal framework. Except one or two suggestions all the farmers' comments are worth considering. Involving farmers to develop this legal framework is in itself a healthy sign.

3.9 IMPACT ON JOINT MANAGEMENT AGREEMENT

3.9.1 Negotiations with the PID: Chronology and Impacts

The water users of the Hakra 4-R Distributary formed their Water Users Federation on March 5, 1997. The WUF started negotiations for Joint Management since its formation. These negotiations were the joint endeavor of both, the WUFs of the IIMI pilot project at the Hakra 4-R Distributary and the OFWM's pilot sites of the Sirajwah and the Bhukan Distributaries of the Fordwah Eastern Sadqia (South) FESS Irrigation and Drainage Project. Details of the negotiations are provided below.

The farmer-government interface covers a wide range of negotiations. The WUF first submitted a proposal for the Joint Management Agreement (JMA) to share distributary management responsibilities before the PIDA Act is enforced. There have been written responses and counter-responses by the WUF and the PID on the WUF JMA proposal. Besides this, there has also been a series of meetings between WUF representatives and the PID officials to discuss the arrangements of responsibilities between the WUF and the PID for the interim period. As an outcome of these negotiations, an eighteen-point Memorandum of Understanding (MOU) was agreed upon between the WUF and the PID at Haroonabad on January 9, 1999. When this MOU was about to materialize, the Secretary of Irrigation offered the WUF the acquisition of responsibilities under the PIDA legal framework, which they accepted. The logical outcome of these negotiations as proposed by Skogerboe et. al (1993) is the agreement on joint management responsibilities. Details of some important negotiations are provided below.

- After federating themselves at the distributary level on June 6, 1997, the WUF President wrote its first letter to the Secretary of the Irrigation and Power Department to inform the Secretary about the objectives, future goals and main problems of farmers along the Hakra 4-R Distributary. Ensuring equitable water distribution, timely and better maintenance, implementation of transparent assessment and collection of *abiana*,

and resolution of water disputes at the local level were the four main objectives of this letter; and

- On August 18, 1997, the Hakra 4-R Distributary WUF sent the detailed Joint Management Agreement proposal to the PID, suggesting that changes in the existing water rights should be the WUF's responsibility, and that once water enters the distributary it would be the WUF's property.
- In a follow-up meeting on November 17, 1997 between IIMI seniors and WUF representatives, the opinions of farmer-leaders on the five-point JMA offered by PID were raised. These five points were to declare WUA presidents as *numberdars*, to register WUAa as canal committees, to prioritize maintenance work through WUAs, to authorize WUOs to manage disputes locally, and to consult farmers when preparing the rotational schedule.
- On December 24, 1997, WUF representatives met the Secretary of Irrigation and Power to discuss the WUF's role and to restructure the PID's responsibilities for the Hakra 4-R Distributary pilot project. This meeting was the outcome of two earlier meetings between IIMI and PID senior officials, between March and November 1997;
- In view of discussions in the above meeting, the WUF president prepared a brief proposal within the five-point jurisdiction offered by the PID. The WUF had to reconsider its response because the PID was neither willing to give the farmers major responsibilities, nor prepared to undertake any special administrative arrangements for the Joint Management of these pilot sites;
- On February 4, 1998, the WUF prepared a two-page comprehensive proposal demanding more responsibilities and clarifying the modalities of the responsibilities if given within only five points. The main points of this proposal are:
 - 1) WUF members agreed to assume the role of the canal committee. The department envisages a limited role for the canal committee to include checking water theft and providing evidence accordingly. The WUF, however, demanded the canal committee's involvement in assessing and levying penalties (*tawan*) to water stealers and to consult them when modifying outlets;
 - 2) The WUF is eager to collect *abiana*, as it is of the view that the revenue gap is due to under-assessment. The WUF proposed that assessment officials and *lumberdars* jointly continue responsibility for conducting an error-free survey, before the *patwari* verifies the survey with respective canal committees (water users' associations);
 - 3) WUF members agreed to become responsible for prioritizing maintenance needs, and demanded further involvement in the supervision and monitoring of maintenance work and quality control; and
 - 4) WUF members agreed to resolve water-related disputes on the premise that the department cooperates by referring disputes to them and acknowledging their decisions. They also agreed to be consulted for programs / plans that ensure adequate, reliable and equitable water supplies.
- The WUF submitted this proposal to the Secretary of Irrigation and Power through the IIMI-Pakistan Director on February 6, 1998;
- On October 31, 1998 the WUF met with the Secretary of Irrigation to discuss arrangements for the Joint Management Agreement. Farmer-leaders from the OFWM pilot sites of the Sirajwah and Bhukan Distributaries also participated in the meeting.
- The Superintending Engineer prepared a twenty-point Memorandum of Understanding (MOU) and sent it to the WUF on November 20, 1998 for comments. The farmers totally rejected this MOU. The reason of rejection was that PID wanted farmers to

