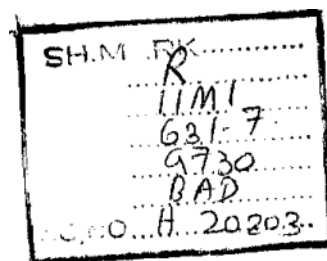


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ON
MANAGING IRRIGATION FOR ENVIRONMENTALLY
SUSTAINABLE AGRICULTURE IN PAKISTAN



Islamabad, November 5-7, 1996

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FOREWORD

Volume V on Institutional Development contains the four papers that were presented at the National Conference on Managing Irrigation for Environmentally Sustainable Agriculture in Pakistan held at Islamabad, November 5-7, 1996. These papers are authored by the researchers of IIMI-Pakistan and by professionals in the organizations with which IIMI-Pakistan has been collaborating. comprising of: Directorate General, Agriculture (Water Management), Agriculture Department, Governemnt of the Punjab; Planning and Development Division, Government of Pakistan, Islamabad: and Water and Power Development Authority (WAPDA).

REVIEW OF IIMI'S EXPERIENCE IN SOCIAL ORGANIZATION FOR IRRIGATED AGRICULTURE IN PAKISTAN

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Muhammad Asghar Cheema and Zafar Iqbal Mirza¹

ABSTRACT

IIMI has been involved in a number of pilot projects experimenting on social organization for managing irrigated agriculture in Pakistan. In about two years of a slow but steady process of mobilizing the water users community, some of these pilot projects have produced some satisfactory results. In collaboration with respective government agencies in the two provinces, Punjab and Sindh, IIMI's effort has now been able to facilitate the formation of four distributary or minor level water users organizations.

IIMI's experience in these pilot projects to date provides some tentative conclusions regarding the viability of water users organizations (WUOs). First, the water users are seen to be willing to organize themselves for greater responsibility. Second, they are keen to acquire the necessary power and authority to distribute irrigation water more equitably than at present. Third, they see the potential of becoming self-sustained in terms of resources for the management of O&M, provided that some initial assistance is provided to them by the government at the beginning.

The constraints against their progress are basically institutional in nature. They are rooted in the societal dynamics arising from skewed distribution of land ownership, rural incomes and wealth, and also from the application of rules related to water rights and law enforcement in general. The new organizations need the support of the state to overcome these constraints. With adequate institutional support, these WUOs are likely to grow into self-supporting and self-regulating grass-root level organizations. They have the potential of developing their organizational capability to hire their own technical staff for undertaking O&M responsibility for both irrigation and drainage of part of the present physical system, not less than the distributary command area.

1. INTRODUCTION

The purpose of this paper is to present some salient aspects of objectives, concepts, methodologies and results of on-going action research activities initiated by the International Irrigation Management Institute (IIMI) on social organization for irrigated agriculture in Pakistan. These activities are part of IIMI's research program related to institutional development.

¹ The authors are Senior Management Specialist, Field Research Social Scientist, Sociologist, Social Scientist and Irrigation Agronomist, respectively, of IIMI-Pakistan.

Institutional development forms the most significant part of a country's development strategy as it serves the essential purpose of institutionalizing the technical solutions introduced by various infrastructure projects. The donors give a very high priority to this aspect, as a good return on heavy investment in infrastructure development can be assured only by a strong and responsive institutional framework. Ironically, past experience shows that these activities are the most difficult to achieve, as there are many obstacles that tend to hinder the introduction of institutional change in any context.

The issues in institutional development related to irrigated agriculture in Pakistan demand a fairly well integrated package of options (Bandaragoda and Skogerboe. 1996). As the institutions should match the unique combination of variables in a given system (Ostram, 1992), this package of institutional options obviously will have to correspond to the combination of contextual variables in Pakistan. The context of Pakistan's irrigation is well known. Among the many options that may have to be implemented to develop a responsive institutional framework for irrigated agriculture, the involvement of water users in the management of the physical systems is of prime importance.

One of IIMI's major activities during the past two years has been to test the hypothesis that the maximum possible involvement of water users in the management of irrigation systems would improve irrigation performance. In this regard, IIMI's first objective is to learn how to organize water users in the context of Pakistan, and secondly, to test the viability of having effective water users federations at the distributary or minor canal level to share management responsibility in an improved joint-management mode.

2. ACTION RESEARCH SITES

IIMI's action research on water users organizations is in five pilot project locations, of which two are in the Punjab Province and three are in the Sindh Province of Pakistan. Of the two pilot sites in the Punjab, action research work has just begun in the small dams at Fateh Jang. The other Punjab site, which is at the Hakra 4-R Distributary in Haroonabad, is the largest pilot project on social organization ever tried in Pakistan. A visiting consultant has recently remarked that the organizational work of this scale in a single irrigation system has not been done anywhere in Asia (Pradhan, 1996).

The work on the Hakra 4-R Distributary is part of IIMI's project on "Managing Irrigation for Environmentally Sustainable Agriculture in Pakistan", which is funded by the Royal Netherlands Government. One of the reasons for selecting this pilot site is that other components of this research project are all located in the same area. The selection of this site was also prompted by the presence of a number of national research institutes and agencies working in the same area under another project, the World Bank-funded Fordwah and Eastern Sadiqia (South) Irrigation and Drainage Project.

The three pilot sites in the Sindh Province are associated with the study project "Farmer Managed Irrigated Agriculture under the Left Bank Outfall Drain Stage I Project, Pakistan", which is conducted in collaboration with the Department of Agricultural Engineering and Water Management of the Government of Sindh. The pilot sites were selected in consultation with the irrigation related agencies of the area, one distributary or minor in each of the three LBOD districts, Mirpurkhas, Sanghar and Nawabshah, using an agreed set of criteria.

The socio-technical characteristics of the five pilot sites are presented in Table 1

Table 1. Description of IIMI's Pilot Sites for Action Research on Social Organization.

Name of the site (Distributary/Minor/ Reservoir)	Funded By	Length (km)	Design Discharge (cfs)	No. of Outlets	CCA (acres)	No. of Land Owners
Hakra 4-R Distributary, Eastern Sadiqia Canal Command area, Punjab	Royal Netherlands Government	58	193	120	44,300	4,680
Mirwal Small Dam	Overseas Development Administration, UK	2,726af	11		1,050	95
Shahpur Small Dam		4,095af	43		4,308	157
Heran Distributary, Sanahar Dist., Sindh	SDC, WB	14	58	31	15,400	539
Bareji Minor Mirpurkhas Dist , Sindh	SDC, WB	12.5	34.2	24	14,318	197
Doro Naro Minor Nawabshah Dist , Sindh	SDC, WB	10.4	51.6	26	13,382	421

3. STUDY OBJECTIVES

The two major objectives of these action research pilot studies are:

- (a) to learn how to organize farmers in the given contexts; and
- (b) to test the viability of organized water users in jointly managing parts of the irrigation systems together with the irrigation agencies so that more efficient and equitable allocation, distribution and use of water can be achieved.

The first objective implies a focused research perspective of **assessing whether the effort in organizing water users would be accomplished in the "right way"**, whereas the second is related to an evaluation of **whether "it is the right thing to do under the given circumstances"**. This distinction in research perspectives is inherent in conducting pilot projects.

All of these pilot efforts are aimed at developing appropriate procedures and guidelines for the wider application of viable and replicable organizational mechanisms for irrigated agriculture in Pakistan. The pilot project objectives contribute to the overall institutional development objective of IIMI's Pakistan National Program, which is to assist in enhancing the existing institutional capacity while maximizing the involvement of water users in irrigation management. In addition, some generic conclusions may also be drawn from these efforts for comparative purposes.

Towards achieving the above objectives, the work undertaken by IIMI in the pilot projects aims:

- (1) to gain an understanding of the ground situation in the pilot distributaries by way of collecting baseline information on physical, socio-economic and institutional aspects relating to the existing systems in operation;
- (2) to use this knowledge to cordially interact with the water users in the pilot distributary command area with a view to discussing with them the possible management strategies for improved productivity and sustainability of irrigated agriculture in the area;
- (3) to mobilize the necessary institutional support for assisting the water users in selected pilot distributaries and catalyzing their interest to establish appropriate water users organizations;
- (4) to facilitate interactions between water users and operating agencies;
- (5) to assist in setting in motion a series of institutional development activities to support these newly established water users organizations to undertake responsibility for maintenance and operation of secondary and tertiary levels of the canal irrigation system for improved water distribution;
- (6) to document the processes of action research in the pilot distributaries; and
- (7) to provide information that will be useful for developing policies and methodologies related to future replication of this pilot effort on social organization for irrigation management on a wider basis.

4. PILOT PROJECT CONCEPTS

As with any other action research effort, these social organization pilot projects are based on a number of theoretical assumptions and principles, some of which are mentioned below:

- (1). **Benefits of Organized Behavior:** The assumption is that collective action is more effective than individual action in sorting out social issues related to equitable resource allocation and sustainable resource management. This is particularly true for water distribution in irrigated agriculture, as irrigation systems are inherently complex socio-technical systems. Conceptually, collective action is not only able to liberate individuals' actions, but also to restrain them (Parsons, 1984). These twin actions are necessary to improve equitable water distribution. For instance, the strength of a water users organization would depend on its ability, not only to mobilize support for cooperation, but also to effect sanctions on members who commit irrigation offences and prevent widespread anti-social conduct in water distribution.
- (2) **Benefits of Water Users Organizations:** In many instances in the past, WUOs have been promoted to take over part of the responsibility for managing irrigation and drainage systems with a view to reducing the government's share of O&M costs, improving equity in water distribution, managing groundwater levels, and improving system performance. For the present pilot projects, all of these objectives remain, but in addition, they are taken as tentative propositions which will further be tested through the results of pilot efforts.
- (3) **Joint Responsibility:** Organizing farmers, who are part of the local community, is essentially a local responsibility, and should not be attempted alone by an international institute like IIMI. Organizing people for popular participation has a political implication, which can best be handled by a local group of people who have access to appropriate authority to engage in such work. IIMI should play a catalyst's role, and mobilize the interests and support of the operating agencies for this work. Suitable community-based opinion leaders and volunteers can play a significant role in sharing responsibility for organizing farmers.
- (4) **Motivation for Sustainable Effort:** Improving existing physical conditions or providing new infrastructure cannot be considered a sufficient condition for effective social organization; nor is the device of cost-sharing for rehabilitation or capital works. Similarly, the delivery of an extension package is insufficient and also tends to make the farmers dependent on those who "deliver". All these interventions have a temporary influence on

social organization. A continuous engagement in some productive activity by the water users as a group is more likely to provide a greater incentive to keep the organizations alive. Therefore, the work by the field teams is based on strategies for promoting collective action on effectively managing maintenance and operation of the irrigation distributary sub-system. An awareness on water-related technical and socio-economic issues in terms of quantity, quality, as well as economic and environmental impact of water used for irrigation, along with an opportunity to have some control over these issues, would motivate the farmers on a long-term basis.

