PARTICIPATORY IRRIGATION MANAGEMENT IN PAKISTAN: OPPORTUNITIES, EXPERIENCES AND CONSTRAINTS

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ABSTRACT

The contiguous Indus Basin Irrigation System of Pakistan covering an area of about 17 million hectares has been mostly operated and maintained by the government under the 130 years or so old Irrigation and Drainage Act of 1873. The mismatch between expenditures and revenues from the irrigation system resulted in continued deferred maintenance leading to poor performance and widespread inequity in water distribution to farmers, especially the tail enders. The Provincial Irrigation and Drainage Authority Acts were passed in 1997 for establishing autonomous and financially self reliant bodies at all levels of the irrigation system. Pilot studies were conducted by establishing Farmer Organizations (FOs) for transferring the operation and maintenance of the secondary irrigation system to them. The transfer of management was either partial, the so-called joint management, where the public agencies and FOs were managing the system jointly; or a complete transfer of management to FOs. The level of success has been varying from system to system and from province to province depending upon the motivation, capacity building and willingness of the agencies involved. There were cases where system performance had considerably improved in achieving a higher level of equity in water distribution, higher cropping intensity, higher revenues collection, reduction in conflicts and reduced operation and maintenance costs. Results from other systems with quasi participation of water users or the government departments have not been encouraging. The involvement of different organizations in different places with limited expertise, experience and resources for water users mobilization, capacity building and lack of democratic approach for establishing water users associations and organizations have been major factors for poor participatory irrigation management experience. While, experience with committed, expert and experienced organizations had been the other way round. Political involvement and fear of loss of authority have also contributed its share.

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INTRODUCTION

The deteriorating performance of irrigation systems due to lack of maintenance funds and vandalism in many Asian countries has been contributing to widespread inequities in water distribution. Poor management of available scarce water resources has led to lack of viability and availability of water during critical periods of crop growth. In large canal schemes in South Asia, it is common for one-third to one-half of a tail end of a designed service area not receiving water form canals. Numerous research studies by International Water Management Institute (IWMI) have documented the pervasive problem of inequitable water distribution in canal irrigation schemes in Pakistan, India, Sri Lanka and Indonesia (Merry, 1997). Similarly the gap between cost recovery and operation and maintenance (O&M) expenditures has been widening with the passage of time. The estimated operation and maintenance requirement in Pakistan was about US$5.70/ha compared with the actual expenditures of about US$2.70/ha (Skuteh, 1998). Low and declining rates of cost recovery are key threats to the sustainability of irrigation systems. Revenue collected from water charges equaled or exceeded the expenditures in the 1960 and early 70s in Pakistan. But, by the 1990, revenue collected from water charges was only 44 percent of O&M expenditures, fro surface irrigation (Vermillion 2005).

Participatory irrigation management (PIM) has been advocated in order to overcome the maintenance and management problems of irrigation systems. With the passage of time, irrigation has become more than a technological process and its management goes beyond the management of infrastructure to include management of human relationships between irrigators, water uses, organization officers and others (Coward 1980). Coward called for research on the human and organizational dimension of irrigation management and that irrigation should be considered as a multi-faced socio-technical enterprise.

THE IRRIGATION SYSTEM

Pakistan has the largest integrated irrigation network in the world. The system is fed by the waters of the Indus River and its tributaries. Since 1947, Pakistan has implemented the Indus Basin Replacement Works Project (IBRWP) with the World Bank's help as the lead donor. The salient features of the system are three major storage reservoirs, namely Tarbela and Chashma on the Indus River, and Mangla on the Jhelum River; 19 barrages; 12 inter-river link canals; 45 independent irrigation canal commands; and over 140,000 watercourses which are complemented by a surface drainage system comparable in size (Figure 1). The length of canals totals 61,000 kms, and in addition watercourses, farm channels and field ditches cover another 1.6 million kms. The system draws an average of 130 billion cubic meters (BCM) of surface water each year for irrigation, supplemented by an annual groundwater pumpage of some 53 BCM. With nearly 80 percent of the agricultural land being under irrigation, irrigated agriculture contributes significantly to the economy of Pakistan, where 25 percent of GDP, 50 percent of employment, and 70 percent of export revenues (directly and indirectly), are from agriculture (World Bank, 1997).