perform tasks with out any right. Of the 20 clauses of the MOU, in 14 clauses, the WUF or its leaders were made liable for punitive measures or were made triable under law if they fail to perform functions.

- Four important government dignitaries met WUF leaders on April 15, 1999 in Haroonabad to discuss transferring responsibilities of the Hakra 4-R Distributary systems to the FO. The Secretary of Irrigation and the Chairman of the Agriculture Task Force arranged this meeting upon their joint request. The Hakra 4-R Distributary leaders also invited FO leaders from the Sirajwah Distributary. The two objectives of this meeting as stated in letters from the task force dated April 8 and 12, 1999, respectively, were: 1) to discuss the drainage issue in the FESS area; and 2) to discuss institutional arrangements for the Hakra 4-R Distributary.

Mian Abdul Wahid, the president of the Hakra 4-R Distributary, delivered a detailed presentation to the delegation, the Secretary and the Chairman of the Task Force.

The Outcome and Impact

The WUF president was urged to either sign a 24-point MOU as an interim arrangement on that day, or to wait until the PIDA framework was finalized in about two months' time. The WUF decided to wait for two months, as it preferred to take management responsibilities under the PIDA framework. The Secretary agreed with this proposal. Later when Government approved PIDA's legal framework in September 1999, the FO again submitted a Joint Management Scheme (JMS) for the Hakra 4-R Distributary. This scheme also could not materialize because of lack of preparation of PIDA for transferring the major responsibilities. Several fundamental issues such as apportionment of O&M costs, management of financial system of FOs, negotiations on water rights, transfer of assets, necessary training of the WUF leaders and redeployments of PID staff in the pilot sites were not settled.

3.10 IMPACTS ON CONFLICT MANAGEMENT

The outcome of conflict management at the local level epitomizes the WUF's ability to settle disputes locally. The traditional judicial system is highly time-consuming and bothersome. In contrast, this ends in harmony and unanimity, which could otherwise result in further conflicts and enmities. The pre-takeover period is also witnessing the short-term impacts of conflict management. A total of 20 disputes were submitted to WUOs for adjudication. The features of these disputes are:

3.10.1 Types

The disputes submitted to WUOs for arbitration by the water users can be classified into five broader types: irrigation, improvement works, land, organization and family. More specifically, the disputes between upstream and downstream farmers on water theft, infringed water turns, the minor's lining route, alignment of ridges, contribution of irrigation-related funds, selection of office bearers at the watercourse level, and between wife and husband, are being tackled.

3.10.2 Extents

There was a large variation in the extent of occurrences among the Sub-systems. Majority of the disputes was referred from Sub-systems 3, 4 and 5.

3.10.3 Modes

Inter-member disputes were frequent among the WUAs. There were, however, cases when the disputes were between the members of two different WUAs, and among the farmers and department staff. A few cases related to resolving water disputes are presented here as examples.

