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RESEARCH INPUTS FOR AN ACTION PROGRAM ON PARTICIPATORY IRRIGATION MANAGEMENT IN PAKISTAN

D. J. Bandaragoda and Gaylord V. Skogerboe¹



Paper prepared for the Seminar on "Participatory Irrigation Management", co-sponsored by the Ministry of Water and Power of the Islamic Republic of Pakistan and the Economic Development Institute of the World Bank.

October 2 - 6, 1994
Islamabad

¹ Senior Management Specialist and Director respectively of IIMI Pakistan, Lahore.

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This paper is meant to serve as background material for the discussion proposed by the Seminar organizers, on "IIMI's past, present and future research activities relating to participatory irrigation management". The paper is structured into three sections. First, it presents a brief review of lessons learned that have been identified by IIMI's past and on-going research activities focusing on social organization for irrigation and participatory irrigation management. This review relates to experiences in a few selected countries, such as Philippines, Nigeria, Sri Lanka, Nepal, Indonesia, Columbia and India. Second, the paper outlines IIMI's general findings arising from its work in Pakistan, and gives a brief commentary on the major research and policy issues related to participatory irrigation management with special reference to possible action research work in Pakistan. In the third section, the paper outlines IIMI's proposed program of activities related to social organization aspects of irrigated agriculture in Pakistan.

¹ Senior Management Specialist and Director respectively of IIMI Pakistan, Lahore.

1. EXPERIENCE IN OTHER COUNTRIES

1.1 Philippines

A widely documented social organization effort is the farmer organization program of the National Irrigation Administration (NIA) in the Philippines. Beginning with small communal systems in the early 1970s, and through a continuous learning process since then, the NIA has stepped up its effort to achieve higher productivity and increased willingness of farmers to pay irrigation fees. By 1995, the NIA will be having active irrigator associations to cover all of its 700,000 ha of communal systems and part of its 600,000 ha of national systems.

Not unfamiliar in terms of experience elsewhere, the story is that this program began as a donor requirement for project funding, products of the first phase being just "paper associations". The success in the Philippines case is that the program has been able to, though slowly, grow out of this donor-driven mode. By the late 1970s, the two initial pilot sites had expanded to a program to cover all 12 regions, and started to gain root with the introduction of young college graduates from outside the project staff as "communal organizers". Later, NIA started its own institutional development department and introduced "farmer irrigator organizers". IIMI entered into a partnership with the NIA to identify research issues, monitor the program, and provide feedback while managing the program's research component.

1.2 Nigeria

IIMI's field research work in Nigeria confirmed the commonly believed set of conditions for the establishment of water users associations: a guarantee of water rights, legal status, secure land tenure, and the use of tenure as the basis for membership in an association. At three pilot sites in the Kano River Irrigation Project (KRIP), IIMI and Project staff acted as facilitators, rather than organizers, in a process of allowing the

associations to evolve. Within a year, the associations were mature enough to organize and carry out about 50% of the distributary canal cleaning work, and about 75% of the work in the field channels. The project was notorious for weed growth in the waterways, and as a result of the cleaning exercise, the flow increased by 12% in the middle and tail portions of the canals. The associations took over the collection of water charges, and one pilot site achieved a 90% recovery rate in the very first season of this change, which led to a policy decision to permit the WUAs to retain 15% of the collections if the rate were to exceed 90%. The Project has now assigned 12 staff members for WUA activities, and KRIP's parent Hadejia Jama'ara River Basin Development Authority has established a separate WUA Wing in its administration.

IIMI's study findings included the following three conditions for the establishment of water users associations:

- 1) A well defined national policy must be established to guide the process of social organization and to see that participatory management becomes institutionalized;
- 2) The agencies should have separate institutional arrangements specifically for the purpose of promoting social organization; and
- 3) There should be a formalized legal basis for the organizations, since legal recognition is necessary for them to gain credibility.

1.3 Sri Lanka

IIMI's experience in Sri Lanka on farmer organization is characterized by its early involvement at the policy level. It started with an initial issues and needs assessment exercise, which matured into a long collaborative policy development phase. With policy support, IIMI then embarked upon a collaborative field-level action research program.

This was a case of IIMI's joining hands with a government program which had already begun on policy reforms aimed at participatory irrigation management. The old Irrigation Department established in 1900, based on mid-nineteenth century legislation (Ordinance No. 9 of 1856 and amended by Ordinance No. 21 of 1867), was restructured in the 1980s to have a strong Irrigation Management Division, with emphasis on water management and social organization. The concept of integrated management of major schemes (INMAS) had been introduced along with these reforms, adding an essential component of farmer participation.

The government's motivation was primarily based on resource mobilization to combat increasing maintenance costs. The official presentation at a May 1986 Workshop organized by IIMI echoed, "any government would be interested in participatory management if it could be demonstrated that such measures would help reduce government commitments for maintenance and rehabilitation, and more importantly, if it would reduce grievances within the farming community, leave alone the government's desire to see a prosperous community". However, this initial incentive on budgetary reasons, later developed into a firm commitment on sharing authority and responsibility with the farmers.

IIMI's involvement in the Irrigation Management Policy Support Activity (IMPSA), guided by a high level Irrigation Management Policy Advisory Committee (IMPAC), helped Sri Lankan authorities to elaborate and refine the government's participatory management approach and to develop a wide national consensus on a set of strategies for institutional reforms. Its Policy Paper No. 2 was dedicated to an "institutional framework for management of irrigation systems and building farmers' organizations". The main recommendations included strategies for turnover of small systems, joint-management of the others, formation of institutional development units within agencies, institutional adaptations for irrigation research, building farmer organizations, and legal reforms. Some of these recommendations have been taken up for implementation. The formation of distributary-level farmer organization is a major step.

IIMI carried out field research in the Kirindi Oya new settlement project to understand how settlement activities could affect settlers' irrigation management behavior and their participation in system management. There was unprecedented enthusiasm for the development of farmer organizations. The findings in this instance included the following:

- 1) The existence of a well defined and commonly appreciated purpose, or a set of purposes is a major determinant for achieving success in social organization. Early settler organizations became inactive when the project made the transition to an operational phase. The subsequent farmer organizations specifically set up for irrigation management purposes began to take shape fairly quickly. As there was no village level mechanism to attend to increasing community development issues in the settlements, the farmer organizations gradually assumed additional responsibilities, and gained greater acceptance and credibility.
- 2) The collective strength through the organization was more effective than individual action to interact with agencies. The project had many construction-related problems hampering the progress of project objectives. The farmer organizations were able to obtain regress fairly quickly and on a more equitable basis.
- 3) "Institutional Organizers" played a vital role in assisting the new farmer community to identify their leadership and get organized on their own initiative. They also played an active role in facilitating the transactions with agencies.
- 4) With the agency staff interacting closely with the farmer groups in a less authoritative way, despite the enormous irrigation problems in the project, there was unprecedented cooperation between irrigators and operational staff.

- 5) There was a quick realization that the new enthusiastic organizations could be easily overloaded with a variety of community development problems; thus, it was considered better for the farmer organizations to concentrate on irrigation-related issues.

1.4 Nepal

The experience in Nepal is mostly on farmer-managed irrigation systems. An innovative idea that has been tested and found very productive is "farmer-to-farmer training". The visits by groups of farmers from a poorly managed system to a well managed system have been very useful. These strategies have helped in the consolidation of farmer organizations in either situation.

Two-thirds of all the irrigation systems in Nepal are farmer-managed. In these systems, farmers perceive the water resources as community property, whereas, in agency-managed systems, water is perceived as a government-owned resource, and its distribution, which is a government responsibility, is not seen as a task serving the best interest of the community. IIMI's research in Nepal has identified the following as the "organizing forces":

- 1) Perception of water as community property;
- 2) Protection of water rights;
- 3) Achieving water distribution in proportion to water share; and
- 4) Mobilization of manpower for common tasks.

1.5 Indonesia

In early 1987, a national level working group was formed in Indonesia, consisting of representatives from the Directorate of Irrigation, Ford Foundation, a national NGO, and IIMI. Within a year, the Working Group was to develop a viable process and a workplan for implementing turnover of irrigation systems to farmers throughout the country. By early 1980, the turnover program started in two provinces, and by 1990, it had expanded to seven provinces. It has been estimated that, over 15 years of implementation, the turnover program could save the government about Rp. 22.5 billion (US \$13.5 million) in O&M costs for small scale irrigation.

Research during early stages of implementation showed no negative impact on system performance arising from the turnover process, and that considerable local investments were being stimulated. However, pressures for achieving ambitious targets appeared to have hampered strategic principles in promoting participatory management.