- (5) **Socio-Technical Linkage:** The social sub-system in an irrigation system does not operate in isolation. It always works in association with the physical or technical sub-system (obviously, the converse is true, *too*). For this reason, social organization cannot be effectively accomplished independently, or without reference to the technical aspects of irrigation management. The water users in an irrigation system pay considerable attention to a discussion on problems and solutions related to their technical sub-system. Generally, rural people are not very much impressed by the outsiders who hasten to discuss their social issues. Therefore, as a strategy, the field teams should be well equipped with information on the technical sub-system, which the water users will be willing to discuss initially. This will also enable an initial rapport to be established between the field teams and the farmers.
- (6) **Mutual Trust:** Literature on irrigation management is rampant with references to lack of mutual trust between farmers and irrigation officials (Chambers, 1987; Hart, 1978; Merrey, 1987; Wade, 1982, 1987). The mistrust on the part of farmers extends to any group that tries to interact with them in the field. To clear this initial cultural barrier, the field teams would benefit by proceeding slowly, but steadily, in the process of trust-building, allowing sufficient time for farmers to air their views, understand the need for change, and identify the genuineness of outsiders interacting with them.
- (7) **Sense of Involvement:** The decisions related to social organization, including those regarding the form and structure of distributary or minor level organizations and their legitimate functions, should eventually be taken by the water users themselves. All other partners in this effort, including IIMI, should act as facilitators in the water users' decision-making process to assist them in taking progressive and implementable decisions.
- (8) **Upstream Abundance and Downstream Shortage:** Like in the case of famines which are not necessarily caused by a shortage of food alone, but

also by mal-distribution', the problems of the end-users of any service or commodity, such as water, are attributable to defects in the distribution system. Acquisition of a large quantity of water by building dams does not necessarily mean that the user will have access to his water requirement (or his entitlement), so easily, or equitably as expected. Therefore, the equitable distribution of water is as important as the acquisition of water in overall irrigation performance. In an attitudinal re-orientation among the persons involved in managing water delivery services, the human interactions will be tested for their real value in bringing about increased productivity through more equitable water distribution.

- (9) **Improved Irrigation Practices:** Even if the equitable water distribution is effected, it does not ensure that the users will consume the water properly. Collective action by an organized group of farmers is expected to facilitate the needed transfer of technology for improved irrigated agriculture by improved management of the combined irrigation and drainage facilities. The field teams in the case of these pilot projects (and a similar institutional arrangement on a more permanent basis for subsequent replication of pilot project results, if they happen to be significantly positive), would serve as a group providing irrigation and agriculture advisory services to the WUOs. The sustainability of WUOs during the initial period would depend on the facilitating and motivating functions of this irrigated agriculture advisory services group. Conceptually, this advisory role of the government agencies is seen as a continuing need even after the establishment of WUOs.
- (10) **Decentralization vs Privatization:** IIMI's present approach in these pilot projects is not perceived as part of the broad policy of privatization in which government owned assets of infrastructure are transferred or sold to the private sector. Rather, it is an effort in transferring some or all irrigation management functions related to a distributary or minor, or a small dam command area, from government agencies to organized water users groups as part of a strategy on decentralizing the management of irrigation systems.

The above assumptions and principles do not form an exhaustive list, but are mentioned as guidelines for a conceptual foundation for the pilot project work and the methodologies to be followed.

² Work done by the renowned economist, Dr. A. K. Sen, on famines in Ethiopia and Bengal, explains that famines are not necessarily caused by a shortage of food alone. Problems of access to the available food resources through a lack of purchasing power and uneven distribution make many poor people vulnerable. Sen's "entitlement" theory could easily find relevance in the field of irrigation water management.

5. METHODOLOGIES

The field approach involves the placing of social organizers in selected communities to interact with and slowly catalyze the farmers to identify their own problems, solutions, leaders, organization, financing, budgeting, and management. For each pilot command area, a Field Team of five members was planned to be deployed initially, consisting of one Team Leader of social science background and four members including both social organizers, as well as technical research assistants. The methodology of deploying a small field team and using PRA methods for field work was first field tested in the Hakra 6-R Distributary³.

A major feature of the methodology adopted in this action research program is the use of community based volunteers. They are called "contact farmers" in the Sindh pilot project and "social organization volunteers" or (***Samaji Razakar***) in the Hakra 4-R Distributary pilot project. These volunteers essentially serve as a link between our field teams and the community, and in effect form an extended part of the social organization field teams. Some of the main criteria for selecting a contact farmer were that:

- * The person was well informed about the area, its people, traditions, geographical details, water and land resources, and generally about its irrigated agriculture;
- * The person was non-controversial, was not known to be a trouble maker, an exploiter, an anti-social person in any way;
- The person was able and willing to communicate freely with all sections of the local community, and also with the outsiders who come to collaborate with the local people in community development activities;
- * The person showed sufficient motivation to help others and saw value in collective behavior for common good;
- * The person had the potential for acquiring some basic training to become a community-based social organizer, and be part of our extended field team;
- * The person having an ability in public speaking was an added advantage; and
- * The person was referred by one or more of the major socio-political groups of the area.

³ The results of this field research work are reported by Waheed uz Zaman et al (1996).

Another important feature of the methodology adopted for this work was the iterative process for social organization (Skogerboe et al, 1993).

The exercise is designed to be conducted in a slow and progressive manner⁴. The process developed for this purpose has the following four phases:

- Phase I - Support Mobilization (Arrangements with collaborating partners and concerned agencies regarding the necessary assistance for pilot projects, the recruitment and training of field staff, and developing methodologies for the pilot projects.)
- Phase II - Initial Organization (Assessing community characteristics through baseline surveys, developing the processes for social organization and generating initial awareness among the water users in the pilot area.)
- Phase III - Organization Consolidation (Identifying the leaders, developing action plans, training, and reaching agreements with agencies for joint management.)
- Phase IV - Organizational Action (Implementation of the Action Plan for O&M in close collaboration with the concerned agencies, and monitoring and evaluation of the action phase.)

These four phases prepare the participants in a slow and progressive manner towards the goal of a WUO taking over some agreed functions of irrigation management at the distributary level.

The major activities of the Hakra 4-R Distributary pilot project in the Punjab are shown in Table 2. The work in the other pilot sites follow a similar pattern.

⁴ Even those who have apprehensions about farmers' participation acknowledge that in Pakistan, the farmers' participation can be best achieved through a gradual and a phased program (Asrar-ul-Haq et al, 1996).

Table 2. Activities of the Field Team at Haroonabad.

1994	1. Select social organization field team	2. Conduct preliminary investigation in project area using the opportunity to train the field team.	3. Conduct planning meetings and negotiate institutional arrangements for pilot program	4. Identify persons for Field Implementation Committees	5. Arrange for consultancy inputs	6. Develop criteria for selection of pilot project
1995	7. Develop the process for pilot program on water users organization	8. Select pilot project sites	9. Conduct baseline survey in selected pilot area	10. Conduct preliminary analysis of baseline data, assess community characteristics and identify sub-systems in the distributary	11. Along with agency resource persons and contact farmers, conduct a series of initial meetings to build up rapport with water users and identify their critical needs	12. Conduct a series of consultation meetings with water users to discuss feasible options for organization.
1998	13. Joint visits by farmers & agency representatives to F.M.I.S areas and other research sites	14. Conduct initial organization activities, identifying organizational levels and structures and potential leaders	15. Conduct training on watercourse improvement and agricultural practices	16. Review warabandi schedules in pilot area	17. Organize WUDs at distributary/ minor or watercourse level	18. Consult WUDs on changes in the legal framework
1997	19. Initiate action to establish formal WUDs at distributary/ minor level	20. Conduct training on O&M and irrigation practices and conduct "walk-trail" surveys				
1998	24. Continue training on O&M, irrigation practices and WUD administration and financial management	25. Implement plan of action for joint management of pilot distributary/ minor				

6. SOME EMERGING RESULTS

6.1 Socio-Economic Baseline Surveys

From the conventional type of socio-economic baseline surveys conducted in the command areas of the canal irrigation pilot sites, a few general observations could be made about the community characteristics of the areas.

In a randomly selected sample of 367 respondents in the Hakra 4-R Distributary command area, some of the main findings were that:

- The average family size was 9, out of which 2 were school going children;
- About 69% of the respondents felt that the unsatisfactory water distribution situation could be solved by the agency staff, if they wished to do so;
- About **45%** of the respondents reported inequity between distributaries, and of this 23% attributed the problem to the "influentials";
- About **80%** referred to inequity within the distributary, and this number ranged from 67% in the head reaches to 84% in the tail reaches, and most of the respondents attributed the problem to big landlords and irrigation officials;
- None reported inequity within the watercourse;
- The respondents showed considerable organized behavior; 94% had participated in collective action in maintaining or constructing the village mosque, 90% in maintaining the watercourse, and 20% in desilting the distributary; and
- The average farm income was Rs. 78,963 for an average operated area of 13.25 acres as reported by the respondents.

At the three pilot sites in Sindh, the sample sizes were 170 for Bareji Distributary in Mirpur Khas, 168 for Dhoro Naro Minor in Nawabshah and 188 for Heran Distributary and its Khadwari Minor in Sanghar. Some of the preliminary results show that:

- The family size varied between 7.5 in Bareji to 12.8 in Dhoro Naro;
- Almost half of the respondents were not satisfied with the maintenance of the irrigation system;
- Inequity exists within and among the distributaries in water distribution;

- A majority of the respondents reported that the distribution of water within the watercourse was equitable;
- A majority was willing to contribute to the O&M of the drainage system but thought that it was the responsibility of the government:
- Almost all of the respondents were involved in maintenance of the watercourse while a vast majority were involved in maintenance of the distributary/ minor;
- Around 90 % of the respondents were willing to contribute for O&M at the distributary level; and
- A majority of the respondents (92 % in Nawabshah to 97% in Mirpur Khas) were willing to work with the people for further development.

6.2 Technical Baseline Surveys

In the Hakra 4-R Distributary command area in Punjab, the average cropping intensity was found to be 122%; it was higher at the head reaches (147%) compared with the tail reaches (97%).

In a technical survey, all the outlets of the pilot distributaries or minors were calibrated and discharge measurements were taken.

In an inflow-outflow test conducted in the last week of October 1995, the Hakra 4-R Distributary received a discharge of 232.7 cusecs as against a sanctioned discharge of 193 cusecs, roughly a 21% increase.

6.3 Community-Based Volunteers

As mentioned above, a major feature of the methodology adopted in this action research program has been the use of "contact farmers", a selected group of community-based volunteers to assist the field team⁵. As the term "contact farmers" would tend to give a value-loaded connotation with reference to its popular use earlier in agricultural extension strategies, the project staff and the people themselves in the Punjab pilot project preferred to use a new term -- "social organizer volunteers (SOVs)". The Sindh pilot sites continued to use the term "contact farmers". These community based volunteers were initially identified by the water users themselves, and were finally selected on the basis of the pre-determined set of criteria mentioned in Section 5 above. In the Hakra 4-R Distributary command area, a total of 146 SOVs were selected after consulting 486 water users through individual and small group interviews (details in

⁵ For details, see "Mobilizing Social Organization Volunteers: An Initial Methodological Step Towards Establishing Effective Water Users Organizations" by Mehmood ul Hassan et al (1996).