- In order to feed his upstream outlet, a farmer from Watercourse 105-R blocked the distributary with tree branches at RD 107 on August 5, 1997, when the distributary was at low flow. A downstream farmer, noticing the reduced water supply, sent his two boys to remove the blockage. The farmer guilty of the offense came across the boys thus disposed, and started beating them, snatching their bicycle in the process. The dispute was referred to the WUF, and a total of 47 farmers formed the *panchayat* called at the WUF president's residence. After hearing both parties, the president declared the offender guilty of blocking the distributary, beating the children and stealing their bicycle. In compliance with the WUF's decision, and in the presence of the *panchayat*, he apologized to the aggrieved farmer. The WUF has also proposed a fine of Rs 5,000 for similar offenses in the future (Waheed-uz-Zaman and Hamid, 1998).
- Another dispute in the XEN court, which remained unresolved for over six months, has been settled by the WUO: A head reach shareholder from Sub-system 4 solicited an additional water turn from the PID, which another farmer claimed as his right. The case remained unresolved for several months, and was eventually referred to the WUO. The WUO executive body requested each litigant to provide two adjudicators of their choice, as well as a written statement binding them to comply with the jury's decision. Both parties provided two adjudicators nominating Muhammad Khan, the president of the WUOs, as the chairman of the adjudication committee. The chairman was given the authority to take decisions after the hearing. The jury, after hearing the case, decided that the water turn in question belonged to a third person, and not to either of the litigants. Accordingly, the water turn was allotted to the third person, and accepted by the disputing farmers.
- The third example is that, there was a breach in the diversion channel near *Chak* 64/4-R. The China Beijing Corporation (CBC) staff (a contractor company for Distributary Lining) filed a case of "deliberate cut" against two farmers. The CBC staff captured the farmers and handed them over to the police. The farmers of the village approached the WUF to settle the dispute. The WUF president and the General Secretary invited both parties to the WUF office. They asked farmers to provide an explanation about the allegation, in the presence of CBC staff. Both farmers were found innocent. The President and the General Secretary then went to the police station to help the farmers and the case was abandoned.

Of the 20 disputes referred to the WUOs, 19 were settled successfully and the remaining 1 is still pending till completion of this report. Among these, some were referred to the sub-system level WUOs and some other to the apex body (distributary level WUF). The disputes were settled through the formation of a *panchayat*, creating arbitration committees comprising 2-5 members, and collectively and individually by WUO executive body members (for more detail of these disputes, see Waheed-uz-Zaman and Hamid, 1998). Besides the water disputes, WUO leaders were approached to settle non-water disputes such as family disputes between husbands and wives.

3.11 NEGATIVE IMPACTS OF FARMER PARTICIPATION

3.11.1 Jealousy on Exposure of Leadership

WUO members had opportunities to participate themselves in national and international forums. These exposures enhanced their personal confidence, as well as helped to broaden their perceptions on the benefits of collective action.

On the other hand, this created jealousies among some members. This situation became most obvious among WUO members when only five WUF executive body members were included for the irrigation study tour to Nepal. The tour was sponsored by the Swedish Development Cooperation, which bore the full cost, including participants' pocket money. These perks motivated feelings of friction among the others. Some members at the sub-system level objected, and the situation worsened when a WUF executive body member had to be excluded from the study tour and was replaced with an office bearer of a sub-system level WUO, because of his mature age. The criterion for selection was broken for genuine reasons, but created friction among members of the sub-system level WUOs.

The Nepal tour created so much enmity and ill-feelings among members that a watercourse level WUA's president, belonging to Sub-system 3, quit the association in protest against the provision of these perks, and isolated himself completely from WUF organizational affairs. The latest report from field shows that this member has again, started participating in WUF's activities. This member had been an extremely active member before, and his two main objections were:

- The selection for the Nepal tour was limited to the leadership;
- The pocket money that participants received should have been deposited into the WUF's common fund.

Friction was also visible in Sub-system 4's WUO. Two office bearers started defaming the Information Secretary, who is a schoolteacher and had been a participant of the Nepal tour. These two office bearers instigated a farmer to file 24 complaints against the Information Secretary to the Education Department within the period of one year. The main focus of these complaints was that the Information Secretary was not performing his teaching duties properly because of his involvement in the WUF's organizational activities. He also filed false written complaints of fund embezzlements against the Information Secretary. Consequently, the Information Secretary had to face a departmental inquiry, and he requested a transfer to another school, but antagonism between these office bearers persists.

3.11.2 Personality Clash among Leaders

The WUF has provided opportunities for different leaders to flourish politically. Two important WUF office bearers are also political rivals. Sub-system 2's WUO president and the distributary's WUF president had rivalries with each other. The WUF president had more exposure with government agencies, and had been abroad. Now the president of Sub-system level WUO has become totally inactive due the jealousy of the president of the distributary level WUF.