1.6 Columbia

Columbia's experience in management turnover is more mature than that in any other developing country. O&M responsibility in some districts were handed over to water users' associations as early as 1976. IIMI is assessing performance before and after turnover and reviewing the transfer process. Initial results indicate the following:

- 1) After a temporary downturn immediately after the turnover in 1976, the area irrigated has continued to expand, indicating that farmers have confidence in being able to obtain water.
- 2) Both farmers and agency staff agree that paper work and delays have been reduced considerably after the transfer.

- 3) Emphasis on cost cutting has led to a decline in real terms in the irrigation fees levied by the WUAs.

1.7 India

Recognizing that there were already several irrigation-related social organization experiments in India (e.g. the CASED work in the Mula System in Maharashtra), IIMI opted to avoid competition or duplication, and to work in places where experiments did not exist, or to strengthen existing experiments by lending its international experience. Given IIMI's limited scope for large scale work, the decision was to work in one or two states where there was strong government interest in pursuing farmer organization activities. The work was essentially to be in collaboration with the local Water and Land Management Institutes (WALMIs).

The case of the Paliganj Distributary (12,000 ha) in the Sone System in Bihar presents a success story in farmer management attempts above the outlet. In a rather hostile environment due to years of neglect by irrigation officers, the WALMI Action Research Program (ARP) study team found many obstacles at the beginning. Social tensions related to caste and tenure were pronounced in this "socially disturbed" area, and the upper-end farmers had the habit of breaching the canal. The ARP team spent months in developing a rapport with the aggrieved majority in the farming community, and finally the breakthrough came. This is an isolated case of a local initiative, maintained by a dedicated group of local researchers, which has no larger strategic framework. Being one of the poorest states in India, Bihar is chronically short of funds, and has declared a policy of transferring management responsibilities to farmers. The experience suggests that it is more valuable, if it can be achieved, to organize farmers to deal with problems above the outlet rather than below the outlet.

1.8 Lessons Learned²

The following can be mentioned as the main lessons learned from research experience on farmer organizations around the world, with particular reference to Asian countries:

- 1) Experience in many countries suggests that farmers are willing to become organized in order to improve irrigation system management; it is commonly appreciated that organizing farmers can lead not only to better production and more equitable water distribution, but also to better relations between farmers and agency officials. Farmers' participation in irrigation management through farmer organizations can contribute positively to planning, design and construction, water management, resource mobilization and conflict resolution.
- 2) Advisably, water users organizations should be built upon small hydrologically defined groups as the primary organizational units, so that all farmers have a chance to participate, without limiting it to subgroups such as landowners.
- 3) There is no maximum size limit for a farmers' organization. There are effective farmer organizations managing small command areas of 20-25 hectares and large command areas ranging from 3000 ha to 15000 ha. In a large system, a farmer organization may need several tiers, each with specific responsibilities, or smaller groups can form a federation. The 15,000 hectare Karnali system in Nepal, the 458,000 hectare King's River Water Association in Fresno, California, and the 150,000 hectare Chia-nan Irrigators' Association in Taiwan are examples of federated farmer organizations.

² This section giving a synthesis of lessons learned from experiences around the world, has benefited considerably from a note, "FARMER ORGANIZATION IN IRRIGATION MANAGEMENT IN INDIA: HOW CAN IIMI CONTRIBUTE?", by R. Sakthivadivel, Jeff Brewer, Douglas Merrey and Douglas Vermillion of IIMI (1992).

- 4) Farmer organizations must have real power and control over resources. Sri Lanka, India, Indonesia and Philippines all have many examples where farmer organizations have failed because actual decision-making power was kept by government agencies; these countries also have many examples where farmer organizations have functioned very well when given real power and legal clarity about rights and responsibilities and the authority to settle conflicts locally and apply sanctions.
- 5) A farmer organization whose primary felt need is water, should reach a level of managerial sophistication that ensures a reliable water supply before it undertakes other agriculture related activities which can augment the productivity of water. A tendency for farmer organizations to undertake additional activities on their own, once they can manage irrigation water, has been observed in the Philippines and Sri Lanka.
- 6) In system rehabilitation or modernization, efforts to organize farmers or strengthen existing farmer organizations should begin well before the physical works are initiated. An event requiring group decision-making and local investment can be a good foundation for an effective organization. The experience of an action research project in Sindhupalchowk (Nepal) shows that once farmers are organized, physical construction does not take long. Many examples in Sri Lanka, India, and the Philippines show that if organizational development does not precede or occur together with design and construction, the work is slower, less effective, and often faces opposition, or even sabotage, from the farmers.
- 7) Farmers' willingness to contribute labor, cash and other resources to operations and maintenance, and to collectively bargain with agencies, is directly related to their power to make real decisions. This is a good index of the potential for organization.

- 8) Many national and state irrigation acts do not provide for farmers' participation in irrigation management. Even where legal provision exists, they generally need to be strengthened and modified.
- 9) Experience in the Philippines, Indonesia and Sri Lanka shows that, as farmer organizations become more effective, they are capable of taking increasing responsibility for irrigation system operations and maintenance, thus relieving the government of these burdens, both managerial and financial.
- 10) Because of the complexity of the process in shifting from reliance on government agencies to reliance on farmer organizations, requiring changes in both parties, no detailed blueprint for achieving this shift is possible. Instead, the process requires experimentation, negotiation, adaptation to local circumstances, and time. It should be emphasized that planners must be prepared to take a long time period to achieve sustainable changes needed at all levels. Sri Lanka, for example, has made significant progress during the last 14 years but will need several more years to consolidate the required changes.
- 11) In some countries (Sri Lanka, Philippines) government units have proven effective in assisting farmers to establish and strengthen their organizations. There are also a number of important cases where non-government organizations (NGOs), working closely with the government, have proven very effective (Indonesia, Sri Lanka, Thailand, India).
- 12) There is no single model for farmer organizations. Each farmer organization must respond to its peculiar environmental and system requirements including agro-climatic and crop requirements, the local cultural system, and the legal and organizational environment.

- 13) Experience in several countries, including India, has shown that using catalyst agents or institutional organizers (IOs) can be an effective way to proceed. Catalysts provide the initial energy needed to get the farmers to work together while at the same time providing the initial contacts and communication between the incipient farmers organization and the irrigation agency. These contacts must eventually lead to negotiation of rights and responsibilities of the farmer organization. IOs can be recruited from NGOs, universities, trained agency field operations staff (a low cost approach in Indonesia), from local villages (Sri Lanka) or from among progressive farmers themselves (another low cost approach in the Philippines).

- 14) In many countries, the concern on having to share management responsibility with water users has been based on a common realization that the actual system performance is deviating from design standards in terms of equity and variability. For instance substantial inequity was observed in field studies in Philippines (Table-1), Sri Lanka (Table-2) and India (Figure-1), as reported by Wijayaratna (1991). Similar, or more serious problems of inequity in water distribution have been identified in Pakistan. Some of them will be discussed in the following section of the paper.

Table-1

Water Availability - Ratio between the highest and lowest:
1983-87, Upper Pampanga Project, Philippines

1993	Dry	2.03
	Wet	3.23
1984	Dry	1.46
	Wet	1.69
1985	Dry	1.52
	Wet	2.05
1986	Dry	1.68
	Wet	1.40
1987	Dry	1.61
	Wet	1.23
Average	Dry	1.50
	Wet	1.58