Table 3). The numbers varied between two to six per village, with an average of four per village. In the Sindh pilot projects, the contact farmers were selected through the same participatory approach, but the identification was on the basis of watercourses (2 per watercourse), rather than villages. The water users in these areas preferred the identity of the hydrological boundaries. Details of SOVs in the Hakra 4-R Distributary are given in Table 3.

Table 3. Number of Villages, Water Users Consulted, Persons Referred by Water Users as Potential SOVs, and SOVs Selected for Hakra 4-R Distributary Command Area.

Sub-system	Number of Villages	Number of Watercourses	Number of Water Users Contacted	Number of Persons Referred as SOV	Number of Persons Selected as SOVs
1	9	23	146	159	30
2	9	23	132	120	31
3	8	27	63	108	33
4	4	15	83	28	13
5	9	32	61	140	39
Total	39	120	486	555	146 ⁶

The prospective volunteers identified by the water users participated in a series of individual and small group semi-structured interviews. The purpose of these interviews was, firstly, to evaluate these persons on the criteria laid down for selection of SOVs, and secondly, to generate an idea about the water and agriculture related problems of the community and their own perceived solutions, particularly through organized efforts. The first few interviews provided a number of issues that seemed to interest the SOVs in general, and this set of issues were discussed during the subsequent interviews. Careful note keeping by the field team provided a good database on the perceptions of SOVs, some of which are given in Table 4.

⁶ This is not a fixed number as the Social organizers kept on adding more SOVs if they found someone well motivated and helpful.

Table 4. Some Perceptions of SOVs at Hakra 4-R Distributary

PERCEPTIONS	RESPONSES		
	Yes	No	No Comments
Water-related problems due to corruption	34 (63)	0	20 (37)
Illiteracy, poverty are main problems in organizing farmers	6 (13)	0	4% (89)
Pilot project not harmful	34 (63)	1 (2)	19 (35)
Union is strength	41 (76)	2 (4)	11 (20)
Water users participation will improve existing situation	44 (81)	3 (6)	7 (13)
Water users are suspicious because of foreigners in the team and in the area	24 (44)	0	30 (56)
Ready to help IIMI in organizing water users	45 (83)	0	9 (17)

Note: Figures in parenthesis are percentages of the total.

6.4 Rapport Building Meetings

After the Contact Farmers (CF) or Social Organization Volunteers (SOVs) were identified, a series of meetings were conducted with them to build rapport between them and IIMI field teams. They were briefed about IIMI, its international character, the pilot projects and possible benefits that may accrue to the farming community as a result of successful implementation. Most of them were convinced of the approach and the project objectives, so they promised to cooperate in the next few steps in general awareness building programs and organizing water users. Some of them were, nevertheless, suspicious of IIMI's field program due to various statements in the newspapers about privatization of the irrigation system and perceived this effort as a prelude to privatization. The uninterrupted process of generating and spreading rumors by different sources, such as some newspapers, agency officials, and some politically motivated water users themselves, added to their confusion.

The effect of the training imparted to the SOVs about social organization in irrigated agriculture was of great value, as they also used the opportunity to engage in group discussions and reach a consensus that the problems of irrigated agriculture could largely be solved collectively at the local level. The Contact Farmers at the pilot sites in Sindh also identified organizational levels, structures and financial sources for the proposed WUOs, while in Punjab, they agreed to provide the necessary information about water users, play a vital role in arranging consultation and planning meetings to create awareness among water users on the related issues. Most of the identified SOVs participated in the training workshops. Table 5 gives some details.

Pilot Site	No. of SOVs invited	No. of SOVs Participated	Participation (%)
Mirpur Khas	48	43	90
Nawabshah	50	40	80
Sanghar	62	60	97

6.5 Consultation Meetings

The main purpose of this set of meetings was to consult the water users for developing tentative plans for establishing water users organizations. Since the methodology of the overall process was to follow an iterative "building-block" process, with one step leading to the other generally, it was felt important to limit these consultation meetings to the purpose mentioned above. These meetings were also used as a follow up of the earlier set of rapport building meetings to clarify any doubts or misunderstandings among the people regarding the program. Since consultation is an essential element of a participatory action research approach, meetings were conducted in such a way that the water users were given enough opportunity to express their views and suggestions.

The following main topics were discussed and negotiated at these meetings:

- * Membership of Water Users Organizations;
- * Organizational structure; and
- * Procedure for identifying organizational leaders (office bearers)

During these meetings, the attention of the participants was also drawn to the provisions of the existing law and possible or desirable changes. One of the ideas put forward by field teams to the participants at these meetings was the need to consider the desirable features of a procedure for election or selection of office bearers, that the procedure should necessarily allow for equal opportunity for participation, that there should be a negotiation process, and that it should be done in a democratic style.

Another major item discussed during consultation meetings was the involvement of water users organizations in solving water related problems. At the Hakra 4-R Distributary pilot site in Punjab, these meetings yielded that:

- There should be a meeting for each watercourse for identifying organizational leaders and all the shareholders should be requested to attend;
- This meeting should start with some description of the objectives of the pilot project so that the water users who are not aware of IIMI or the pilot project may come to know the necessary details. Afterwards, the water users should choose with consensus 3-9 executive members for each watercourse, based on criteria, such as the socio-political groups, land distribution and length/ location of the watercourse. The water users assembled at this meeting will either themselves decide about one person who will be their leader for a higher organizational level, or the executive members may decide about that choice taking into account the feelings of the general body of water users in the watercourse;
- The participants of the planning meetings and IIMI's field team will be jointly responsible for ensuring that every shareholder is informed about the next set of meetings through personal communication, announcements in the village mosque, and through written letters to those who have not so far shown any interest;
- The tenants and lessees will also be invited and consulted, and will not be debarred from being considered for membership since they also will share the benefits or disadvantages equally;
- The tenure of office should be 1-2 years for the organization at the watercourse level. The leaders may be re-elected at the end of the tenure or may be dismissed if the majority decides to replace them;
- Important issues should be supported by 2/3rd majority;
- Some people (mostly the SOVs) volunteered to prepare an effective warabandi list as a reference for the selection process. Some of them, nevertheless, requested IIMI to supply them with an official warabandi list for background information:

The relatives of the water users (son, father, uncle, brother, cousin etc.) may be regarded as an effective proxy for the water users in case of an emergency or unavoidable situation, in case other water users do not object on this participation;

- At a few places, where participation was very high, the participants were enthusiastic to choose their leaders immediately. After discussions, the social organizers agreed, provided that the participants accepted the responsibility of informing the absentees and convincing them to acknowledge and accept the decisions already taken by the majority; and
- Some of the water users influenced by negative propaganda opposed the organizational efforts, not because it was not the right thing to do, but for the fears that the WUOs were going to be used for hidden agendas such as privatization, charging high abiana and the like. The field teams with assistance from the SOVs tried to clear such misconceptions.

The degree of participation in these meetings is reflected in the table given below.

Table 6. Participation of Water Users in Consultation Meetings.

Pilot Site	No. of Meetings	No. of Shareholders	No. of Water Users Participated	Participation (%)
Haroonabad	52	4680	1370	29
Mirpur Khas	24	354	206	58
Nawabshah	25	504	253	50
Sanghar	30	667	552	a2

6.6 Identification of Organizational Leaders

The structure of WUAs at the watercourse level as proposed by the water users was to be formal at the pilot sites in the Sindh, while in the case of Punjab pilot sites, one leader as a nominee for the higher level organization and an informal committee of 3-7 persons were chosen at each watercourse. Another main difference is that the water users at the Hakra 4-R Distributary have opted for all the shareholders, including landowners, tenants and lessees, to be the potential electorate for selecting the organizational leaders, while in the Sindh, the landowners have not agreed to include the tenants as members of the water users organizations.

Based on the discussions held during the consultation meetings, the selection of leaders at the watercourse level has been completed for all 80 watercourses in the three pilot sites of the Sindh Province, while the selection process continues at the Hakra 4-R Distributary pilot site in the Punjab, where leaders have been identified on 54 watercourses so far.

Since the Sindh pilot sites have completed the selection of organizational leaders for all of the watercourses, the process followed by them can be presented. After the consultation meetings, the water users at each watercourse met separately to elect or select the organizational leaders for the WUAs, on the basis of one WUA for each watercourse. While IIMI field staff acted as facilitators, these meetings were convened by the Contact Farmers, and the minutes of the meetings were recorded by appropriately selected WUA officials. The Contact Farmers played a positive role in organizing these meetings. They informed water users about the time and place of these meetings, going from door to door, or by announcing through the village mosque's loudspeakers. The meetings were held at the convenience of water users. Mostly they preferred the meetings after sunset. A representative from the OFWM Directorate participated in almost all of the meetings.

At a few places, the field teams faced the problem of non-availability of water users in sufficient number at the assigned time for the meeting, in which case the meeting was postponed for another time. In a very few instances, the field teams also faced negative propoganda against the program by some unknown persons.

The level of participation in various organizational activities is indicated in Table 7 and Table 8.

Pilot Site	No. of Water Users	No. of Contact Farmers	Training of Contact Farmers	Rapport Building Meetings (CFs and Others)	Consultation Meetings
Mirpurkhas	354	48	43	103	206
Nawabshah	504	50	40	71	253
Sanghar	667	62	60	133	552

Pilot Site	No. of Watercourses	No. of Water Users	No. of Water Users Participated	Participation (%)
Mirpurkhas	24	354	256	72
Sanghar	31	1076 *	686	64

7. CONCLUSIONS

At this stage of these pilot projects, the following main issues are under consideration by IIMI staff, collaborating partners, SOVs and the Water Users:

- There is a need to provide the water users some cost-benefit information related to collective action by water users organizations (WUOs) so that their initial motivation demonstrated so far can be sustained:
- Several important aspects of the status of the water users organizations need to be clarified in consultation with operating agencies-
 - Objectives and functions of WUOs
 - Legal status of the WUO
 - Financial and technical help (to be given by whom?)
 - Type of membership (who decides?)
- Accountability of the WUO as a whole, and of its ordinary members, office bearers, and the interfacing agency staff should be well defined and understood by all;
- Liaison mechanisms need to be developed between agencies and WUOs; and
- Followup procedures and the functionaries responsible for monitoring and evaluating the functioning of WUOs should be made clear.

There should be some wider appreciation regarding the difference that exists between the government's policy on proposed organizational changes involving the agencies in the irrigation sector, and the on-going pilot projects on social organization aimed at water users' involvement at distributary level irrigation management. The confusion that is developing regarding the creation of PIDAs and AWBs, and the PIM policies on water users organizations, appears to be an impediment to successful pilot project implementation.