3.11.3 Lack of Subsequent Follow up on Decisions

Personal enhancement creates jealousy and prejudice among members. Further, this promotes a lack of cooperation, which then inhibits the organizational growth of the WUOs. Abundant evidence of instances when members did not cooperate with each other in organizational development activities

exists. The organization is weak in its follow-up instruments due to the lack of support from ordinary farmers.

- The WUF introduced the bed-and-furrow technique to grow the cotton crop in the area. IIMI provided the WUF with two furrow shapers, which were given to farmers on rent. Many farmers used the implements, but did not deposit the rent;
- The WUF formed a committee to recover the rent for the furrow shapers, but this committee did not even meet even once until September 1, 1998; and
- Immediately after its formation, the WUF established common funds. The WUF imposed an equal contribution of Rs. 2,000 on all of the five sub-system level WUOs. Some WUOs deposited their shares within a few days. Two WUOs, for example, did not deposit their shares even after two years has lapsed.
- Sub-system 3 set up a committee to inspect oversized outlets. Although this is a positive impact towards maintaining equity, the report indicated that the committee could not perform any of its tasks because of the lack of cooperation among members and the lack of subsequent action taken on decisions. The outlets, however, inspected by the Chairman of the Committee. He reported that of the 27 outlets of Sub-system 3, 9 were oversized.

The reasons for the situation mentioned in the preceding section, are that an effective mechanism for subsequent action taken on decisions, and support to the WUF executive body by other members does not exist.

3.11.4 Gap Between Leadership and Grass-roots Membership

Because of the lack of means and process in communication, organizational information and decisions by two higher tiers does not reach the grassroots. Consequently, some members think that they are being deprived of some of the opportunities availed by members of the Executive Bodies of these tiers (Progress Report, September 1998).

Since all the organizational and management activities are performed by the two higher tier organizations (sub-system level WUO and distributary level WUF) the watercourse level association does not engage in any organizational activities. This has resulted in the absence of interaction between the office bearers of the watercourse level WUAs and the community. Similarly, there is a serious communication gap and lack of purpose between the WUF leadership and the watercourse level WUAs. Consequently, in some of the watercourses, the WUA general members have forgotten the names of the WUA executive body members (Progress Report, September 1998). The pre-takeover period was devoid of scope for salient activities at the watercourse level. In the proposed Memorandum of Understanding (MOU), the WUAs are eager to take over management activities, such as involvement in the assessment and collection of *abiana* and the resolution of disputes.

3.11.5 Increased Antagonism Among Office Bearers

Antagonism increased among office bearers of some of the WUOs after the organizational process. The WUF platform had provided international exposure, opportunities for inland training to selected office bearers, and opportunities for organizing big events at the local level, such as oath-taking ceremonies and maintenance campaigns. These opportunities led to the personal enhancement of farmer-leaders. As a result, capable leaders started managing organizational affairs. The dominance of some leaders inculcated feelings of prejudice among other office bearers. These leaders started propaganda campaigns against the active office bearers in order to discredit them and to take

leadership role from others . These moves were more prominent in Sub-system 4's WUO, but most of these moves remained unsuccessful because of insincere motives such as desire of leadership and vainglory.

Leadership exposure when organizing big events at the local level also instilled animosity among various WUF leaders. Another example of an event which accelerated antagonism among members is given here. An office bearer from Sub-system 5's WUO had a leading role to facilitate the logistics of the maintenance campaign conducted in the annual closure of 1998-99. This office bearer is not a WUF general assembly member, but he was given these responsibilities because he is well qualified. As he is not a member of the apex body, other office bearers expressed that he should not be preferred for leadership opportunities. Sub-system 3's office bearers have become envious towards him and are openly saying that he should not be given leading roles in organizational affairs.