Table-2

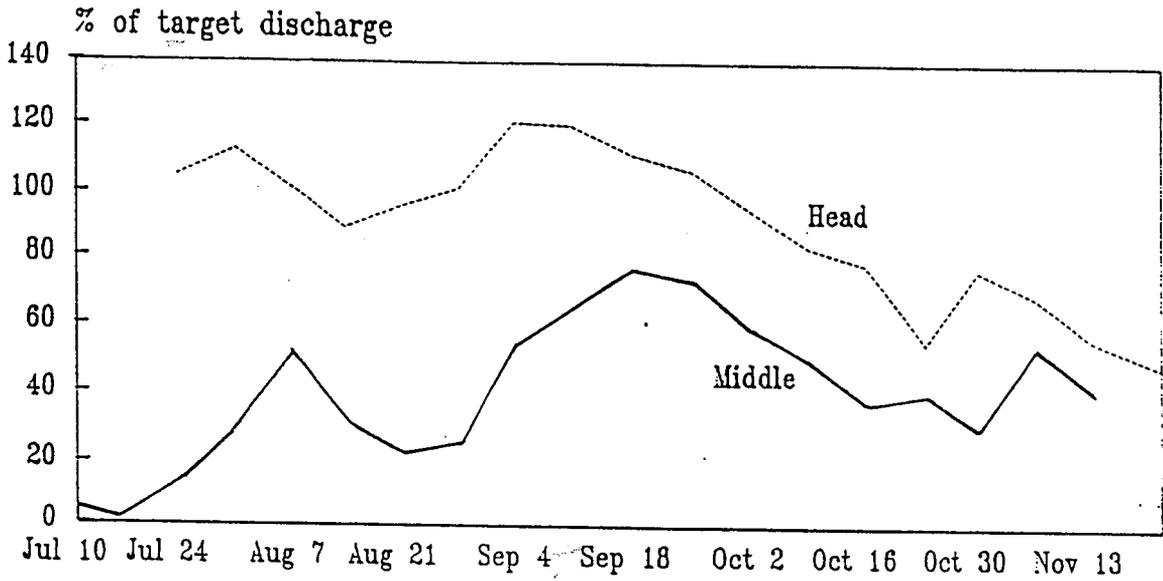
Summary of the Analysis of Variance in the Distribution of
Water Availability - Gal Oya Project, Sri Lanka

	1980/81 (Wet)	1981 (Dry)	1981/82 (Wet)	1982 (Dry)
Main system	53	24	55	48
Field channel	9	14	18	22
Among farmers	29	38	11	21
Within farm	9	24	16	9
Total	100	100	100	100

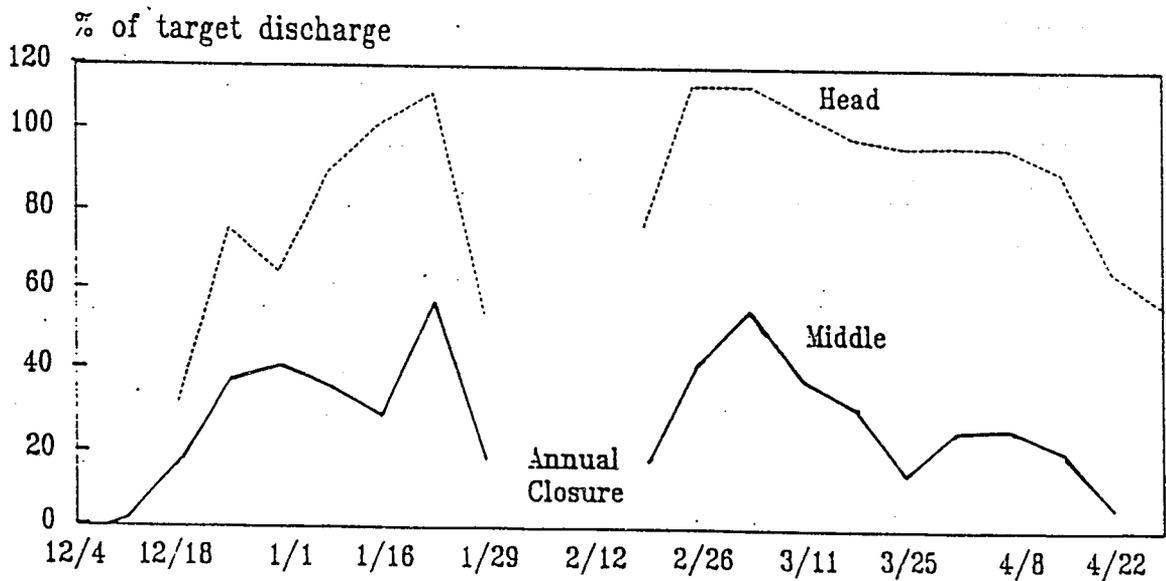
Figure-1

Water Delivery Performance along Distributary D36 Tungabhadra Irrigation System, India

a) Kharif 1987



b) Rabi 1987-88



2. PARTICIPATORY IRRIGATION MANAGEMENT IN PAKISTAN:

The Context and Prospects for Action Research

2.1 The Context

The management of Pakistan's integrated canal irrigation network is a very complex task. Its vast size, its dependence on run-of-the-river flows, fertile but environmentally fragile soils and their location in different ecological zones, large numbers of water users and a huge bureaucracy to administer, are just a few features of the world's largest contiguous irrigation system, which have made its management indeed a highly complex responsibility. That it has been run for such a long period, exceeding one hundred years, is in itself a commendable effort. But not many good efforts, carried out in their original design and style, can last that long and still be very productive.

A number of second generation problems started to surface, when the old systems were rehabilitated, remodelled and modernized, yet over-used or misused, and improperly operated under fast changing socio-economic conditions. These problems are too well known to need elaboration here. The constraints encountered in the present operation of the system can be summarized as:

- (1) a general shortage of canal water, which becomes more pronounced during peak periods of crop water requirement³;
- (2) The implications of the new-found supply of groundwater⁴ in the continued operation of traditional allocation methods based on equitable distribution;

³ See Tables 3 and 4

⁴ See Figure 2 for the growth of groundwater development.

Table-3

Water Allowance in Major Perennial Canals in Pakistan.

Canal system	Year operations started	Canal capacity		Water allowance	
		M ³ /sec	(Cusecs)	L/s/ha	(Cusecs per 1,000 acres)
1 Central Bari Doab	1859	73.58	(2,600)	0.23	(3.22)
2 Sidhnai	1887	127.35	(4,500)	0.21	(3.00)
3 Lower Swat	1890	22.64	(800)	0.44	(6.15)
4 Lower Chenab	1892	325.45	(11,500)	0.22	(3.17)
5 Lower Jhelum	1901	150.00	(5,300)	0.20	(2.84)
6 Upper Jhelum	1915	53.77	(1,900)	0.21	(3.03)
7 Panjnad	1929	254.7	(9,000)	0.30	(4.20)
8 Rohri	1932	316.96	(11,200)	0.20	(2.84)
9 Thal	1947	283.00	(10,000)	0.23	(3.18)
10 CRBC	1987	130.1	(4,879)	0.53	(7.53)
11 Lower Swat (Remodeled)	-	55.0	(1,940)	0.78	(11.00)

Sources: Revised Action Programme for Irrigated Agriculture, Vol.I, WAPDA 1979. Item 10 from PC-I (Revised) for CRBC Project, WAPDA May 1981. Item 11 from Final Project Plan, Mardan SCARP, June 1981 (Draft Report) Harza/Nespak Consultants.

Table-4 The Ratio of Water Supply to Crop Consumptive Use for Typical Canal Systems in Pakistan