The WUOs are expected to focus on water-related issues at the beginning. However, the water users are basically agriculturalists, and their interest is to enhance their agricultural income. Therefore, the WUOs are unlikely to become dynamic rural organizations, unless the people can see a good potential for WUOs' sustainability in terms of their contribution to individual incomes, in terms of the individual costs towards managing and financing WUOs, and finally the social acceptance for WUOs.

In concluding this presentation, reference can be made to some overall findings by IIMI's research conducted in a number of countries to date (Vermillion, 1995). For sustainable local management of irrigation systems, the following conditions have been identified by these studies:

- Clearly recognized water rights;
- * Appropriate infrastructure to suit local management capacities;
- * Clearly defined responsibility and authority for different management functions;
- * Supportive accountability and incentive mechanisms; and
- * Adequate resources (financial, information, human).

In the context of the above, the results of IIMI's pilot projects to date, part of which is mentioned in this paper, can come to the following tentative conclusions regarding the viability of WUOs in Pakistan:

- 1 Objectives of organizing farmers should be very clear to all involved in this exercise;
- 2 The success of establishing WUOs and their sustainability will depend on their environment, such as legal, social, resource endowment and distribution, law and order, and governance;
- 3 Motivation of the participants is a major determinant of WUOs' success;
- 4 The capacity of the community to absorb these new changes, and take the responsibility for which they agree, will be another crucial factor;
- 5 The process of organizing the water users' community is seldom seen as an important element in the overall programs of social organization. The pilot projects offer good evidence that a well planned process is of extreme value in organizing farmers; and
- 6 The organizational activities should be conducted keeping in view the socio-cultural milieu of the community, their aspirations and expectations.

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REVIEW OF ON-FARM WATER MANAGEMENT EXPERIENCE IN THE CONTEXT OF USERS' ORGANIZATIONS

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ABSTRACT

Water Users' Organizations were not a part of the agricultural system in Pakistan till as recently as the late 1970's. With the onset of the On- Farm Water Management Pilot Projects, their involvement was experimented, at times when it was considered politically explosive and socially vulnerable area, and proved successful. Under various OFWM Programs, efforts were exerted to involve them at tertiary levels of the irrigation system and by now, they are contributing 55 percent of the cost of the civil works on the watercourse. Though some studies show some precarious doubts about the post-lining activities of the WUAs, but this is justified as the sole role assigned to these WUAs under the WUA Ordinance 1981 was limited to that extent and was bureaucratic in nature. The usefulness of farmers participation in other countries fostered the testing of some pilots on their participation at secondary levels of the system. A few pilots have been conducted so far though, but the results have shown that the WUAs participation can play a promising role in operations and maintenance of the already deteriorating irrigation systems to not only improve productivity but also sustain the environment. Their performance will, nevertheless, highly hinge upon effective organizational efforts, imparting necessary training to them, proper recognition and adequate legislative support from the government and commitment from operating agencies. This paper reviews the experience of the OFWM Punjab on various facets of users participation in irrigated agriculture in Pakistan in general and in Punjab in particular.

1. INTRODUCTION

The On-Farm Water Management (OFWM) Project was launched in 1976 by the Government of Pakistan. This is the only government organization that has the pride of having twenty years of experience of working with the farmers through informal or formal water users organizations. OFWM Organization also believes that an agrarian country, whose economy is predominantly dependent on irrigation, cannot prosper without involving 70% of the population of the country who are the direct or indirect end users of the irrigated agricultural system. They are the actual sufferers in the present bureaucratic system. The purpose of this paper is to review and present some salient aspects of OFWM experience in the context of users organizations for sustainable irrigated agriculture in Pakistan, which is one of the biggest future challenges for researchers, policy makers, government and its implementing agencies.

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2. BACKGROUND

Nature has blessed this country with the world's largest and the most integrated irrigation system. This network was installed almost a hundred years ago and now its efficiency has reduced to such an extent that more than 50 percent of the irrigation water is lost in transit and during application to the crops.

The quantum of wastage of precious irrigation water is not only the limiting factor for expansion of the irrigated area and realizing the maximum benefit per unit of already irrigated land but also has aggravated the severity of the twin menace of waterlogging and salinity. Crop yields on average Pakistani farms are considerably lower than the average yields attained by many other countries of the world under similar agro-climatic conditions. The mounting population pressure has furthered the importance of conservation and better management of this scarce resource manifold. Thus, the low productivity of irrigated agriculture and ever increasing population pressure represent a major threat to the country's food security in the future. Therefore, this also necessitates a dire need to save every drop of water wasted in the irrigation system and at the farm level through active participation of the end users.

2.1 Establishment of OFWM

Research studies commenced in the early 1970's at the Mona Reclamation Experimental Project under WAPDA, with assistance from USAID, to measure and find ways and means to reduce seepage losses from the estimated 110,000 watercourses in Pakistan and improve the efficiency of the irrigation system. These early studies resulted in diagnosing of huge water conveyance losses in the watercourses which on an average are 40-50% of water delivered at the outlet (i.e. about half of the flow reaching at the mogha did not reach the fields. Huge water wastage from the watercourse commands, diagnosed by these research studies, highlighted the urgent need to overcome this acute problem.

Researchers, experts and donors were also of the opinion that these losses can only be minimized with active involvement of the beneficiaries (i.e. water users). But, in the early 70's, it was considered politically unsafe to talk about farmers organizations and there was also no such example in the country, except cooperatives, which were usually centered around a single family.

However, keeping in view the increasing expenditure on management and maintenance of the system, inequitable distribution of water among the share holders, and to provide for its appropriate use, demanded a change in the management of the irrigation system to make it more beneficial for the farming community. The improvement cost of watercourses through a traditional contractual system was worked out to be double without participation of the farmers. The problems of alternate arrangements for

continuing the water supply, conveying the material at site, and alignment of the watercourses also seemed an uphill task for the irrigation bureaucracy. A farmers participation program was, therefore, proposed by the USAID, who financed the pilot project. This participatory approach was offered to the Irrigation and Power Department, which showed its unwillingness for implementation.

The same was then offered to the Agriculture Department. Being trained in working with the farmers, though with groups of unorganized or individual farmers, this challenge was accepted by the department and that led to the establishment of the On-Farm Water Management Wing. The Government of Pakistan (GoP) launched an On-farm Water Management Pilot Project in the provinces during 1976-77 with the assistance of USAID.

2.2 First Pilot Project in Punjab

The major objective of the project was to increase overall irrigation efficiency through improvement of community watercourses, precision land levelling of farmers fields, and adoption of advanced irrigation agronomy techniques. An important strategy of the OFWM pilot project was that farmers had to contribute skilled and unskilled labor for civil and non-civil works, while the government supplied materials and technical assistance to informal water users associations. There was no cost recovery at that time.

The project was successfully completed by June, 1981, wherein the stipulated targets were achieved one year ahead of its planned schedule due to active participation of water users through these informal water users associations. Overall renovation of 1083 watercourses, precision land levelling of 38,804 acres and installation of 47,490 water control structures were achieved. This program was the first initiative undertaken in the context of participation through users organizations in irrigation system management at the tertiary level in Pakistan.

2.3 Legalizing Water Users Participation

The success of the pilot project, socio-political the pressure from farming community and donors interest led to the extension of the OFWM program in **July, 1981** for the entire irrigated, as well as major rainfed areas, of Pakistan with the financial and technical assistance from IDA, USAID, IFAD, OECF and Asian Development Bank, etc. The Water Users Association (WUA) Ordinance was promulgated in the provinces in 1981 to provide a legal framework with an aim to clearly define roles, duties, rights and responsibilities for these institutions incorporating the lessons learned from the pilot projects. Since then, WUAs are organized on each watercourse and formally registered prior to commencement of the improvement process on a watercourse to achieve some specific objectives.

3. OBJECTIVES OF THE OFWM PROGRAM

The On Farm Water Management Program has the following specific objectives:

- (a) Organization of Water Users in formal Water User Associations under the Punjab Water Users Association Ordinance 1981 for proper improvement and maintenance of watercourses.
- (b) Rehabilitation/ reconstruction of watercourses with partial brick lining and installation of water control structures to minimize conveyance losses with the active participation of Water Users Associations on a cost sharing basis.
- (c) Increase application efficiencies by precisely levelling the farmer's fields and promoting advanced irrigation water management techniques.
- (d) Impart training to On Farm Water Management personnel, Water Users Associations and Agricultural Extension Staff etc. on advanced water management techniques.

4. FUNCTIONS OF WATER USERS ASSOCIATIONS

Effective involvement and participation of the beneficiaries act as a catalyst for the successful implementation of any development project. The participation of water users is, therefore, considered essential under the OFWM Program to achieve the desired goals. Water Users Associations are assigned with the following specific responsibilities.

- (a) To arrange and provide labor and to distribute the physical and financial involvement proportionately.
- (b) To collect funds from the farmers in proportion to their land holdings for making payments to the masons.
- (c) To settle all matters of disputes amongst various water users in respect of alignment of the watercourse, fixation of water control structures and distribution of work, etc.
- (d) To make alternate arrangements for the conveyance of water during the period of the watercourse reconstruction and improvement.
- (e) Carry out works according to standards and specifications under the technical supervision of water management field staff.

- (9) Safeguard the watercourse material supplied to them and maintain a proper record of materials received and utilized on the watercourse construction.
- (g) To arrange for periodic cleaning, maintenance and repair of the watercourse after its improvement.

5. ACCOMPLISHMENTS OF THE WUAs

The OFWM is probably the only program in Pakistan, where contractors are not engaged and civil works are supervised and carried out by the beneficiaries themselves. The strategy chosen for rehabilitation of tertiary irrigation systems through a participatory approach has been widely acclaimed by farmers as well as by the national and international experts. The performance of the WUAs can be judged by considering the following facts.

- 1 Due to the failure of the cooperative movement in Pakistan and several other socio-cultural barriers, the OFWM program in Punjab has been successful in accomplishing improvement of the watercourses through community participation. So far, around 30 thousand water users' associations have been organized in the country at the watercourse level, out of which over **24** thousand (80 %) are in the Province of Punjab. These WUAs have accomplished tasks of lining/ earthen improvement of the over 22 thousand watercourses bearing the full cost of earthen improvement and almost 55% of the total cost of the lining works (Table 1).
- 2 In Punjab, 15 projects have been completed at a total cost of Rs. 4220.55 million and farmers have contributed almost Rs. 2300 million where a total length of over 12 thousand kilometers of watercourses were lined. At present six projects are being implemented at a total cost of Rs. 5775.52 million with the farmer's share being almost Rs. 3,100 million, which have so far lined another over 5 thousand kilometers.
- 3 A total of 0.89 million water control structures, including nakkas, culverts and siphons etc., have been installed on the abovementioned watercourses.
- 4 One of the major objectives behind the OFWM program is to reduce application and conveyance losses at the field level. For this, precision land levelling has been introduced and modern laser technology has been adopted. So far, over 0.35 million acres of land have been precisely levelled in Pakistan with over 0.31 million acres in Punjab. Full cost of this operation has been borne by the farmers, themselves

- 5 The best communication takes place when a farmer talks to another farmer. Keeping in this mind, the OFWM has established over 18 thousand demonstration centers at farmer's fields so that water saving techniques can be made popular among the water user community, because "seeing is believing".