3.11.6 Increased Competition in Water Distribution

Future institutional reforms will provide operation and maintenance as the WUF's two main responsibilities. Operations and maintenance (O&M) are interconnected, and yet, can be viewed separately. The operations create competition between the water users, whereas, the maintenance has the element of organized behavior. The WUF of the Hakra 4-R Distributary undertook two maintenance campaigns in the annual closures of 1997-98 and 1998-99, in which 796 and 626 farmers participated, respectively. The general belief is that upstream and downstream farmers do not cooperate, but in this campaign the farmers of lower reaches participated in repair and maintenance of the initial section. This shows that maintenance has the element of organized behavior and cooperation.

Farmers have reported that the cooperation among farmers in irrigation-related matters has improved within the sub-systems, but the water distribution has created competition among the sub-systems. This competition became more evident since the formation of the WUF. This negative impact of the WUF on the issue of water distribution was so visible that, for example, it caused serious friction between two members of the executive body of the WUF. One of these office bearers submitted his resignation in an open meeting. The reason for increased competition and friction between these two members is described below.

The Hakra 4-R Distributary bifurcates into the administrative units of Sub-systems 3 and 5 at RD 72+200. One main office bearer owns land in the command area of Sub-system 5. Coincidentally, the PID Sub-engineer also owns agricultural lands in this sub-system. With support from this office bearer, the Sub-engineer diverted more water into this sub-system by placing *karies*(wooden logs) at the bifurcation. He repeated this action against the will of Sub-system 3's water users. Another WUF executive body member from Sub-system 3 presented this issue to a WUF meeting. He condemned the alliance between the Sub-engineer and the office bearers from Sub-System 5 for issuing more water to their sub-system. In a WUF meeting the Sub-engineer was supported by Sub-system 5's office bearer, which created conflict between them. The tussle ran so high that the office bearer from Sub-system 3 attempted having the Sub-engineer transferred, but the office bearer of Sub-system 5 worked for the Sub-engineer. This resulted in increased friction among these two office bearers, and consequently, the office bearer of Sub-system 3 submitted his resignation in protest against the alliance between the Sub-engineer and the WUF's office bearer from Subsystem 5. However, his resignation was not accepted, and the WUF president managed to cool the issue down, even though friction on this issue still exists between these office bearers.

WUF office bearers of Sub-system 3 now keep an eye on the regulation at the bifurcation structure at RD 72+000. On April 25, 1999 at around 10 am, the author himself saw the WUF Information

Secretary, along with two other WUO members, checking the *karies* in the head regulator of the Hakra 4-R Distributary at RD 72+000. They discovered that these had been placed to feed the Subsystem 5 (1-R Minor). They also perceived that WUF office bearers had instigated this, which suggests that water distribution will generate conflicts among the members. Similarly, after the formation of the WUF, modifying the outlets will be a great challenge for the WUF, especially when it involves their own recommendations.

The author of this report has already expressed his apprehensions and concluded in his thesis research that WUOs will encounter many problems after taking over the system. Water distribution will be the most conflicting one (Waheed-uz-Zaman, 1998). Such evidence has already started emerging as mentioned in the preceding section. These problems will be graver when the WUOs will have the authority to allocate supplies among the sub-systems, and among the new water turns. They will be even graver when WUOs take some steps to reduce the supplies of over-sized outlets by eliminating informal payments and by correcting faulty outlets. Therefore, the WUOs' sustaining ability as a service provider organization might have negative impacts on inter-member, as well as inter-organizational relations. These anticipated negative impacts could diminish by providing organizational, leadership and management training to WUF members in the initial years of the service-oriented environment.

4 CONCLUSIONS

The water users of the Hakra 4-R Distributary formed their water users' organizations (WUOs) on March 5, 1997. Two and half years after their formation, the government has still not recognized them as a legal entity. The WUOs were, however, operative and functional during this period. They took many organizational and management functions to prove their mettle and strength. These activities witnessed many impacts. The grades of these impacts vary from just obvious to substantial among the different areas of impact assessment.

There are periods of low, high and no-demand in both, the *rabi* and *kharif* seasons. In instances of low and no-demand, farmers usually close the outlets. The effect of outlet closures reaches the tail-cluster and causes the submergence of watercourse commands; consequently, worsening waterlogging conditions. A flow of information between the farmers and the agency staff on such crucial management issues did not exist. After the formation of the WUOs, members started submitting requests to the WUOs to force department staff into decision-making for operational activities. In two instances the distributary was closed for 1 to 3 weeks, and in other instances the regulation was conducted using *karies* (wooden logs); for the first time under the control of the WUOs, which shows that farmers' demands for water supplies started reaching the PID quickly. This is a substantial impact in view of distributary operations that consider farmers' demands. This has resulted in better regulation and operation of the distributary.