PRESENT STATUS

Although irrigated agriculture contributes significantly to the country's economy, Pakistan's irrigated agriculture suffers from waterlogging and salinity, over-

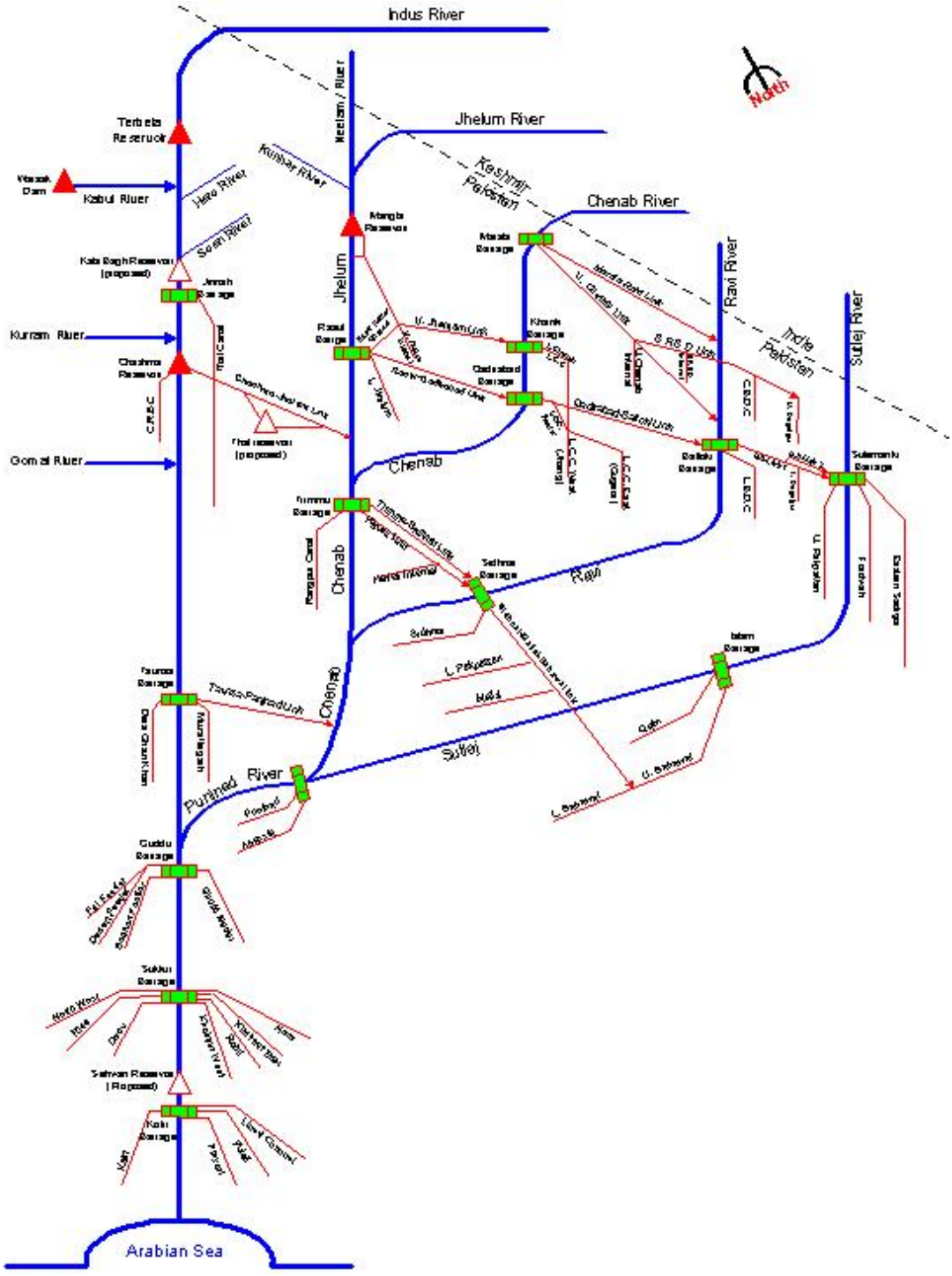

Figure 1: Indus Basin Irrigation System**.**

exploitation of fresh groundwater, low efficiency in delivery and use of irrigation water, inequitable distribution and unreliable delivery of water, and from insufficient cost recovery of irrigation and drainage charges. Waterlogging and salinity are the principal threats to the sustainability of irrigated agriculture in Pakistan. Nearly thirty eight percent of the Gross Command Area (GCA) is waterlogged, of which 15 percent is severely waterlogged. Fourteen percent of the surface is saline, of which 6 percent is severely saline. Salinity is estimated to rob farmers of about 25 percent to the potential production of major crops. Due to age, overuse and poor maintenance, the efficiency of delivery of the canal system is low, ranging from 35 to 40 percent from canal head to the root zone. Furthermore, the system which is based on gravity flow, is supply-based and has low use-efficiency. Inefficient water delivery and use also mean that, in reality, water does not reach many users toward the tail-end of the system. Inequity in the distribution of surface water –due to deliveries less than design levels, poor O&M, and even illegal diversion—is a major concern in Pakistan. Operation and maintenance is inadequately financed. Cost recovery of O&M is perennially inadequate. For example, the gap between O&M expenditures and recoveries in Punjab was 62 percent in 1994-95, and increased to 74 percent in 1995-96; and the gap between O&M expenditures and revenues in Sindh was 89 percent in 1994-95 and 88 percent in 1995-96; and the gap between O&M expenditures and revenues in Sindh was 89 percent in 1994-95 and 88 percent in 1995-96. Many users and polluters of drains do not even pay for the use of drainage infrastructure. For example, urban centers and industries dispose of municipal waste and toxic effluents in canals and drains without payment or regulation. The poor state of drainage O&M is reflected in the periodic need for rehabilitation at roughly five year intervals (World Bank 1997).

FARMER MANAGED SYSTEMS

Pakistan is country where irrigation and water management is done both by the state as well as the water users themselves. The centuries old Karezes in Balochistan, the civil canals in the North West Frontier Province (NWFP) and the Rodkohi and Sailaba (Spate irrigation) in NWFP, southern Punjab and Balochistan are all farmer managed irrigation systems with no involvement from the government. Water users have developed their own rules for operating and maintaining these systems since centuries. Civil canals have been serving 0.33 million ha of land in NWFP, while the Karezes have been serving about 0.10 mha in Balochistan. The irrigation from hill torrents is practiced on about 0.095 mha.