Table 1. Accomplishments with the Active Participation of WUAs.

ACTIVITIES	Pakistan	Punjab
a) WUAs organized (Nos)	40960	24074
b) Watercourses improved (Nos)	36410	22166
c) Length improved		
Lining (km)	27125	17551
Earthen (km)	95212	92622
d) Structures installed (Millions)	1.15	0.89
e) Total Cost (Rs. in millions)	16205	6447
Government share	8265	3288
Farmers share.		
a) Labor & Masons	3653	1453
b) Recovery	4287	1706

6. SOCIO-ECONOMIC IMPACTS

Several monitoring and evaluation studies (OFWM, 1979, 1981, WAPDA 1984, Agriculture Department Punjab 1981, P&D division 1984, PERI, 1985) in the province showed that the program had the impacts described below.

6.1 Direct benefits

1. Watercourse renovation and improvement reduced conveyance losses ranging from 23 % to 53 % in different project sites. It was estimated that an amount of 243 acre-feet of water was saved per improved watercourse per annum.
2. An increase in the cropping intensity ranging between 6% to 20 % was observed.
3. The crop yields increased ranging between 13 percent to 17 percent.
4. Waterlogging and salinity was reduced.
5. Siltation and related maintenance was reduced.
6. Inequity between head and tail end farmers was reduced.

6.2 Indirect benefits

There was a general concept that the farming community, being illiterate and divided into different socio-political and religious groups, cannot get organized or work collectively for the common cause. The water users participation in On-Farm Water Management activities has exploded this myth and proved that they can get organized for collective action. For example:

1. Theft of water and water related disputes at the watercourse were reduced due to their organized behaviour;
2. At the beginning, only a few watercourses per year could be improved, but now almost two thousand watercourses per year are being improved, inspite of substantial increases in cost recovery (i.e. 10 - 30%);
3. OFWM program has given them a sense of ownership;
4. The demonstration effect of this organized behavior led to the installation and management of 1056 community tubewells during the last one-and-a-half years under the Second Scarp Transition Project; and
5. Installation of 10 tertiary drains (20 km in length) with the participation of beneficiaries is another example of users awareness and interest in organizations, with 25 Drainage Beneficiaries Groups (DBGs) in progress under an OECF-funded project.

7. WATER USER'S ASSOCIATIONS: POTENTIAL AND CONSTRAINTS

For an organization to be successful and sustainable, it has to **be** self supporting, self regulating and self governing, so that it has an independent capacity for group action through its leadership. These WUAs had a great potential to undertake several activities at the watercourse level to reduce water losses and enhance agricultural productivity. Some of the possible activities could be:

- a) operation of the watercourse;
- b) rehabilitation, improvement and maintenance of the watercourse;
- c) conflict resolution;
- d) fund raising;
- e) formulation of by-laws; and
- 9 federation at higher levels.

Various evaluations of the program have indicated that though the WUAs have performed a commendable job by undertaking improvements on a cost sharing basis, yet, it is generally felt that these institutions lost their viability after renovation of the watercourses. The main reason identified for this problem is that no definite post-

improvement activities were assigned to the WUAs², except for regular desiltation and maintenance of the watercourse that is already conducted by the farmers even on the watercourses where they are not organized. The performance of the associations regarding the aforementioned activities is briefly discussed below.

7.1 Operation of the Watercourse

The operation of the watercourse was initially an activity that was being performed by the WUs before 1960. Due to emerging conflicts in managing kacha warabandis, the Irrigation Department started enforcing a pakka (or agreed) warabandi on each watercourse. By now, almost every watercourse has a pakka warabandi (with a few exceptions) as a roster of irrigation turns without considering the amount of water in the watercourse. The water users have to observe the warabandi irrespective of the fact that whether they get their just share or not. Violation of the warabandi (wara Shikni) is an offence to be decided by the respective canal officer (SDO). The WUA Ordinance 1981 does not consider watercourse operations as an area of activity for WUAs. Therefore, the potential of the WUAs could not be exploited in this area.

7.2 Rehabilitation, Improvement and Maintenance

To better perform rehabilitation, improvement and maintenance of the watercourse, the water users can form an association to manage and facilitate the activities. However, it was perceived somehow that an association is an instrument to obtain the subsidy for improvement works. Instead of considering it as one of the roles to be performed by the WUA, it became the sole activity. One of the reasons behind this false perception was that the staff of the OFWM were themselves not aware due to the lack of proper training and enough motivation. Another reason was that since the program remained donor funded since its start, there had always been more emphasis on physical targets (i.e lining of watercourses) as this was the major indicator for progress. Besides, to learn and implement improved water management practices was the area that was to be taken care of by the agricultural officers, who were scarce in the staff compared to the area covered. Once the watercourse is lined, there is no frequent contact between the staff of the OFWM and the water users of that watercourse.

The approach, wording and the contents of the ordinance indicate that after the improvement works have been completed, the field officer was made responsible to impose future maintenance activities and post-lining works on the associations. The result of this authoritative approach was that the associations might have been waiting for the field officer's orders to perform the tasks who is in-charge of a whole tehsil (about 1000 watercourses) and cannot frequently go to the lined watercourses to

² See for instance Gill, 1994, Bashir and Iqbal 1994, Byrnes 1992

dictate to them about what to do next. On the other hand, the Field Officer didn't realize that need and was kept busy in achieving physical targets.

The following sections of the WUA Ordinance for Punjab³ pertains to maintenance activities.

Section 4(1). Future maintenance of a watercourse, etc

"Where a watercourse has been reconstructed or improved by an Association the Field Officer may, subject to such conditions as may be laid down by him, entrust the future maintenance of the watercourse to that Association, on behalf of all the irrigators of the watercourse".

Section 5 Field Officer to check maintenance of watercourse

*"The Field Officer shall, from time to time, make spot inspection of **the** watercourse to satisfy himself that it is being properly maintained and may issue such directions for the proper maintenance of a watercourse as may be considered necessary".*

In fact, the associations should have been made aware for identifying future activities of their own to make this body sustainable. They are informally engaged in such activities already, though not uniformly and on a regular basis, such as desiltation of the watercourses. The need was to let them make it more regular, systematic and including it in their by-laws of the WUA.

7.3 Conflict Resolution

Instead of resolving the conflicts at the watercourses, these associations sometime started with a conflict regarding the leadership, route of the watercourse, etc. The effectiveness of the associations in resolving the disputes were limited due to limitations in the ordinance as it declares the field officer as the "arbitrator". This, in fact would have been the responsibility of the associations themselves to resolve disputes and they should have been empowered to do so by the law. The empowerment of the field officer reflects the bureaucratic spirit of the ordinance and hampers the associations in performing this function.

³ For details, see Water Users Association Act, 1981

Section 9(1-3) Disputes

"If any dispute touching the business of an Association arises between: members, past members, agent or servant of an association, its managing committee, one Association and another Association etc; The Field Officer may hear the dispute and decide the matter. The decision of the Field Officer shall be final"

7.4 Funds Raising

The organizations can be sustainable if they are financially viable. The WUAs that were created were limited in scope because the improvement work was provided as a material incentive that was to be recovered later as arrears of land revenue, again by the field officer. He was declared as assessee and the collector, but without proper authority to do so. The result is that in many areas, the recovery rates are dismal. In fact, the associations themselves were the appropriate fora to recover the costs of lining from their members with proper legal authority and power. This legal flaw also weakened the performance of the WUAs and they never could become financially viable. This way, by gaining experience, fund raising could become a regular activity to perform credit and marketing functions and become sustainable and self supporting.

7.5 Formulation of By-laws

The WUAs were required by law to formulate their own by-laws, but this was never done in practice as the WUs were organized by a relatively untrained staff who themselves were not aware of the role of by-laws in the organizations. Mostly, the WUs were required to sign the papers without understanding. A set of already prepared by-laws was used everywhere. This should, instead have been a learning process in order to be more meaningful and productive. Every WUA should have made its own by-laws considering its own socio-cultural milieu.

7.6 Federation at Higher Levels

Experiences from the countries where farmer organizations are active and productive, show that they can federate at higher levels. This has two important advantages. Firstly, they become more organized and enter into a lot of regular and productive activities such as marketing. Secondly, they remain sustainable because the higher level organizations require a regular set-up at the grass roots level. Unfortunately, the WUA Ordinance of Punjab does not provide for that, whereas in other provinces, though there is no legal barrier, but the WUAs were never encouraged to federate at higher levels.

8. COMMAND WATER MANAGEMENT PROJECT 1985-92: A STEP TOWARDS SUSTAINABILITY OF FARMER INSTITUTIONS

In order to make the farmer institutions sustainable, besides its regular activities of watercourse improvement and precision land levelling, an effort was launched to integrate water and agriculture related agencies at the canal command level for increasing agricultural production by combining institutional, administrative and technical expertise, agricultural inputs and extension service to the farmers in a coordinated manner. Under the Command Water Management Project, an attempt was made to establish an informal "Zaili Nehr Committee (Water Users Federation)", inter-alia, at Pukka Dulla minor, the tail reach of Shahkot distributary, under the Command Water Management Project (CWMP).

Under this project, 18 WUAs were federated together. Farmers were educated about their potential roles and rights through different techniques for bringing them at a common platform. They successfully maintained the minor and the equity of water distribution was improved. It was realized that the only threat to their sustainability was that there was no legal protection for the federation.

There were many small projects for identifying regular activities for WUs and the results indicated that the farmers could manage and run some useful groups, such as information communication groups, equipment and implements groups, seed management groups, etc. They also succeeded in generating a capital of 0.2 million rupees. The major constraints faced were ; shortage of community organizers, over expectations of the community, bureaucratic attitude of government functionaries, slow nature of the process, and rigid and unsupportive rules and regulations of the government.

9. LESSONS LEARNED

From the experience gained from the projects under the CWMP, the following lessons can be derived:

- There is a big potential for building farmer's institutions and they can get organized for a common cause;
- Appropriate legal cover is immensely needed;
- Farmer's institutions can only stand on sound footings by sharing authority and power with the government employees;

Young farmers are helpful to the community organizers;

Multi-tier organizations provide better replication models;

- Activities requiring continuous effort and tangible targets can keep the organizations viable and sustainable; and
- Community organizers should themselves be adequately trained and motivated and should have the required knowledge to do the job. Stereo-type staff recruited through common recruitment policy may prove inefficient and sometimes even counter-productive.