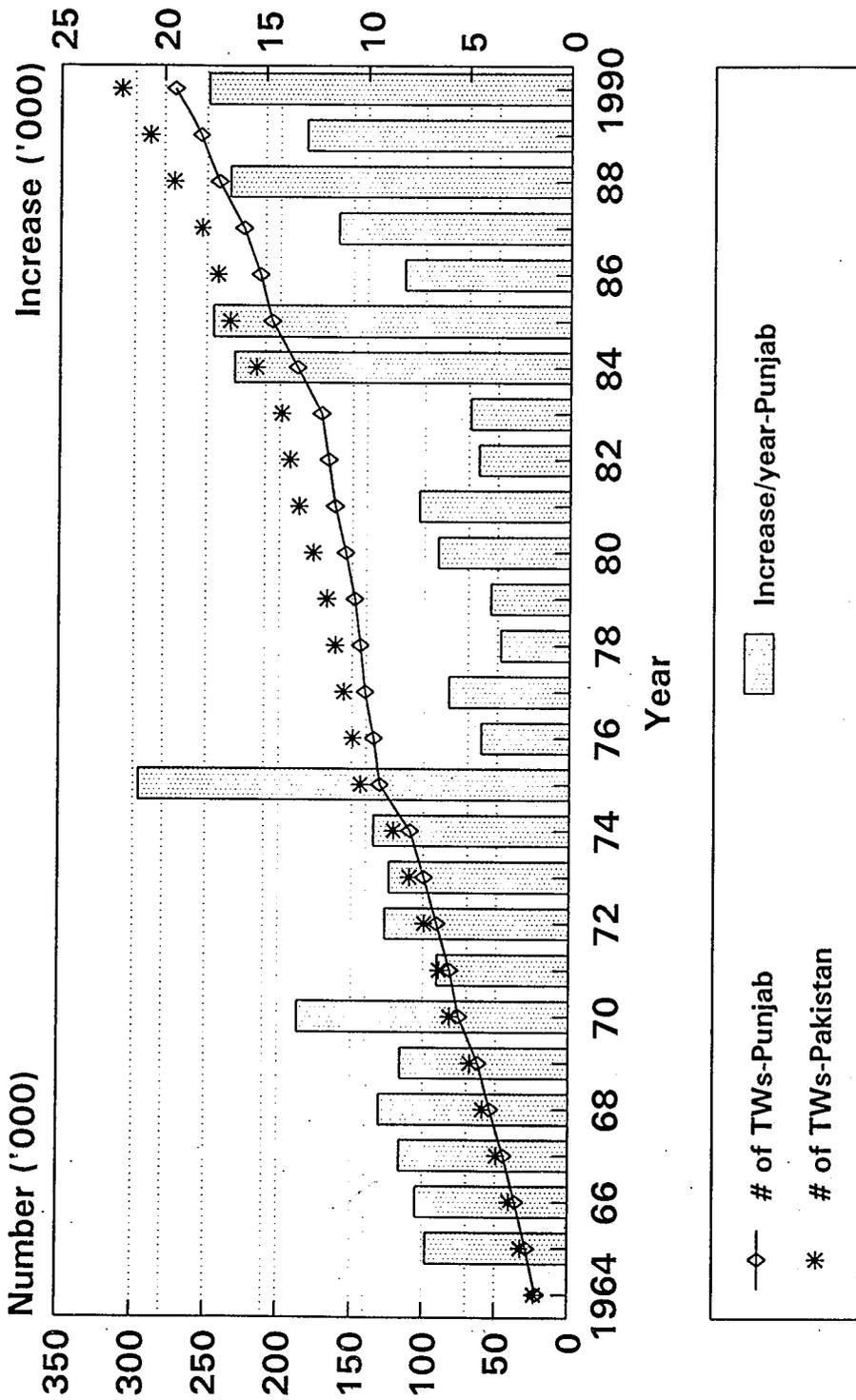
Canal	Rabi							Kharif							Ann-ual
	Oct	Nov	Dec	Jan	Feb	Mar	Sea-son	Apr	May	Jun	Jul	Aug	Sep	Sea-son	
1 Lower Swat P, LG	0.42	0.78	2.54	1.10	0.86	1.29	0.80	0.94	0.39	0.24	0.37	0.47	0.23	0.36	0.47
2 Upper Jhelum PP, GW	1.63	1.25	1.21	2.07	0.93	0.56	1.13	1.29	1.75	0.86	1.82	2.52	1.14	1.40	1.28
3 Sidhnai NP, LG	0.72	1.02	1.11	0.99	0.48	0.38	0.69	0.90	0.99	0.63	0.70	0.61	0.43	0.66	0.67
4 Muzaffargarh NP, GW	1.81	0.81	1.51	1.63	0.78	0.49	0.98	1.09	1.24	1.17	1.62	1.38	1.04	1.27	1.14
5 D.G. Khan NP, LG	1.21	0.51	0.43	0.85	0.21	0.08	0.46	0.38	0.58	0.77	1.10	1.06	0.65	0.83	0.68
6 Rohri P, LG	0.82	0.81	1.56	0.35	0.47	0.49	0.67	0.82	0.71	0.59	0.38	0.50	0.69	0.57	0.61
7 Rice NP, LG	1.02	0.01	0.02	0.00	0.00	0.02	0.18	0.50	1.36	0.81	1.04	0.85	0.77	0.89	0.70
8 Beghari	0.54	0.03	0.04	0.09	0.04	0.09	0.13	0.36	0.05	0.55	1.30	1.51	2.82	0.93	0.68

Source: Revised Action Programme for Irrigated Agriculture, Vol.I, WAPDA, 1979.

Notes: P=Perennial, PP=Partly perennial, NP=Non-perennial,
LG=Limited groundwater, GW=Groundwater supplement available.

Figure-2

Private Tubewell development in Pakistan and Punjab



- (3) a deterioration in physical conditions of the canal system, which continues to reduce the water delivery efficiency while aggravating the water shortage situation; and
- (4) the increasing difficulties of a centralized administrative system to fully cope with the growing problems of both operation and maintenance of the physical system.

These main constraints are further compounded by environmental problems associated with waterlogging and soil salinity and sodicity.

The combined effect of these problems can be seen in an increasing inequity in the distribution and use of canal water, a decreasing concern for rules and regulations of canal operations, and consequently, a growing mistrust between water users and agency staff.

The present inequity can be seen as the cumulative effect of two interacting factors: 1) the deficiencies in maintaining physical conditions of the canal system; and 2) persistent deviations from the designed operational procedure. Maintenance is basically a support activity to facilitate operating the irrigation system; the two activities need to go hand-in-hand for the system to perform according to its design parameters.

To the theoretical understandings of irrigation management in Pakistan, as outlined above, IIMI's past and on-going research activities have added some empirical results in an effort to isolate a few important issues that relate to this situation. They are mainly in the following subject areas:

- 1) Performance of canal systems and equity in water distribution;

- 2) Implications of groundwater development;
- 3) Institutional factors affecting irrigation performance;
- 4) Environmental implications of irrigation; and
- 5) Potential for crop-based irrigation operation.

The first three items are selected for further elaboration, as they directly relate to the subject under consideration.

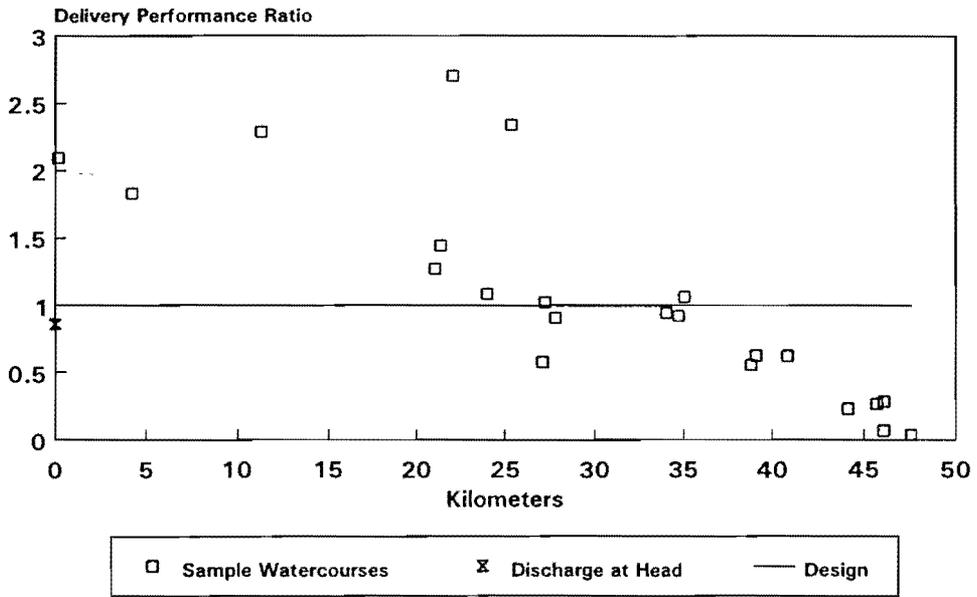
2.1.1 Canal performance

With the gradual decline in the quality of physical and management conditions, the design objective of equity steadily eroded. When design assumptions for distributary outlets, such as continuous full supply water level in the canal and outlet modular conditions, were no longer valid, the distribution of water among the outlets was found to be substantially inequitable (Bhutta and Vander Velde, 1992).

The following comments relate to some of the main aspects of inequity as found in IIMI's field research (Kijne and Vander Velde, 1991 and 1992; Vander Velde and Murray-Rust, 1992):

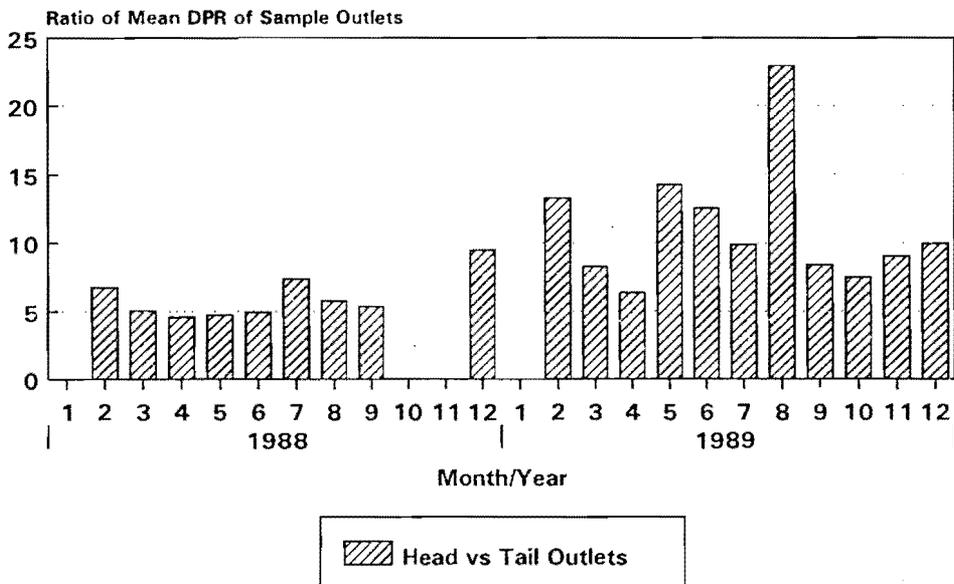
- 1) Monitoring activities in Farooqabad and Bhagat Sub-Divisions have shown that the long standing system performance objective of equity in surface-water distribution is now rarely achieved. On average, the farmers in tail-end watercourses have less than one-fifth the access to surface water enjoyed by farmers in the head-end watercourses. The pattern observed for the Pir Mahal Distributary, having a design discharge of 4.67 cubic meters/second for a CCA of 14,891 ha, can be seen in Figure-3 and Figure-4.