The general belief of the irrigation professionals is that WUOs will be controlled and monopolized by "influentials" and that more inequity instead of equity will result. Contrary to this belief, the Hakra 4-R Distributary WUO office bearers took many measures to induce water equity. Although the farmers cannot improve equity unless they have more power, their opinions matter in management functions. For example, controlling water theft is not possible without power, which they do not have yet. But, they took certain measures to induce equity, which were voluntary and without legal cover. As is applicable to routine water supplies, additional water available in *kharif* should be equitably available to everyone. The three WUO leaders' decisions to refrain from installing *kharif* pipes was a step towards achieving equitable water distribution. The WUOs also assisted the Irrigation Department in correcting the outlets to improve water equity at the tail.

The synthesis of farmers' perceptions during a walk-thru survey to assess O&M needs was another discernable impact of farmer participation. Different reaches have different maintenance problems. The walk-thru survey was an important activity when assessing maintenance needs. One-hundred-and-five farmers and their leaders participated, from the head to the tail reaches. This walk-thru survey led to the synthesis of farmer-leaders' indigenous knowledge. Furthermore, it led towards farmers' deeper understanding of the physical aspects of the systems, as well as facilitating capacity building. Another positive impact is that maintenance activities were endorsed with social approval of the farmers at the implementation stages.

The farmers were involved in all of the assessment processes for O&M needs. The costs were calculated for all the major maintenance problems. Farmers used this information to prepare the Joint Management Agreement (JMA). The O&M needs have been translated into management and financial responsibilities. A farmer-leader is translating this business plan into *Urdu*, which is another noteworthy impact of farmer participation.

The WUF's undertaking of cost-effective and less expensive maintenance is another noticeable impact of farmer participation. The WUOs undertook a five-day maintenance campaign in the annual closure of 1997-98. They formed a WUO Maintenance Committee to assess and prioritize

maintenance problems, and later formed the Maintenance Evaluation Committee to evaluate work conducted by various WUOs. The difference between the actual and assessed cost of resources mobilized indicates that the farmers can manage the system very cost-effectively when compared to government costs. This shows that if the department had hired contractors the cost would have been three times more. The maintenance campaign conducted by the WUOs spanned only two weeks, including the field survey by the maintenance committee. A clear impact of the maintenance undertaken by WUOs is that it is cheaper, more efficient and based on needs.

Participation of the downstream farmers to repair the initial section of the distributary is also visible evidence of impact. The general notion is that upstream and downstream farmers usually have conflicts of interest. This is especially considered true in the case of head- and tail-enders. But, in the case of the Hakra 4-R Distributary, all the WUOs participated in the repair of the head reach in both maintenance campaigns undertaken in the annual closures of 1997-98 and 1998-99, respectively. This also shows a very broad impact on the organizational behavior of the WUOs.

The impact on mobilization of common and contingency funds is obvious. Membership contributions towards these funds range from 60 to 70 percent among the different WUOs. The impact on the mobilization of funds by the higher level membership was immediate and rapid because these funds were established at the outset of the WUOs. This fund was equal and compulsory. However, this cannot be attributed at the grassroots level. The real impact comes when common folks also participate to raise funds. This level of impact was very slowpoke and gradual and took nearly one-and-half years after their formation. The impact at this level was noticed when all 122 watercourse-level WUAs completed the process of establishing bank accounts by mobilizing equal and compulsory funds at the grassroots level, because voluntary funds do not have positive organizational impacts. Voluntary funds can have positive impacts if they are mobilized to motivate others.

Another prominent area of impact in resource mobilization is the knowledge with which to disseminate indigenous and organizational skills. Thirteen WUO leaders delivered 21 lectures ranging from technical to organizational topics, i.e. as resource persons in flow measurement training courses and sub-system level WUO's organizational meetings, receptively. This is also an important area of impact because it shows the WUO capacity to use local resources. This potential indicates that if WUOs invest in their selected members their capacity building will be enhanced.