10. INSTITUTIONAL DEVELOPMENT

Based on the lessons learned from the past 20 years of the OFWM Program in Pakistan, it can be deduced that the future food, feed and fiber production depends on the effective participation of the end users in decision making. The deteriorating situation of the irrigation system without efficient operations, proper maintenance and appropriate drainage facilities are the major threats for the future as millions of acres of land annually turn barren due to inappropriate policy decisions with regard to ignoring local conditions. The experiences of the OFWM have exhibited that the potential of Farmer's Institutions could not be exploited as they were unorganized or inadequately organized. Another emerging problem is the lack of coordination among various government organizations involved in the country's agricultural system. A multi-disciplinary approach becomes a must including the long ignored beneficiaries. Keeping in view these considerations, from the early 1990s, many multi-disciplinary projects of participatory approaches have been introduced into the irrigation management programs at the minor and distributary level of the existing schemes, or the development of new schemes. The most important projects are:

- * Fordwah Eastern Sadiqia (South) Irrigation and Drainage Project, Bahawalnagar;
- * Sustainable Development of New Irrigation Schemes - PATA Integrated Agriculture Development Project (joint project of NWFP, OFWM and DOAE, supported by the Netherlands);
- * SCARP Transition Project (Participatory Groundwater Management);
- * Pilot Project for Participatory Irrigation Management (under OFWM-III Program);
- * Private Sector Groundwater Development Project;
- * Farmer Managed Irrigated Agriculture under LBOD-I, Sindh (IIMI-Pak);
- * Action Research on Social Organization at Hakra 4-R Distributary (IIMI-Pak);
- * NWFP Pilot Project for Participatory Irrigation Management; and
- * Institutional Reforms under Second Irrigation and Drainage, Sukh Beas LBDC Project.

The interesting point in some of these projects is that both the PAD (OFWM & Agr. Ext.) and PIDs are involved in implementation. This will help both of the organizations to understand the limitations of the component projects and the benefits of implementing integrated projects. The experiences of the PATA Project are worth mentioning, although they primarily relate to the new small scale schemes, as this was the first project which ended-up in formulation of a scheme development process which is participatory and based on a step-wise approach.

A multi-disciplinary project named as "Fordwah-Eastern Sadiqia (South) Irrigation and Drainage Project" was started with financial assistance from the World Bank in 1992-93. An effort was made to bring together all of the collaborating partners including WAPDA, Punjab Agricultural Department, Punjab Irrigation Department, the technical consultants and the farmers. Farmers participation in irrigation and drainage was to be tested as a pilot project under the name of Participatory Irrigation Management (PIM) and Participatory Drainage Management (PDM). The former component is entrusted with the OFWM and the latter with the International Waterlogging and Salinity Research Institute (IWASRI).

11. PARTICIPATORY IRRIGATION MANAGEMENT

There has always been an acknowledgment that greater involvement of farmers in management of irrigation systems is essential in achieving its long term sustainability. The GoP has embarked on increased user's participation in operations and maintenance of irrigation systems at the tertiary levels. A pilot project for farmers participation in irrigation management (Integrated Irrigated Agricultural Management) has been launched under IDA-assisted Fordwah Eastern Sadiqia (South) Irrigation and Drainage Project area (denoted as FES(S)) to extend users participation and involvement to the minor/distributary level. The main thrust of this sub-project is to identify and implement institutional strategies for achieving equitable and efficient irrigated agricultural management by involvement of the beneficiaries. Furthermore, replicable models for introducing structural changes in the existing infrastructure for effective management of irrigated agriculture have to be produced. Besides, improvements have to be suggested in engineering and agronomic aspects of water use at the farm level, This component has been launched with the following objectives:

- Strengthening of farmers institutions (e.g. WUAs into Federations and Canal Councils);
- Providing farmers institutions a stronger voice in operations and maintenance of the irrigation system, and developing a framework for addressing legal and social constraints related to them:

- Improving irrigation scheduling for better water deliveries to match crop water requirements through introducing improved operations and management; and
- introducing appropriate site-specific cropping patterns, cultural practices and input management.

11.1 Pilot Sites

Pilot sites had to be selected within the FES(S) Project area. The FES(S) Project area is irrigated by the Eastern Sadiqia Canal that emanates from the Sulemanki Headworks off the left side of the River Sotlej. Two distributaries, namely Bhukan and Sirajwah, were selected considering the features that they cover small and the medium irrigation systems and make a compact block; the community is relatively receptive and approach to the command area is relatively easy; and farm population comprises of small, medium and large farms and the structures allow for a variable supply.

It was also decided that on the Sirajwah Distributary, initially one of its minors, Bahadarwah, will be chosen for organizing the water users at the minor level. Main characteristics of both sites are given in Table 2.

Table 2. Main Characteristics of the Pilot Sites in FES(S).

Characteristics	Bhukan Distributary	Bahadarwah Minor
Culturable Command Area (acres)	3027	19843
Authorized Discharge (cfs)	12	82
Number of Shareholders	322	1985

11.2 Organizational Models Used

Keeping in view the size of the distributary/minor, two different organizational models were used at the sites. At Bhukan, being a relatively smaller irrigation system, WUAs were organized at the watercourse level and the WUAs were federated at the distributary level so the chairman of each WUA is a member of the General Body of the distributary federation .

At Bahadarwah Minor, 52 WUAs were (re)organized at the watercourse level. Three intermediate level organizations called Federation of Water User's Associations (FWUAs) representing the head, middle and tail sections of the minor were formed, where the chairman of each WUA are the members of the General Body. The General Body members of each of two watercourses chose one person to the Executive Committee of the FWUAs. All of the members of the Executive Committees of the three FWUAs are members of the General Body of the Bahadarwah Minor Committee and they have chosen 9 members for the Executive Committee of the Minor Committee (three per section). Five of these nine executive members have been declared as office bearers (President, Vice President, General Secretary, Secretary Information and Treasurer), while the remaining four are members.

After the establishment of the organizations at the minor/distributary level, they have so far desilted their respective secondary systems and strengthened the banks on a self-help basis. Besides, with the help of the OFWM, they have arranged and distributed seed for rabi and kharif seasons in 1996. They have also planted some 4600 plants on improved watercourses. The FWUAs have opened their joint account with the bank.

Both federations have donated land for a community center, store and office,

The organizations are very enthusiastic to undertake roles and responsibilities for improving their irrigation systems. They have, however, to be adequately trained before the responsibilities are turned over to them.

11.3 In-Country Training Workshop/National Seminar

Growing concern over water users participation, the critical need to improve the productivity of agriculture, and the demands for increased incomes for the rural population all makes urgent the need for sustainable irrigated agriculture. Keeping in view these needs, an In-country training workshop on Participatory Irrigation Management in Pakistan was organized by OFWM and the Ministry of Food, Agriculture & Livestock (FWM Cell), Islamabad, in July - August, 1996. The purpose was to discuss the relating issues, evolve some strategy for implementing Participatory Irrigation Management in Pakistan to improve the performance of irrigated agriculture. The experts, consultants (W.Clyma, M.S.Shafique, 1996)⁴, participants and farmer representatives concluded that water users involvement in irrigation system management and improved irrigated agriculture is a must. Therefore, Pilot Studies on farmers participation in irrigated agriculture should be carried out with the following conditions for successful irrigation management and development of replicable models:

⁴ Paper presented at National Seminar on Participatory Irrigation Management in Pakistan, from August 11-13, 1996, Lahore, Pakistan.

- * Strong high-level political support;
- * Clear policy direction;
- * Legal basis for new managing entities;
- * Economic benefit to farmers
- * Well-defined water rights at the system and farm levels; and
- * Functional irrigation facilities.

12. EMERGING ISSUES

- Mono-dimensional or mono-disciplinary approaches in the past could not result in sustainable institutional development.
- Water users are not yet considered as an equal partner
- There is no legal provision for federation of the WUAs. Consequently, no organization is ready to register the federations including cooperatives. WUAs Ordinance 1981 is limited in scope and needs amendment as is the case with the other three provinces to allow for federation of WUAs, but the WUA Ordinance for Punjab Province is the weakest.
- The success of the federations will greatly depend on their level of acceptance by the concerned agencies. So far, the departments are reluctant to see a positive role for the farmers as they see their own role in the context of canal and Drainage Act 1873 and WUA Ordinance 1981, which precludes the possibility of farmers participation. These water users organizations are seen as a potential threat by the departments.
- Lack of desired coordination among Agri.Ext, OFWM and PID. All of the three agencies are the key actors working for farmers to improve and sustain irrigated agriculture.
- The organizations are unclear about the activities, tasks and functions to be performed by them in the future. The roles and responsibilities are vague and too broad and have to be precisely defined. They have to be empowered to perform those tasks by providing them with necessary training, authority and financial resources.
- These farmer institutions need effective accountability and incentive mechanisms to perform their roles and responsibilities. The same has to be effectively managed for the government agencies involved in irrigated agriculture.
- Training needs, methods and resource organizations that could impart training to both the farmers and the organizers are unclear and not precisely identified, nor imparted.

Some sections of the community are spreading strange rumors that retard organizational efforts and make motivated farmers dubious about the objectives of such organizations.

Community organization is a difficult job since it has to deal with human beings, Observing the office hours only will never give a success unless someone is motivated enough to sacrifice some time from their own purse. To keep the staff adequately motivated, some sort of incentives are needed.

Frequent transfers, lack of needed facilities, political pressure, etc. are the potential threats that can retard the process.

All efforts in community organization will meet partial success if bound by physical and material targets, like civil works or engineering assignments, since human behavior is not always predictable.

13. CONCLUSIONS AND RECOMMENDATIONS

- a) There is an urgent need to adopt a multi-disciplinary approach instead of a mono-disciplinary approach.
- b) Farmer institutions have a great potential to participate in operations and management of the irrigation and agricultural systems. The need is to properly organize them and exploit this potential through federating their grass root level organization up to higher levels.
- c) Organizing farmers is a slow process and it should be accepted as such. Any hurried effort may not only harm these efforts but also the collaborating partners may lose confidence. the best strategy would be to learn through pilot programs and then replicate them on a broader scale in a step-wise sequence.
- d) For users participation to be successful and productive, the roles and responsibilities of the farmers and various government functionaires have to be clearly and precisely defined and strongly adhered to.
- e) For performance of the identified tasks and responsibilities, the farmers have to be equipped with the necessary knowledge, power and proper legal recognition. They should be considered as collaborative partners rather than a group of trade unionists.

- f) Necessary amendments needs to be made in the Canal and Drainage Act of 1873 and the Water Users' Association Ordinance, 1981 to surrender powers to WUAs for their effective participation in irrigation system operation and maintenance, assessment and collection of abiana, and dispute resolution.
- g) The level of collaboration among different departments is very low. Commitment usually is not translated into actions. A multi-disciplinary and well coordinated set-up among various departments is the most congenial condition for improving agricultural productivity.
- h) The organizational structure of the OFWM Field Team needs to be modified; Social Organizers (SOs) should be incorporated into the OFWM Field Teams for social mobilization of the farming community.
- i) Community organization is a difficult process, which needs motivated and regular efforts. Observing office hours only will never give a desired success. NGOs and local consultants should be used more frequently to implement the social mobilization process.