Public involvement in water resources management started with the introduction of properly regulated and large irrigation systems during 1850s and afterwards, when water users were not given any management role above the tertiary channels. The first amendment mad by the government for involving water users in water management was the enactment of Water Users Association (WUA) Act 1981. Under the Act, WUAs were involved in the construction of tertiary channels for improving the conveyance efficiency and reducing seepage losses in unlined channels. There are about 140,000 tertiary water courses in Pakistan which are being partially lined under a phased programe since 1976, where a part of the cost is being paid by the farmers, either in cash or in kind. The Government of Pakistan has now embarked upon a crash program of lining about 86,000 watercourses by investing US$ 1.1 billion in about four to five

years (2004 – 2008) for saving water and improving productivity. The contributions coming from the WUAs in this National Program for Improvement of Watercourses (NPIW) are 22.1 percent of the total cost. However, the role of these associations has remained limited and have not been instrumental in the long run for improved and sustained efficiency of their watercourses.

PIM AT SECONDARY CANAL LEVEL, PILOT STUDIES

Organizing water users and handing over canal management responsibilities to them on bigger secondary canals was considered to be an impossible task before the International Water Management Institute (IWMI) and the Punjab, Provincial Agriculture Department through its On-Farm Water Management (OFWM) Directorate took on the pilot studies in southern Punjab and Sindh. IWMI conducted its studies on the Hakra 4-R Distributary (17,733 ha) of Hakra Branch Canal in Punjab and on Bareji Disty (5,728 ha), Heran Disty (6,164 ha) (under Nara Canal System) and Dhoronaro Minor (5,353 ha) (Rohri Canal System) in Sindh. The Sindh study was replicated on another ten channels after the success of the pilot schemes. While the OFWM carried out its studies on the Sirajwah Distributary and Bahadurwah Minor of Malik Branch Canal.

The studies were conducted almost simultaneously form 1994 to 1998 without a blueprint through a consultative and adaptive process between the organizing teams and the water users. Being pilot and research oriented in nature, these studies were conducted in the absence of any legal framework and without the involvement of the concerned irrigation departments (Khan 2006). These studies were conducted with the expectation and assumptions that the irrigation department would transfer the management responsibilities to FOs and that FOs would cope with the social and feudalistic forces for achieving equity in water distribution. The four pilot FOs formed by IWMI and two by the OFWM in Punjab and Sindh have been termed as excellent in all respects, i.e. orientation, clearance of objectives, awareness and capacity building and discharge of responsibilities. But, it took about two to three years for these organizations to establish these FOs. The social mobilization and awareness phases took considerable time for the water users to understand the concept and be willing to accept the new responsibilities. Also, all the process was more democratic and consensus oriented.