Figure-3
Pir Mahal Distributary
Water Distribution Equity



Bhagat Sub-Division

Figure-4
Pir Mahal Distributary
Water Distribution Equity

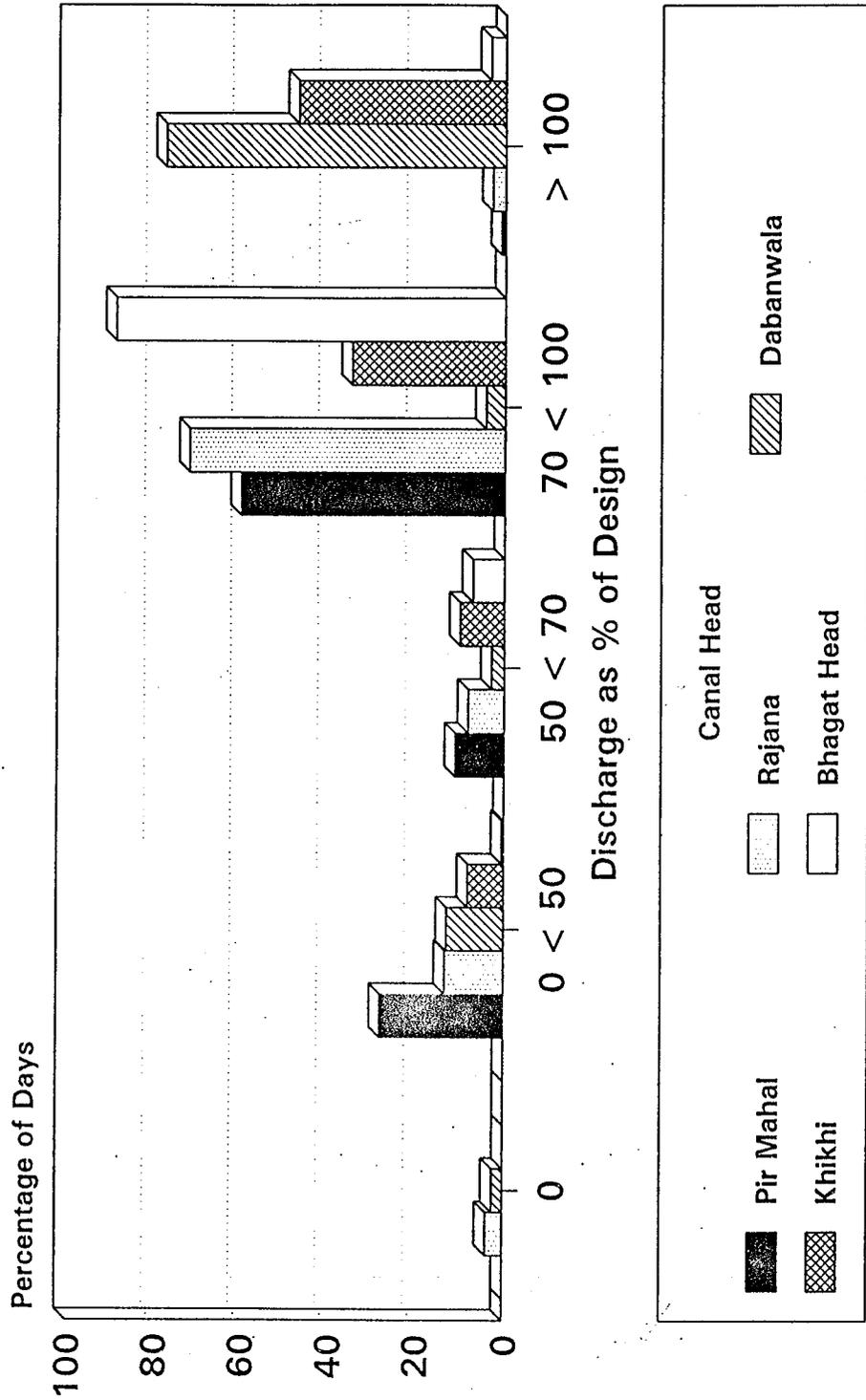


No Ratio October-November, 1988
 Flood Closed Tail Outlets

- 2) When the discharge at the distributary head falls below 70% of design, an occurrence observed in some distributaries of the Lower Chenab Canal (LCC) for as much as one-third of the annually available operational days, supplies to tail outlets simply collapse.
- 3) As the Lower Gugera Branch delivers insufficient surface water supplies to the tail of the system, an inter-distributary rotation is operated for much of the year at Bhagat Head. Yet, significant inconsistencies in the equitable implementation of scheduled rotational operations were observed in the Pir Mahal Distributary. For several months in 1990, this distributary operated about 40% of the time period below 70% of full supply level, contrasting with nearby Khikhi and Dabanwala distributaries which operated nearly continuously at 90% or more of full supply level (Figure-5). Heavy silt accumulation, embankment erosion, unauthorized or informal withdrawals of canal water upstream, and variability in distributary flows upstream were identified as causes of severe tail-end deprivation.
- 4) Laxity in canal operations has promoted anarchy in the field. There are many instances of breaching of canal bunds, installing of unauthorized outlets, pumping and siphoning of canal water, and tampering with outlets and other canal structures. These acts in turn exacerbate the maintenance problems. Both under normal supply and shortage conditions, generally the upstream water users receive more water than their due share, while those in the tail reaches of the canal command receive less⁵.

⁵ Surprisingly, there are also instances where the tail-end watercourses in some canals have been reported as receiving more water than their due share. This unusual inequitable situation observed in Puran and Nari distributaries in the Punjab is attributed to an overall over-supply of water to the canals (Gleason et al, 1993). A similar anomaly was seen in an IIMI study in the Lower Swat Canal in the North West Frontier Province, where its downstream Sheik Yousaf Minor was drawing more excess water relative to the design discharge than its upstream Distributary No. 3, and downstream watercourses receiving a greater allowance than watercourses upstream in the Minor, and the same reason was identified for explaining the unusual reversed inequity (Bandaragoda et al, 1993).