Skeptics among policy makers, planners and professional engineers believe that farmers are illiterate and lack management capacity. Capacity building activities undertaken by the WUF prove that farmers can be trained in technical activities and that they have the potential to manage the distributary system.

The impact in the mobilization of organizational networking was clearly visible. The WUOs undertook a wide range of activities (from irrigation management to the environment) to solve the farming community's problems. The impact was quite visible because these problems were solved by mobilizing organizational links, and without informal payments. These links were not used for their personal interests, but rather, WUO leaders were motivated enough to network. This is one very positive and healthy impact.

Interaction between the WUO and government agencies has improved considerably as a result of interfacing. The WUO has had three formal meetings and 8 written interactions with the Secretary of Irrigation to discuss arrangements for management responsibilities. Consequently, in the meeting of January 8, 1999 with senior local PID officers, a 24-point Memorandum of Understanding (MOU) has been agreed. The ideal impact would have been that responsibilities would be transferred to the

WUOs, but there is still a substantial impact of these interactions as some limited roles for the WUF and PID in the management of the distributary has been redefined. But later, in the meeting of April 15, 1999, the Secretary of Irrigation agreed to give management responsibilities to the WUF through two options; under interim arrangements and under the PIDA legal framework. The WUF favored the PIDA framework.

The second positive impact associated with these interactions is the increased commitment to participatory reforms at the higher level of the Irrigation Department. This commitment was very clearly shown by the Secretary of Irrigation in the meeting of February 23, 1999 with the seniors of IWMI and the PID. At the inception of participatory reforms, PID higher-ups emphasized restraining the WUOs within the jurisdiction of Section 4-A of the Canal and Drainage Act, which provides for the involvement of farmers to assist in irrigation crimes only. Department staff is now willing to test the participatory approach by transferring major responsibilities to the farmers.

Farmers pay special charges for additional water supplies. The third impact, as a result of farmer-agency interactions, is that informal payments to agency staff for additional supplies have been reduced significantly. Information collected on the informal payments for tampered outlets shows that there is a significance reduction in these payments. This impact varied evenly throughout the distributary command. The field investigation also showed reduced instances of irrigation misbehavior during the first year. There was not even a single case of outlet tampering in the first year after the formation of the WUOs. But outlet tampering increased later during erratic water supplies due to lining works at the distributary level.

Private sector recognition of WUOs as potential delivery points for agricultural inputs is also an encouraging impact. Private sector representatives contacted WUO leaders to deliver agro-chemicals on behalf of their companies. This shows the WUOs' ability to expand its functions in non-irrigation matters, which also reflects the credibility of the WUO to deal with the private sector.

A formal forum needs to be established at every project site to secure the support of collaborative partners. In the start of the project the Field Implementation Coordination Committee (FICC) could not get enough support from field staff of the line agencies. But later, in 1997, it was the main vehicle for interface with the local staff of line agencies. The FICC at the Hakra 4-R Distributary acted as a problem-solving platform for farmers. The two reasons why line agencies were disinterested in the start of the project are:

1. They were unsure about the success of farmer-participation at the distributary level; and
2. They had no incentives to participate in collaborative activities.

When the impossible became possible (FO formed at the distributary level), farmers started approaching agency staff collectively. Collective action also encouraged them to enhance their collaboration. The implementers of social organization work require institutional support from such forums. The government should provide incentives to professionals and field staff, especially in their job descriptions, to collaborate with implementers through forums such as the FICC. Unfortunately, the FICC became inactive in 1998, due to the change in preferences in collaborative activities by the field team. The success of collaborative activities demands for personal initiatives on the part of team leaders of social organization field teams.

Another recommendation is that when the WUF becomes sustainable and operational, about 2 years or so after its formation, the FICC should be converted into Water Users Field Implementation

Coordination Committee (WUFICC), with active control and participation from WUF representatives.