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CURRENT POLICY PERSPECTIVE ON INSTITUTIONAL REFORMS FOR THE IRRIGATED AGRICULTURE SECTOR

Abdul Hafeez Qaiser¹

ABSTRACT

Efficient and effective operation and maintenance (O&M) of irrigation facilities is a key to achieving sustainability in irrigated agriculture. In Pakistan, the practice of deferred maintenance coupled with an aging irrigation system has put sustainability at the verge of threat. Policies of physical improvement, technical training and farmers involvement were pursued in the past but could not hit the bulls eye i.e. achieve sustainability. It is being felt strongly that somewhere in the process, there is a missing link, which needs to be chained for improving and maintaining the irrigation system on a long term and sustained basis. The rapidly increasing O&M burden on the public sector has resulted in enormous economic repercussions. It is therefore essential to seek a solution that can ease not only the O&M burden on the public sector but can also result in substantial improvement of the irrigation system. For this, institutional reforms leading to a self supporting nature for line agencies are unavoidable. Self sufficiency can be achieved through introducing service fees, water vending in a Private Public Partnership, autonomous bodies, user management, devolution of responsibilities and privatization.

2. In the wake of the extremely deteriorating situation of operation and maintenance of the irrigation system, three possible solutions to rectify and improve the running of the system have been discussed.

3. The O&M responsibility should be handed over to the beneficiaries. There should be devolution of responsibilities from the officials to the farmers and the farmers should be involved in the decision making process. It implies that serious consideration should be given to the institutional reforms in a way which is likely to be owned by the people of Pakistan and succeed in the Pakistani environment. The proposal of creating PIDA's and AWBs is being actively considered. However, it will not be an easy task as it will require radical changes in the physical, institutional, technical, social, managerial and operational set up of the existing irrigation institutions. A beginning has already been made by the transitioning of SCARP tubewells and privatization of fresh groundwater. A lot more is to be done.

4. This paper also discusses the fear of farmers that transformation of PIDs into PIDA's appeared to be too big of an experiment and that PIDA's should not be established until the success of Pilot Area Water Boards and Farmer's Organizations had been determined. It has also been viewed that nonfulfillment of commitments made with the donors might prove to be an instance of gross irresponsibility resulting in grave consequences for the country.

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1. OPERATION & MAINTENANCE

Efficient and effective operation and maintenance (O&M) of irrigation facilities is a key to achieving sustainability in irrigated agriculture. In Pakistan, the practice of deferred maintenance coupled with an aging irrigation system has put sustainability at the verge of threat. Policies of physical improvement, technical training and farmers involvement were pursued in the past but could not hit the bulls eye (i.e. achieve sustainability). It is being felt strongly that somewhere in the process, there is a missing link, which needs to be chained for improving and maintaining the irrigation system on a long term and sustained basis. The rapidly increasing O&M burden on the public sector has resulted in enormous economic repercussions. It is therefore essential to seek a solution that can ease not only the O&M burden on the public sector but can also result in substantial improvement of irrigation system. For this, institutional reforms leading to a self supporting nature for line agencies are unavoidable. Self sufficiency can be achieved through introducing service fees, water vending in a Private Public Partnership, autonomous bodies, user management, devolution of responsibilities, and privatization.

2. WATER RESOURCES MANAGEMENT POLICY (RECENT PERSPECTIVE)

A policy recognizing that water is an increasingly scarce resource requiring careful institutional, economic and environmental management is needed. It requires that attention be focused on key priority areas which include:

- a) Developing a comprehensive framework for designing water resources investment, policies, and institutions. The framework would consider relationships between the ecosystem and socioeconomic activities in river basins. The analysis, the complexity of which would vary according to the country's capacity and circumstances, would take account of social, environmental, and economic objectives. Special attention would be given to the views of all stakeholders;
- b) Adopting pricing and incentive policies that would achieve cost recovery, water conservation, and better allocation of water resources;
- c) Decentralizing water service delivery, involving users in planning and managing water projects, and encouraging stakeholders to contribute to policy formulation. We recognize that a variety of organizations including private firms, financially autonomous entities, and community organizations may contribute to decentralize water delivery functions. Thus, the policy supports projects that introduce different forms of decentralized management, focusing on the division of responsibilities among the public and private entities involved;

- d) Restoring and preserving aquatic ecosystems and guarding against over-exploitation of groundwater resources;
 - e) Avoiding waterlogging and salinity problems associated with irrigation investments by monitoring water tables and implementing drainage networks, as well as adopting best management practices to control water pollution; and
- 9** Establishing strong legal and regulatory frameworks to ensure that social concerns are met, environmental resources are protected, and monopoly pricing is prevented.

3. NEED FOR DECENTRALIZATION AND USERS' PARTICIPATION

Because of their limited financial and administrative resources, governments need to be selective in the responsibility they assume for water resources. An operational principle is that nothing should be done at a higher level of government that can be done satisfactorily at a lower level. Thus, where local or private capabilities exist, the water delivery service should be transferred to the private sector, financially autonomous public corporations, and to community organizations. The lessons of experience suggest that an important principle in restructuring public services agencies is their conversion into financially autonomous entities. With effective authority to charge and collect fees, and with freedom to manage without political interference. Such entities need to work under hard budget constraints that enhances incentives for efficiency and revenue generation. Participation empowers stakeholders to influence the formulation of policy, the choice of design and investment, a management decision affecting their communities. It establishes a necessary sense of ownership, bringing user discipline, and accountability for service delivery.

4. LESSONS LEARNED

According to IIMI research, 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.

- 4.1** 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 agencies officials. Farmers' participation in irrigation management through farmer organizations can contribute positively to planning, design and construction, water management, resource mobilization and conflict resolution.

- 4.2 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.
- 4.3 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 farmers organizations.
- 4.4** 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, as well as the authority to settle conflicts locally and apply sanctions.
- 4.5 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.
- 4.6** In system rehabilitation or modernization, efforts to organize farmers or strengthen existing farmers 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.

- 4.7** Farmers' willingness to contribute labour, 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.
- 4.8** Many national and state irrigation acts do not provide for farmers' participation in irrigation management. Even where a legal provision exists, they generally need to be strengthened and modified.
- 4.9** 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.
- 4.10** Because of the complexity of the process in shifting from reliance on government agencies to reliance on farmer organizations, requiring change in both parties, no detailed blue print 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.
- 4.11** In some countries (Sri Lanka, Philippines) government units have proven effective in assisting farmers to establish and strengthen their organization. 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).
- 4.12** There is no single model for farmers' organizations. Each farmer organization must respond to its peculiar environmental and system requirements, including agro-climatic and crop requirements, local cultural system, and the legal and organizational environment.
- 4.13** Experience in several countries, including India, has shown that using catalyst agents or institutional organizers (**IOs**) can be an affective 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 communications between the incipient farmers organization and the irrigation agency. These contacts must eventually lead to negotiations of rights and responsibilities of the farmers organization. **IOs** can be recruited from NGOs, universities, trained agency field operation staff (a low cost

approach in Indonesia), from local villages (Sri Lanka) or from among progressive farmers themselves (another low cost approach in Philippines).

- 4.14 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 the Philippines. Similar, or more serious problems of inequity in water distribution have been identified.

5. OPTIONS FOR PAKISTAN

Pakistan has a good irrigation infrastructure - the Indus Basin Irrigation System, the largest in the world developed over the last century. But, it is the unanimous opinion of all the experts that the system is deteriorating. There are growing inequities in water distribution and secondary salinization is increasing due to over-exploitation of groundwater. In the past, mostly engineering solutions were employed to solve these problems. These are in fact symptoms of a much deeper problem; government control of the irrigation service. The institutional and social aspects of the irrigation system were neglected. Any future strategy has to address these issues. The present system has to be changed to ensure sustainability of the irrigation. The system has to be decentralized to provide a larger role for the private sector and users in order to achieve self-sustainability, equity and efficiency.

Many questions are being raised as to whether the participatory approach can work in Pakistan. But this participatory approach is not entirely new to Pakistan. Warabandi, which is the key to water distribution in Pakistan, is managed by the farmers themselves. Farmers have participated in the on-farm water management program to improve watercourses. Farmers manage minor schemes in Balochistan and civil canals in NWFP. When they were called for, farmers participated in cleaning the distributary and branch canals in Punjab. Like any other institution, clearly defined objectives, proper balance in rights and responsibilities, and provision of adequate resources are essential for the success of participatory organizations. We need to pilot the next steps in Pakistan. World wide experiences show that farmer's organizations (FOs) succeed when: they are legally recognized institutions responsible for providing essential services; they have control over the distribution of water with clearly defined water rights; they control revenue generated from the water charges; and they are large enough to generate sufficient funds for supporting their institutional setup as well as technical staff needed for assisting in **O&M** of the system. In Pakistan's irrigation system, water is controlled at the head of the distributary or minor and that also covers a sufficiently large area to support the operation of an FO. Therefore, the distributary head is a logical turnover point.

If decentralization takes place in Pakistan, the government will continue to have a pivotal role, such as the development of a regulatory framework for surface and groundwater exploitation and an information system for natural resources management, etc. In the foreseeable future, O&M of multipurpose reservoirs, provision of off-farm drainage, flood control and management, as well as inter-river and inter-provincial transfers of irrigation water will be managed by the Government.

6. RECENT ACTIONS

6.1 In the wake of an extremely deteriorating situation of operation and maintenance of the irrigation system, there are three possible solutions to rectify and improve the running of the system:

- i) Plan to the extent which can be maintained later-on;
- ii) Bring deferred O&M as a development activity; and
- iii) Hand over O&M to the beneficiaries,

6.2 The desired results have not been achieved by adopting the first two solutions. Therefore, the third solution needs to be actively considered. It requires that the O&M responsibility should be handed over to the beneficiaries. There should be a devolution of responsibilities from the officials to the farmers and the farmers should be involved in the decision making process. It implies that a serious consideration should be given to the institutional reforms in a way which is likely to be owned by the people of Pakistan and succeed in the Pakistani environment. The proposal of creating PIDA's and AWBs is being actively considered. However, it will not be an easy task as it will require radical changes in the physical, institutional, technical, social, managerial and operational setup of the existing irrigation institutions. A beginning has already been made by transitioning of SCARP tube-wells and privatization of fresh groundwater. A lot more is to be done.

6.3 Many meetings have been convened to discuss the important **issues** pertaining to the transformation of PIDs and PIDAs proposed to be established under the National Drainage Programme. The issue has been extensively discussed over the last one year, including meetings held at the highest levels. The NDP loan agreement with ADB has been negotiated, Progress on arrangements for loans with the World Bank and OECF is held up for want of reconciliation on the PIDA's issues. There is complete consensus on the setting up of Pilot Area Water Boards and Pilot Farmers Organizations. There is still need to have consensus on the

formation of apex organizations i.e. PIDAs. Some details relating to the structure of PIDAs, uncertainties in the increase of water rates, and the details of components to be charged under O&M from the farmers are being worked out. Many of the items, such as power of disconnection of irrigation water to the defaulting farmers, delinking land from water, provincial water commissioner, etc. have been deleted.