Figure-5
**Bhagat Head Rotational Operations
 Distributory Head Discharge**



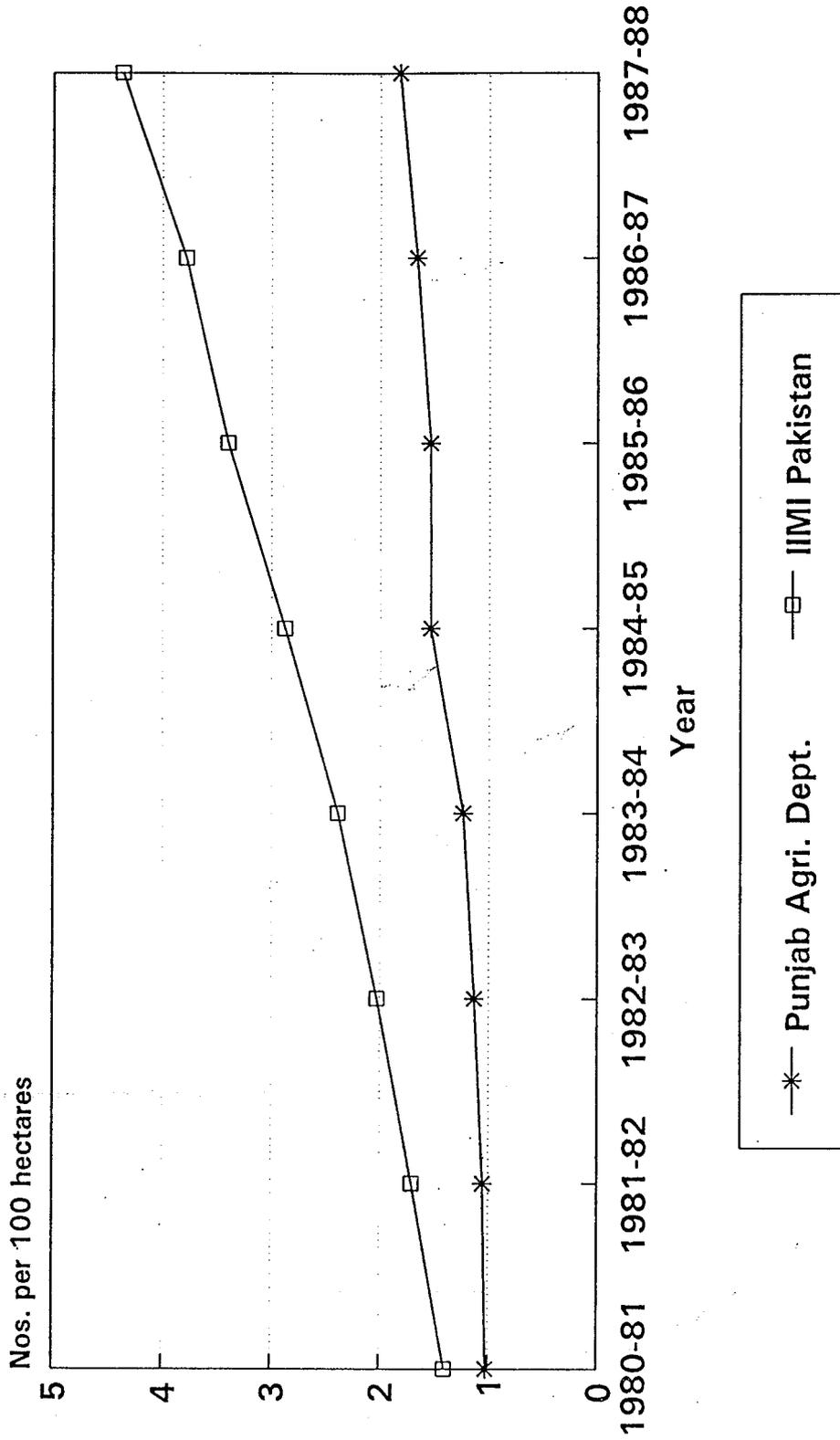
Feb. 14 - Sept. 11, 1990 (n = 210 days)

2.1.2 Groundwater

Public and private groundwater development added a new dimension to equitable use of water resources. It tended to help the richer farmers and also to adversely affect the tail-end farmers as the groundwater quality decreased towards the tail areas of the distributary commands.

A substantial increase in water supplies at the watercourse level due to public tubewells in some areas (eg. Rechna Doab) meant that the low design cropping intensities (50-75%) could now be exceeded. Annual cropping intensities in many LCC distributary commands increased to well over 100%. Simultaneously, some farmers started to grow higher priced, water-intensive crops like rice and sugarcane. This was accompanied by a rapid development of private tubewells in the 1980s (Figure-6). A tubewell census of 35 watercourse commands of Mananwala, Karkan (Minor) and Largar distributaries revealed that the average density of private tubewells in the area was over 5 per 100 ha. IIMI studies showed that total groundwater supplies, on average, contributed about 70% of water used in the Farooqabad Sub-Division. Therefore, to exclude this high percentage of total water supply from the norm of equitable distribution is a major factor relating to consideration of equity.

Figure-6
 Densities of Private Tubewells
 Punjab Agriculture Dept. vs IIMI Data



IIMI = Farooqabad SD Canal Watercourses
 PAD = Sheikhpura District

2.1.3 Institutional Factors

A study on the institutional framework for irrigation management in Pakistan concluded the following (Bandaragoda and Firdousi, 1992):

- 1) A major institutional factor that affects Pakistan's irrigation performance is the continuation of complex and outdated formal rules and procedures while they are consistently over-ridden by several socially evolved informal institutions. The original intentions of ensuring strict discipline for codified behavior in water distribution, as well as in water use, can no longer be achieved due to changed circumstances in the social and physical environment. A review of formal irrigation rules, measures to arrest the dysfunctional effect of some informal rules, and an overall assessment of the whole structure of irrigation organization are the urgently needed research and policy initiatives.
- 2) With the changes in the socio-political systems after the demise of colonialism, the modern democratic values and the old cultural values appear to be running parallel to each other, often resulting in conflicting manifestations in the field. The challenge is to find an appropriate congruence between these two streams and convert the present institutional barriers to useful institutional support for irrigation management.
- 3) A centralized administration designed to control a large supply-oriented canal irrigation system has lost its effectiveness, if not largely its relevance, in an emerging demand-oriented system. The regional and location specific management requirements arise from the presence of additional tubewell water on the one hand, and different cropping patterns and intensities on the other. Centralization needs to be replaced by appropriate decentralized mechanisms, remote control by more intimate performance monitoring, and narrow departmentalism by greater coordination.

- 4) Any form of institutional change in any context requires positive support from policy. A deep-rooted administrative culture in this region would necessarily require carefully considered strategies and the support from the highest levels of policy to make any change in the existing irrigation-related institutions. Attempts can be fruitful when they are strongly based on local initiatives and a full understanding of the prevailing constraints, and when they are correctly placed in the country's socio-economic context.

Generally, a fairly common picture emerges in many canal systems. When the canal is silted, its upstream outlets tend to draw more water than their design discharges. This is simply a hydraulic phenomenon, which however has an impact on social behavior; it discourages upstream farmers from promoting maintenance activities in the canal⁶, it encourages "free-rider" behavior (in which some individuals try to get more than their due share at the expense of the others), and increases social conflict.

Conditions of scarcity and poor reliability of supply normally encourage the individual water user to engage in various malpractices for maximizing personal gain. A long period of this behavior results in a "syndrome of anarchy", which is a product of mutual mistrust between the water users and the operating staff. The users lack the confidence that if they refrain from stealing water, or breaking the structures, they will get their entitled water on time, while the officials lack the confidence that if they apply themselves properly to somehow get water on time, the users will refrain from breaking the rules. The problem is, where and how to break this vicious circle. As long as the offenders are the majority in either group, enforcement is not possible as any law can be effective only when a small minority of the population tends to break it.

⁶ In a seminar held in Karachi, mention was made that some influential farmers in such advantageous locations in a canal command had brought tractor loads of removed silt back into the canal, immediately after a major desilting effort by the government.

2.1.4 Rationale for Organization of Water Users in Pakistan

A strategy that seems most congruous with this situation is to approach the problem from the demand side of the irrigation management equation. This strategy has not been fully explored so far in Pakistan, where a supply-sided bureaucracy has consistently been playing a dominant role.

The proposition is that growing inequity and declining productivity can be resolved by an institutional change initiated at the level of water users, which would help to adjust their own behavior, and would help to generate corresponding institutional (and behavioral) changes in the delivery organizations as well. There is evidence to suggest that, given the opportunity, Pakistan's water users are willing to take decisions on their own.

In the absence of pressure from rigid administrative behavior, Pakistan's farmers have demonstrated their willingness and ability to manage their own irrigation affairs amicably and productively. In the newly established Chashma Right Bank Canal Stage I system, any form of warabandi or official water distribution methods have not been established yet. Taking this opportunity, farmers resorted to close and open outlets according to their collective needs within the watercourse commands. IIMI's research results show that the pattern of this outlet closure almost coincide with the actual crop water requirements for the season (Figure-7 and Figure-8). Field research in Fordwah Distributary has reported very prudent behavior by the farmers in water trading and sharing (Strosser and Kuper, 1993), and in coping with salinity (Kuper and van Waijjen, 1993).

The current problems of irrigation management in Pakistan typically call for new thinking. Hitherto, the country's irrigation development has been mainly technology-oriented, and pursued with a pre-occupation in expanding the resource base. The commendable work done so far in technology application and resource base expansion is now clearly facing a decline in its productive value.