These studies were a major breakthrough in the irrigated agriculture of Pakistan when Farmer Organizations (FOs) were formed, and registered with the Provincial Irrigation and Drainage Authority (PIDA) under the PIDA Act 1997. The management of pilot schemes was transferred to FOs under the irrigation management transfer agreement signed between PIDAs and FOs. An important aspect of the pilot channels was that they were adequately rehabilitated before management transfer. All the important control points, outlets and cross sections were improved with the involvement of FOs for improved water conveyance and distribution.

Studies on irrigation management in East Asian countries have show that well-designed institutional arrangement can create a synergetic relationship between state and local farmers to ensure the productivity and sustainability of irrigation systems. Effective irrigation management requires that people understand and develop locally-appropriate

institutional arrangements and division of roles between the state, the community of water users and the private sectors (Lam, 1999).

Limited work has been done on evaluating the overall performance of these FOs. Field studies conducted by IWMI on Sindh farmer managed irrigation systems show considerable improvement in the hydraulic performance of the concerned irrigation canals. FOs mobilized their resources and ran a "desilting campaign" in their respective channels in order to convey water to tails. Figure 2 shows that water distribution (delivery performance ratio [DPR], the ratio of actual to design discharge) had significantly improved. Most of the channels were drawing more water than their design allocation, however, the tails were proportionately getting much less, before the desilting campaign. Water distribution improved substantially after silt was removed all along the channels. Most of the tails started getting increased supplies as is evident from Figure 2, while Mirpur, Belharo, Potho and Bagi Distributaries were very much benefited. Another important observation was that most of the channels were drawing more than their design discharge with the exception of Khattain Minor, before the maintenance activities which was reduced thereafter.

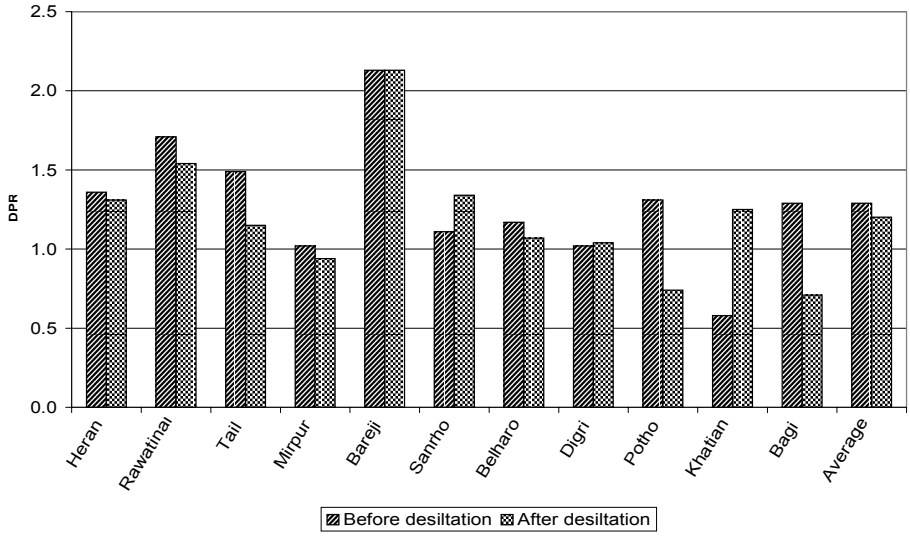

Figure 2a: Water delivery at head**.**

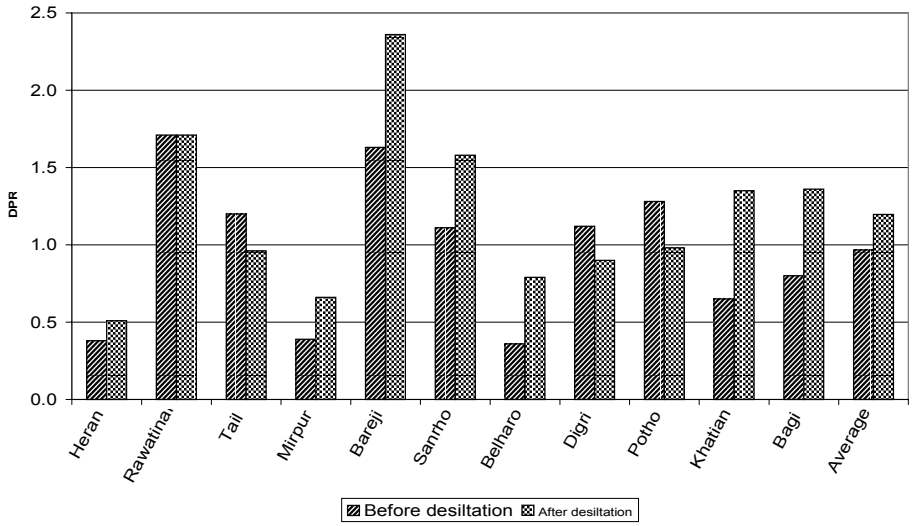

Figure 2b: Water delivery at tail.