The process of negotiations for the Joint Management Agreement with the PID was exacting on patience, as an enabling environment to facilitate the JMA was not present. A legal framework is essential for the creation of distributary level FOs while initiating such negotiations. These JMA negotiations were intended to provide very limited roles under Section 4-A (which gives provision of canal committees to assist the department in preventing irrigation crimes only) of the Canal and Drainage Act of 1873.

It is recommended that any JMA model should, however, contain the following essential ingredients: 1) the provision of services to the users, 2) contributions comprising farmer-payments or other resources in return for those services, 3) procedures to check that services and payments are provided as agreed, 4) each party not fulfilling the agreement should face the consequences, 5) authority to address conflicts, and 6) procedures to update the agreement (Hofwegene, 1996).

Besides these achievements and positive impacts the research has seen some weaknesses of farmer participation. The study shows the lack of purpose and cooperation between the grassroots and leadership, the lack of subsequent action on decisions taken, increased friction among WUF office bearers, and increased competition for water supplies among a few sub-systems. This situation suggests that the leadership needs to develop regular information channels to convey decisions to the grassroots.

The water users submitted their disputes to different WUOs for arbitration. After confirming the admissibility, some WUOs constituted formal juries to establish jurisdictional powers. For example, an unsettled dispute in the court of the Executive Engineer was referred to the WUO. The WUO formed an arbitration committee. The committee required that parties involved signed an agreement preventing them from appealing to the court of law against the decision of the arbitration committee. This exhibits the effectiveness of the WUO when handling disputes, and also demonstrates the degree of confidence that members have in their organization. A total of 20 disputes occurred and was referred to WUOs for resolution.

Referring disputes to WUOs by the members is itself an impact. The existing values of Pakistan's rural community encourages conflict. In the past, *panchayats* were very strong. All kinds of disputes have been referred and settled by these traditional institutions, even murder cases. With the passage of time a shift from tradition-bound institutions to policing has evolved. The reason is that people can bribe to influence decisions. In this situation the farmers organization can help revive the institution of the *panchayat*. This research has seen a tremendous potential to settle disputes locally. This also betokens that the old norms, customs and traditions can still be revitalized, and the need to return to the tradition-bound institution for brisk, cost-effective and efficient conflict management.

Farmers' comments on the legal framework indicate their prudence in the system management. They are aware of both, their rights and obligations. Thus, farmers need to be involved at the operational (day-to-day operation), strategic (planning and decision-making) and constitutional (legal component) levels during the process of institutional reforms.

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ANNEX I: LIST OF REGULAR MEMBERS OF FIELD IMPLEMENTATION COORDINATION COMMITTEE (FICC)* FOR FO'S PILOT PROJECT OF THE HAKRA 4-R DISTRIBUTARY

Sr. No.	Title of the officials	Department/Organization
1.	Sub Divisional Officer (SDO)	Irrigation & Power Dept. Govt. of Punjab
2.	Sub Engineer (SE)	Irrigation & Power Dept. Govt. of Punjab
3.	Sub Divisional Officer (SDO)	Irrigation & Power Dept.(Lining Wing) Govt. of Punjab
4.	Extra Assistant Director (EAD)	Agriculture Department, Govt. of Punjab
5.	Agriculture Officer (AO)	Agriculture Department, Govt. of Punjab
6.	Water Management Specialist (WMS)	On-Farm Water Management (OFWM), Punjab
7.	Sub Divisional Officer (SDO)	Public Health Engineering Department, Govt. of Punjab
8.	Assistant Commissioner (AC) Haroonabad	District Management
9.	Extra Assistant Commissioner (EAC) Haroonabad	District Management
10.	Veterinary Officer (VO)	Punjab Veterinary and Livestock Department
11.	Veterinary Officer (VO)	Punjab Veterinary and Livestock Department
12.	Manager	Agricultural Development Bank of Pakistan(ADBP)
13.	Manager	Pakistan Agriculture Storage and Supply Corporation (PASSCO)
14.	Senior Engineer	China Beijing Company (contractor of canal lining).
15.	President	Water Users Federation
16.	Vice President	Water Users Federation
17.	General Secretary	Water Users Federation
18.	Finance Secretary	Water Users Federation
19.	Information Secretary	Water Users Federation
20.	Team Leader, Social Organization Field Team	IIMI

*: Remained functional In the years 1997-98.