Figure-7
WATERCOURSES CLOSURE RECORDS: DISTY # 3
DISTY AVERAGE (1/92 TO 6/93)

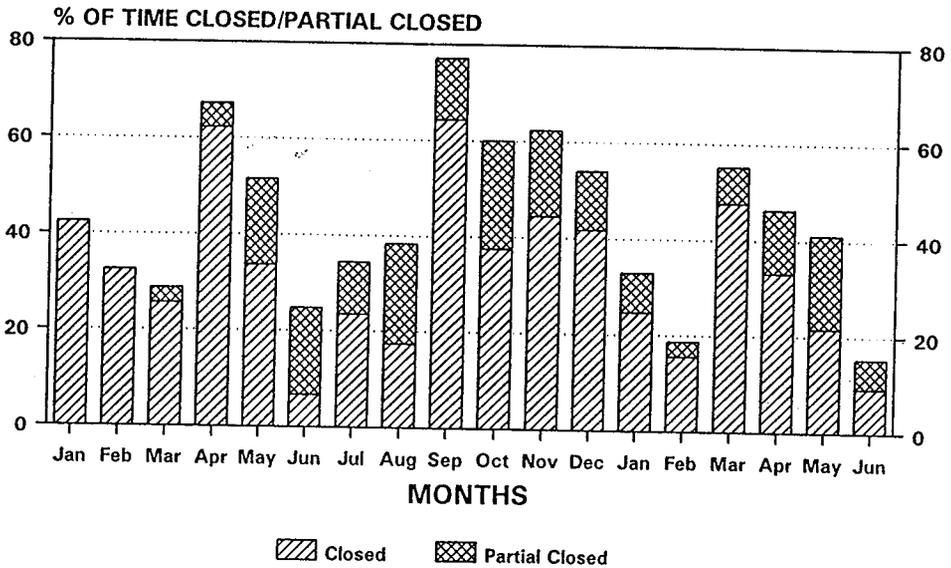
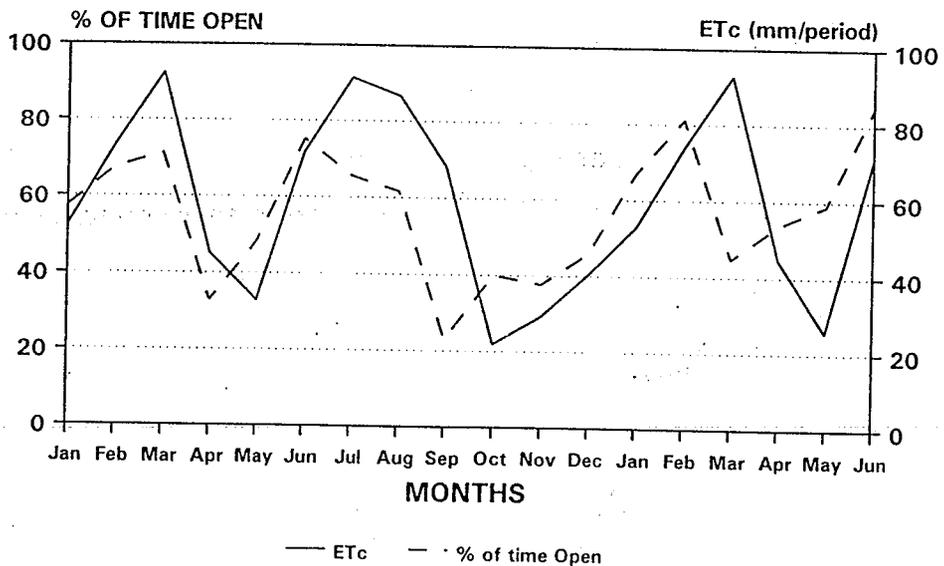


Figure-8
WATERCOURSES OPEN RECORDS : DISTY # 3
COMPARISON OF ET_c WITH FARMERS BEHAVIOR



Jan 1991 - Jun 1993

Yields of main crops under irrigated agriculture in Pakistan are either stagnant, or declining. The Pakistan National Conservation Strategy, a recently published government document, points out that Pakistan's average yields of all main crops are considerably less than the average yields achieved by other countries; wheat yield is 44% of that in Mexico, rice yield is 43% of that in Egypt, maize yield is 33% of that in Turkey, cotton yield is 75% of that in Mexico, and sugarcane is 66% of that in India. The 1990 *Water Sector Investment Plan* of Pakistan predicts a food shortfall of about 10% by the year 2000 and 25% by 2013, even if the Plan's proposed targets of resource base and performance improvements are met. This represents an increase in the food deficit from 24% to 36% during this period. Thus, the low productivity of irrigated agriculture in Pakistan represents a major threat to the country's food security.

2.2 Prospects for Action Research on Social Organization

The rationale for social organization in irrigation management in Pakistan was seen to be based on the country's context. However, generally for any country, the idea of organizing water users should raise a number fundamental questions, answers to which are usually assumed to be common sense. But these questions need to be raised, and clear answers sought and clarified so that there is a common platform of appreciation of the strategies to be undertaken.

For instance, who gains by farmer organization, and who loses? If it is for common benefit, how can the benefit be clearly identified to make it easily convincing? Can this goal be achieved in a skewed social system? What makes an organized users group function effectively under these conditions? And so on and so forth.

A few issues that relate to these questions are mentioned below:

2.2.1 Empowering Water Users : A Basic Issue

The following excerpt from a recent article by John S. Ambler (1993) aptly raises the issue of empowerment:

In practice, the implicit meaning of the phrase "farmer participation" frequently means "we need farmer participation in the government's program". With this unsaid attitude, the government acts as the prime mover, making the key decisions about investment priorities, the design of improvements, the system of management, and the rules of operation. Water user's associations become an appendage of the state, rather than autonomous bodies with real decision-making powers. The concept of farmer management (or alternatively, "government participation in peoples' programs") requires a reorientation of the irrigation bureaucracy from a position of implementing agency to one of service agency. This would be one step towards conditioning ourselves to think about placing meaningful authority in the farmers' hands.

The validity of this view rests on a number of observable facts and related interpretations. One dominant feature of irrigation management in South Asian countries is the exercise of power and authority in day-to-day management affairs. Therefore, a basic issue in social organization for irrigation management is whether, and to what extent, the power and authority can be shared among the relevant partners.

Ambler's views quoted above represent a common concern among many from outside the irrigation bureaucracies, and the concern has been increasingly emphasized in recent times. However, not much has been articulated on this issue by those within the bureaucracies who, in fact, possess the power and authority, which they are being encouraged to share with their "beneficiaries". A forum of this nature provides a good opportunity to clarify the insiders' view.

The downside of this issue is an apparent lack of both interest and its articulation at the grass root level. Do water users really want to get organized, or be empowered?

This question has to be answered with empirically tested results. That the people in one place have wanted users organization, or even benefited from it, is no reason for one to assume that the people in another place would do the same. Even if the common realization among those who are interested in their welfare is that any group of people would need it, there is a need to engage in some social engineering field work to ensure that people in fact are convinced that they want to be organized. Individuals will readily agree to join a group only when they see the personal gain in doing so.

In summary, the sharing of power and authority is a basic requirement for shifting to participatory management through the involvement of organized users. This presupposes the existence of a commonly accepted set of useful functions to be performed by the organizations. Without these, there will be only "paper organizations".

The desirability of power transfer may be widely accepted, but the issue needs to be further analyzed in terms of mainly three aspects:

- 1) Viability (is it really possible?);
- 2) Extent (how far is it possible?); and
- 3) Mechanisms (the strategies for transferring power).

2.2.2 What Can the Organized Water Users Do ?

Past experience in state-sponsored interventions in organizing water users shows that their emphasis was for more tangible, target-oriented and engineering-related activities by the water users. Once the limited involvement in lining and improving watercourses was accomplished, the "WUA" that was formed for this purpose collapsed. In fact, the activity itself was a doubtful incentive for the farmers to organize themselves for

collective action, as the task could be undertaken with minimum organized behavior by the individuals. Studies on Swabi Irrigated Agriculture Project (SIAP) activities in the North West Frontier Province concluded that lining of watercourses is hardly seen by the farmers as a strong incentive for collective action. However, further research on this aspect is necessary to arrive at firm conclusions.

An organization of water users implies that the "water use" itself is an important task to be gainfully accomplished through collective action by the organization. This assumption has not been tested yet in Pakistan, but underlies the conceptual framework outlined in this paper. One of the important objectives of any future interventions in organizing water users in Pakistan should be to test the validity of this proposition. Can organized water users manage water more productively and more equitably, if they were to be given the responsibility, not only at the watercourse level, but also at the distributary canal level ?

2.2.3 Who Should Organize Water Users ?

The political nature of participation requires that the policy on social organization should essentially be indigenous. It should finally be determined by the local people alone, and not by any donor or foreign expert. However, external assistance can be a very useful catalyst in the process of policy formulation, situation analysis and developing implementation strategies.