Lashari et al 2003 have reported that the maintenance carried out by FOs was about $0.45 per ha which was only 40 percent of the water fee that farmers were expected to pay. This was a substantial saving for the government which could not meet the increasing maintenance cost. Another study carried out on the Pilot Hakra 4-R distributary has shown that the hydraulic aspects of the irrigation services delivered by FO had significantly improved resulting in highly proportionate and equitable water distribution at the tail reaches of the distributary. Tampering with outlets had been almost eradicated and an increase of about 6-7 percent had been reported in the irrigated area. Similarly revenue collection improved by about 14 percent for Kharif (summer) season and by about 23 percent for Rabi (Winter) season (Latif 2003). The Hakra 4-R FOs achievements were more than just water management. For example, the FO opened a joint bank account, collected money from members to purchase cotton seed and distributed it to members for cultivation. When empty bags were not available for harvest, they collectively approached the government and obtained the bags (Nakashima).

The experience with the pilot farmer managed systems has been quite encouraging, though they used a lot of support for their sustainability.

PIM UNDER NDP

The Government of Pakistan launched a massive National Drainage Program (NDP) of US$ 785 millions mainly with the World Bank and Asian Development Bank assistance in 1997 in order to rehabilitate the irrigation and drainage infrastructure in the country. A package of major reforms had been agreed upon between the Government of and the donors within the framework of the NDP project. The reforms consisted primarily of decentralization and management transfer of the irrigation and drainage system from Provincial Irrigation Departments (PIDs) to a multi-tier system of autonomous institutions with clearly defined roles and responsibilities within the system, and with a firm commitment to phase out subsidies for O&M in seven to ten years. Consequently,

the four provinces of Pakistan promulgated the Provincial Irrigation and Drainage Authority (PIDA) Acts in 1997 for transforming the existing provincial Irrigation Departments into autonomous and financially self-reliant entities. One of the major functions of PIDA was to introduce the concept of PIM through the pilot Area Water Boards (AWB) at existing canal circle level and FOs at the secondary canal level in about 7 years. Each PIDA was responsible for developing a legal framework, byelaws and regulations for their respective AWBs and FOs.

Basically, all the four Acts promulgated by the four provinces were almost similar in nature. They had provisions for farmers' representation at the Authority and for their role in important decision-making, but their enforcement varied considerably from province to province. The absence of a clear policy till very late regarding the number of farmers' representatives in the Authority and their selection/election or nomination by the government or FOs had seriously affected the process of PIM. Lack of awareness and capacity building of the irrigation department staff before initiating the process of AWB, FOs, the concept of PIM and the new role of the staff had created the impression of loss of job. The reluctance of the government agencies for transferring authority to water users and fear of loss of job especially at the field level cadre delayed the development of rules and regulations for proposed FOs.

Development and revision of by-laws and regulations for AWB and FOs took too long for every province, which delayed the process of trnasfering the O&M responsibilities to FOs. Punjab had done some work on these regulations in 1999 after two years of PIDA Act for the pilot FOs formed by IWMI and OFWM and have now finalized them during 2005. Sindh had developed some regulations but amended the PIDA Act 1997 during 2000 to be called Sindh Water Management Ordinance 2000 for incorporating the detailed functions and responsibilities of every institution under PIDA including tertiary watercourse associations. NWFP has not made major changes in the Act except increasing the number of farmer members from one to three in the Authority.

Sindh was leading in the formation of FOs where 206 FOs had been formed by the end of 2005 and Irrigation and Drainage Management Transfer (IDMT) agreements had been signed with 166 FOs along with the complete transfer of management to them. Punjab started late and had completed the first pilot AWB of Lower Chenab Canal Circle (LCC) East by transferring 85 secondary channels to FOs for joint management by December 2005. The NWFP PIDA had formed 49 FOs had signed Irrigation and Drainage Management Transfer (IDMT) agreement to 6 of them only (Table I). NWFP PIDA has provisions for joint management during the first year, however, FOs had concerns about the support and help form PIDA.