That the content of participation is usually determined by the political ideology of each country is an added reason why there should be a fairly cautious approach to any type of intervention relating to the organization of people. Particularly, the rural people are generally believed to be the more vulnerable section of the society, and should be approached with greater care.

In Pakistan, this policy interest has already been expressed. Two extensive state sponsored programs, On Farm Water Management and Command Water Management, represent a clear expression of policy interest in social organization, which is further supported by the laws established for water users associations and their federations. What is lacking however, is a firm commitment on the part of both policy and management to pursue this effort beyond the program-based obligations to the donors. Once a favorable policy environment has been firmly established, ideally, the need for WUAs should be felt by the water users themselves, and the organization and development of WUAs should be based on their own expressed interest. These propositions can be tested in an action research program.

3. IIMI'S PROPOSED ACTIVITIES IN PAKISTAN

With the experience gained in different contexts, IIMI would like to collaborate with Pakistani agencies and research groups to provide the necessary research inputs for developing and implementing a strategy for participatory management. The above mentioned questions, and several others, will form the basis for a collaborative research and development program.

IIMI's proposed research effort aims to:

- 1) develop a general awareness regarding the field response to the past policy initiatives;
- 2) rekindle the interest among policy and implementation levels for undertaking more meaningful measures towards lasting institutional development among water users; and
- 3) identify the conditions for effective social organization.

Contextually appropriate action research efforts will follow the initial "learning" phase, on the basis that any external assistance can be effective only in playing a facilitating or a catalytic role. Methodologies used elsewhere with a fair degree of success (Skogerboe et al 1993) will be used with appropriate amendments to suit the local conditions.

Action research on this theme has to be essentially collaborative. With this requirement in view, the proposed research effort will also explore the development of appropriate extension mechanisms and training strategies for collaboration.

In the next phase of the Dutch funded project, "Managing Irrigation for Environmentally Sustainable Irrigated Agriculture in Pakistan", IIMI is planning to emphasize on the social organization aspects. The project document indicates this emphasis in the following preamble:

In line with present thinking within the Pakistan Government, and supported by similar World Bank initiatives in the irrigation and drainage sector, the project will embark upon a program of studies related to required institutional changes in irrigation delivery and drainage. Water Users Associations (WUAs), that are still insufficiently developed after many years of Government support, and institutional changes in provincial government agencies, will form a new thrust of the project. IIMI's involvement in many disciplines and sectors as Pakistan changes its approach and strategy, together with its experiences in other countries, would enable possibilities for success in these activities.

The activities will be built around four main areas:

- 1) Establishing viable water users organizations;
- 2) Farmer-agency interactions;
- 3) Coordinated irrigation services; and
- 4) Role of provincial institutions.

3.1 In the Punjab Province

These activities will be carried out in the Fordwah Eastern Sadiquia (South) area, where a World Bank funded irrigation and drainage project is being implemented at a total cost of about Rs.2300 million over a period of six years from 1992-93 to 1998-99. The infrastructure development and related research work is jointly executed by the Water and Power Development Authority (WAPDA), Punjab Irrigation Department (PID) and Punjab Agriculture Department (PAD). The proximity to this project work provides an opportunity for IIMI to closely collaborate with these agencies. For IIMI's activities related to social organization, the PAD (particularly its Water Management Directorate), will be the main partner. This partnership will be able to draw on the long experience of the Command Water Management Project (CWMP) and the On-Farm Water Management (OFWM) program, in which attempts had been made in the past to strengthen the irrigated agriculture management through improved infrastructure, institutions, agricultural inputs and services. The work will be carried out in the watercourse commands of two distributaries, the Sirajwah Distributary and the Bhukan Distributary.

3.2 In the Sind Province

At the request of the Government of Sind, a similar program is planned to be incorporated in the World Bank and Swiss funded "Supplementary Project for Strengthening of LBOD Stage I, Water Management Component". Pilot projects will be undertaken to induce genuine farmer management of irrigation. One minor or distributary command area will be selected as a Pilot Distributary Turnover Command area in each of the three LBOD districts (Nawabshah, Sanghar and Mirpukhas). The Directorate of the LBOD Water Management Cell in particular, and the Provincial Agriculture Department in general will be the collaborating partners of IIMI in this activity.

Dutch funding for IIMI's work for water management interventions will reinforce this LBOD activities to fine-tune the delicate balance between conjunctive irrigation and drainage practices that are required for the waterlogged situation in the Sindh. This combined support will further help IIMI to involve strong collaboration with existing research organizations and government agencies in the Province of Sindh.

IIMI places a strong emphasis on the collaborative nature of these activities. IIMI would work as a partner with the implementing agency and other collaborating institutes. In the long run, a successful farmer organization effort aimed at participatory irrigation management approaches will necessarily be accompanied by policy and organizational changes within irrigation agencies, which they must be prepared to plan and implement. IIMI would like to participate in launching this institutional development program, by providing it the relevant research inputs and international experience.

References

- Ambler, John S. 1993. Rethinking the language of farmer water users associations, in FMIS News Letter No. 12, September 1993. Colombo, Sri Lanka: International Irrigation Management institute.
- Bandaragoda, D. J.; and G. R. Firdousi. 1992. Institutional factors affecting irrigation performance in Pakistan: research and policy priorities. IIMI Country Paper - Pakistan No.4. Colombo, Sri Lanka: International Irrigation Management institute.
- Bandaragoda, D. J.; M. Badruddin; Rana M. Afaq; and Saeed-ur-Rehman. 1993. Institutional and management implications of system modernization: rehabilitation of the Lower Swat Canal irrigation system. Paper presented at the Ninth Internal Program Review, Colombo, Sri Lanka: International Irrigation Management institute.
- Bhutta, M. N., and E. J. Vander Velde. 1992. Equity of water distribution along secondary canals in Punjab, Pakistan. *Irrigation and Drainage Systems*, Vol 6: 161-177.
- Gleason, Jane E.; and James M. Wolf. 1993. Evaluation of the impact of canal rehabilitation on hydraulic and agricultural economics indicators. Irrigation Systems Management Project Phase II. USAID, Islamabad.
- International Irrigation Management Institute. 1989. IIMI Review, Vol 3, No. 1, Special Issue on Farmer Participation in Management.
- Kijne, Jacob W.; and Edward J. Vander Velde. 1991. Secondary Salinity in Pakistan - Harvest of Neglect, in IIMI Review, Vol. 5, No. 1. Colombo, Sri Lanka: International Irrigation Management Institute.
- Kijne, Jacob W.; and Edward J. Vander Velde. 1992. Salinity in Punjab Watercourse Commands and Irrigation System Operations, in *Advancements in IIMI's Research 1989-91*. Colombo, Sri Lanka: International Irrigation Management Institute.
- Kuper, M.; and Erik van Waijjen. 1993. Farmers Irrigation Practices and their Impact on Soil Salinity in the Punjab, Pakistan: Is Salinity here to Stay? Ninth Internal Program Review, Colombo, IIMI.
- Merrey, D. J. 1993. Institutional context for managing irrigated agriculture. Paper presented at the DSE/IIMI Strategy Workshop on Institutional Framework for Irrigation, 1-5 November 1993, Chiang Mai, Thailand.

Pakistan National Conservation Strategy. 1992. The Pakistan national conservation strategy: where we are, where we should be, and how to get there. Environment and Urban Affairs division, Government of Pakistan.

Skogerboe, G. V.; L. P. Poudyal; and K. B. Shrestha. 1993. M&O guidelines for turnover of irrigation systems to farmers. Water Resources Development, Vol. 9, No. 4.

Strosser, P. and Kuper, M. 1993. Water Markets in the Fordwah/Eastern Sadiqia Area: An answer to perceived deficiencies in canal water supplies? Working Paper No. 30, Colombo, Sri Lanka: IIMI.

Vander Velde, E. J.; and D.H. Murray-Rust. 1992. Impacts of physical managerial interventions on canal performance in Pakistan: A review of five years of field research studies. Paper presented at the Eighth Internal Program Review. IIMI. Colombo.

Vermillion, Douglas L. 1992. Irrigation Management Turnover: Structural Adjustment or Strategic Evolution?, in IIMI Review, Vol. 6, No. 2. Colombo, Sri Lanka: International Irrigation Management Institute.

Wijayarathna, C.M. 1991. Irrigation Management in Asia: Experience and Prospects. Paper presented to the Study Mission on Management of Irrigation Facilities, 18-28 June 1991. APO, Tokyo, Japan.