Table 1: Number of FOs, signed agreements and offtakes transferred.

Province	No. of FOs formed	No. of IDMT signed	No. of FOs with transferred management
Punjab	85	85	85
Sindh	206	166	166
NWFP	49	29	6

*(*Source*: PIDAs (Punjab, Sindh and NWFP)*

The fundamental objective of the irrigation and drainage sector reforms was improvement in water distribution equity and self-reliance of the autonomous PIDAs. Out of the total 340 FOs formed by December 2005, 257 FOs had taken over management responsibilities. However, limited information has been available on their performance so far. No independent and detailed study has been carried out for evaluating the farmer-managed systems for water distribution equity, crop assessment and revenue collection. Punjab has reported the following major achievements of the FOs managed systems during the first 100 days of their operation after March 2005 (PIDA 2005).

- Water distribution has improved as cases of theft of water have been controlled by about 80 to 90 percent as compared to previous years.
- Silt clearance activities have been carried out by many FOs on self-help basis.
- 14 out of 20 channels had 32 breeches during the 100 days due to weak banks.
- 146 disputes mainly relating to warabandi of watercourses were reported to FOs and disposed off.
- Progress on crops assessment in channels command was about 70 percent.

Internal reports from Sindh PIDA suggest considerable improvement in water distribution, recovery of water fee and conflict resolution. Latest information is lacking but the performance during 2001-02 has been encouraging. Overall water fee collection was 80 percent of the target for kharif 2001 and 50 percent of target for Rabi 2001-02. While FOs had collected 82 percent of water fee in Kharif 2001 and 45 percent in Rabi 2001-02, i.e. Nara Canal Pilot AWB. Similarly, water distribution had also improved where some of the tail reaches that did not receive water for many years had been growing rice (Haque 2003).

Another important aspect of the Pilot Area Water Board of Nara Canal in Sindh was the more democratic and transparent process of social mobilization and election of office bearers of FOs. Out of 100 registered FO in Nara Canal AWB, 47 FOs chairmen were from tail ends, 28 from middle whereas 25 were from head reach. 40 FOs chairmen held less than 18.25 ha of land, 23 were owning upto 40 ha while 37 had more than 40 ha (Haque 2003).

CONSTRAINTS IN PIM

Accepting a change is not easy, especially when it involves loss of authority and financial control. Even accepting a change or responsibility without an incentive is not forthcoming most of the times. The first proposal submitted by the World Bank in 1994 for introducing PIM in Pakistan had received considerable resistance as it involved transformation of provincial irrigation departments into commercially oriented public utilities. These utilities were supposed to be autonomous and financially self sustainable by adjusting water charges and had to be eventually privatized. According to the proposal farmers would take over the management of secondary canals and that water markets would be developed at different levels of irrigation systems. The proposal of privatization was not accepted by the provincial government because irrigation is a provincial subject. Government officials, officers from provincial administration,

farmers and researchers debated over the feasibility of the proposed reforms proposed by the federal government.

The debate through seminars, workshops and media resulted in dropping the proposals of privatization and delinking water rights from land (Renaudo, Zubair, 1999). The farms lobbies also strongly opposed the first draft of PIDA Act for their insufficient representation. Another important constraint was lack of understanding and details about the proposed reforms. The first impression of privatization and water markets had created sufficient resistance that could not be easily eroded with the revised and improved PIDA Acts of 1997. The knowledge and skills gap among farmers and agencies need to be filled with a blend of skills and attitudinal changes at all levels including policy makers. Lack of capacity was one of the major reasons that took PIDAs to take several years for developing bylaws and regulations for AWB and FOs. And one of the major reasons for the success of pilot FO has been their proper training and education on technical, financial, administration and legal aspects of the irrigation systems.

However, the capacity building of other FOs formed by PIDAs and other agencies has not been as good as that of pilot FOs which would definitely adversely affect their performance. Social mobilization and capacity building of water users for a socio-technical and complex job of irrigation system is a time consuming and laborious process. Continuous support is always needed for effective and successful management transfer which is not the case with FOs formed by consultants within a short specified period, of the assignment. Irrigation Management with limited capacity of FOs and without back up support from PIDA may not produce the desired results.

The staff of the provincial irrigation departments especially the field level cadre, were not very encouraged to support the reforms process mainly for two reasons, one, loss of authority and financial control over a large part of the system (secondary canals and below) and two, the perception that water users did not have the capacity to operate and maintain the system.

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