- 6.4 It is feared that the conditionalities attached to the NDP loan will have far reaching implications on the agricultural economy of the country, farmers associated with PIDAs will not be effective, there will be high increases in water rates, and why should farmers pay for O&M of flood protection works, soil erosion and environmental conservation and they should only pay for O&M of canals and surface drains. The farmers had also feared that the transformation of PIDs into PIDAs was too big of an experiment and that PIDAs should not be established until the success of Pilot Area Water Boards and Farmers Organizations has been determined.
- 6.5 The provinces agree to the fact that the irrigation system in the provinces had progressively deteriorated over the years and that the existing system needs to be refined and renewed to increase the operational efficiency and sustainability of the network. They are also of the view that institutional reforms should be implemented initially on a pilot scale. They do have financial constraints for arranging their contribution to the NDP.
- 6.6 Based on the above, it can be safely concluded that the biggest concern is the price of the water and the budgetary position of provinces. There is a need to make the issues politically and economically palatable as soon as possible because non-fulfillment of commitments made with the donors might prove to be an instance of gross irresponsibility, resulting in grave consequences for the country.

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SOME ALTERNATIVE INSTITUTIONAL CHANGES FOR IRRIGATION MANAGEMENT

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ABSTRACT

Pakistan's agriculture is classified as irrigated agriculture and is a predominant component of the national economy. About 90 percent of agricultural output is entirely dependent on irrigation. Irrigation is central to the economy of Pakistan. Sustainability of irrigated agriculture is at a critical juncture due to waterlogging and salinity, inequitable water distribution, insufficient water cost recovery, low productivity and environmental degradation. Part of the past agricultural output increases have come at the expense of depletion of the resource base. Management of water resources is poor and damage to soil resources considerable.

Despite heavy budgetary inputs in irrigated agriculture and well endowed natural resources, growth performance is far less against population growth. Policy makers and planners are of the view that Pakistan's agriculture requires new strategies to enhance input efficiency and maintain and improve the quality of the resource base and to get the irrigation system out of crises.

The World Bank has suggested that Pakistan should commercialize or at least autonomize the supply of irrigation water to farmers through market mechanisms and to create autonomous public utilities (PUS) - one for each of the 43 canal commands in the country. The transition of the irrigation system to PUS and ultimately to Farmers Organizations has been suggested as a solution to eliminate government liability. The approach has dealt with reducing the gap between recovery and O&M costs. We have pondered over this issue and have come to the conclusion that the same objective can be achieved by incorporating certain changes of a fundamental nature through integrating the departments and farmers participation.

An effort has been made in this paper to achieve this objective through certain institutional reforms to improve irrigated agriculture on an environmentally sustainable basis through better coordination between farmers and nation building departments (Agriculture, Irrigation, Local Government and Rural Development). Keeping this in view, a model based on integrating these departments has been developed. The major emphasis has been laid on farmers participation through union councils. The three departments will work in close cohesion at the provincial level under the Board for Irrigated Agriculture (BIA), headed by Chairman, P&D, Secretaries for Agriculture, Irrigation, LG&RD and farmers representative will be members of the Board. The major functions of the board will include policy formulation and implementation, budgetary claims for irrigated agriculture, water rates assessment and collection procedures at the provincial level. Under the Board will be tiers of Provincial Development Committee (PDC), Regional Development Committee (RDC), District Assessment and Water Rate Recovery Committee (DA&WRC), and Water Rates Collection Committee (WRCC) at the Union Council level with fair participation of farmers and these departments.

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The views and interpretations in this paper are those of the authors and should not be attributed to WAPDA.

The PDC comprising of departmental heads of these departments (DGs/Chief Engineers) and farmers representative will implement the decisions made by the Board and assist the Board in technical matters. The RDC comprising of regional heads and farmers representative will work at the division level and sort out operational procedures and problems. The DA&WRC comprising of district heads of Agriculture & LG&RD, XEN Irrigation, Deputy Collectors (Revenue), Chairman District Council as Chairman of the Committee will monitor the cropped area assessment, water rates collection, exemption of water rates in case of crop failure etc., formulate plans and strategies to improve recoveries, and minimize concealment in cropped area. The WRCC will be the lowest tier comprising of representatives of departments and farmers at the Union Council level working under the Chairman of the Union Council, The main functions of the Committee will be to collect revenue from farmers. The committee will also assist the farmers in procuring credit, farm inputs and technical guidance. Watercourse cleaning, improvement and maintenance will be ensured through a farmers organization organized at the village level.

The Union Council will be considered as the basic development unit. The revenue recovery will be improved by making transparent the procedures for assessment, crop reporting and revenue collection at various tiers. The approach will help increase farm production through integrated efforts of serving departments and farmers. Farmers will be in a position to pay full service charges, thereby eliminating government liabilities.

The success of the suggested approach requires creating an enabling environment, strong commitment and devotion on the part of politicians, task managers and higher levels of agency management for institutional changes for the effective use of land and water resources through greater participation of the farmers. It would also be desirable that the relationship between serving departments and farmers organizations become close for a smooth working relationship on future development needs.

INTRODUCTION

Irrigated agriculture in Pakistan is at a critical juncture due to waterlogging and salinity, low delivery **efficiency**, low cost recovery, productivity, etc. It requires solutions to maintain the resource base, to improve agriculture productivity and sustain irrigated agriculture in Pakistan. Irrigation is central to Pakistan's economy, accounting for 90 percent of agricultural production, with gross commanded area of **16** million hectares.

Efficient management of water resources is a key element for the development of irrigated agriculture in Pakistan. Despite heavy budgetary inputs in irrigated agriculture and well endowed natural resources, growth performance is far less against population growth. Policy makers and planners are of the view that Pakistan's agriculture requires new strategies to enhance input efficiency and maintain and improve the quality of the resource base and to get the irrigation system out of crises.

This paper makes an attempt to bring jointly farmers and nation building departments into the debate of management of irrigated agriculture. The paper has been divided into three sections. Section I attempts to review briefly the various water management programmes and their related issues. Section II presents the World Bank's recent approach to solve these issues and a critique on this approach by various agencies. Section III presents an integrated approach for sustainable irrigated agriculture through farmers participation.

SECTION I

REVIEW OF WATER RESOURCES DEVELOPMENT AND ISSUES

1. Perspective Review

A number of studies, projects and programmes were initiated since the late 1950's for the development and conservation of water resources in Pakistan. Drainage measures to control waterlogging and salinity were initiated with the introduction of salinity control and reclamation projects (SCARP) in the late 1950's. Studies in the area of drainage and reclamation were intensified with release of the Reveille Report of the White House Interior Panel on Waterlogging and Salinity in the Indus Plain of Pakistan. A series of major interrelated reports emerged as a consequence of these events.

WAPDA, with the assistance of the World Bank, prepared a comprehensive Action Plan for this purpose in 1967. The Plan envisaged an expenditure of **Rs. 9 billion** during the period 1965-75. However, the actual expenditure made in the Plan during this period was **Rs. 4 billion**, which shows an achievement of 43 percent. The Revised Action Programme for Irrigated Agriculture was prepared in 1979 for the period 1980-90. This involved an expenditure of **Rs. 68 billion** in the public sector. The actual expenditure however came to **Rs. 38 billion**, showing a shortfall of 46 percent in the public sector. The Water Sector Investment Planning (WSIP) report was published in 1990. It envisaged an expenditure of **Rs. 69 billion** for the first five years (1990-95). However, the investment that has occurred is of the order of **Rs. 35 billion**, giving a shortfall of 49 percent (2).

The above shows that the availability of resources in the public sector for the development of water and agriculture has been a continuous problem during the last four decades. However, there has been one consoling feature --that the private sector has taken cognisance of the situation and has started to shoulder its responsibilities in this area wherever it directly benefits from this investment.

Pakistan has embarked upon a number of extension and water management approaches to increase the productivity and income of farm families. Some of the major approaches with increased level of farmers participation are discussed as below.

i. On-Farm Water Management Programme (OFWM)

In order to improve water efficiency and farmers participation in irrigated agriculture, On-farm Water Management (OFWM) was initiated in 1976 under US Aid - supported Pilot Project in all of the four provinces. The package comprised

improvement of Sarkari Khal with 10-15 percent lining and the installation of Pucca Nakkas at turn outs, precision land levelling and institutional development of farmers groups and concerned government agencies. The full scale implementation was taken up in 1981 (4). About 17,000 Water Users Associations (WUAs) have been organized in Pakistan. The evaluation of the programme denotes that WUAs remained effective only during the watercourse improvement work and afterwards no longer remained viable and ceased to function in any capacity (7).

ii. Command Water Management (CMW)

The Command Water Management Pilot Programme was started in 1984. The programme comprised seven projects, four in Punjab and one in each of the other provinces. With the objective to increase agricultural production by improving the availability of water in individual commands by conservation through canal lining, the projects included rehabilitation and lining of minor canals, OFWM, and to coordinate enhanced non-water inputs by the extension department, private sector suppliers and credit institutions. Review of the CWM project indicated that the project generally reduced losses that resulted in more equitable distribution, improved conveyance efficiency of watercourses and increased use of fertilizers (7,17).

iii. Irrigation System Rehabilitation Programme (ISRP)

The ISRP was started in 1982 in all of the four provinces with the objective to rehabilitate badly deteriorated selective irrigation and surface drainage sub-systems, providing funds for required O&M on a sustainable basis, institutional improvements, and development of technical skills. Monitoring and Evaluation studies reveal that delivery efficiency, cropping intensity and use of fertilizers has increased with this project (4).

2. Major Sustainability Issues

The various approaches started in succession did not encompass the irrigated agriculture related problems in totality and problems continued to accumulate, resulting in an inefficient and unsustainable irrigation system leading to stagnant agricultural production. The issues identified in RAP (2) and subsequently highlighted in WSIPS (20) are viz a viz. waterlogging and salinity, inequitable water distribution and low delivery efficiency, water scarcity, low O&M cost recovery, advanced irrigation technologies, SCARP transition, environmental protection, data management, project preparation and implementation, monitoring and evaluation, low water delivery efficiencies, beneficiary participation, lack of coordination between agriculture and irrigation departments, etc. Major issues are described in brief as under.

i) Equity in Water Distribution

Equity in the distribution of water among the users in the canal command has been an operational objective of the management of the canal systems in Pakistan. In fact, there is inequity in distribution at all levels of the systems. Within a watercourse command, water delivered to the head farmers is generally 32 percent and 11 percent more than to the farmers at the tail and middle needs, respectively. Inequity in water distribution between head and tail is of the order of between 20 percent to 50 percent. If this is the quantum of water which is not available to those who deserve, it poses specific problems of scarcity on the one hand and waterlogging on the other (24). Similarly, outlets on a minor or distributary receive different amounts of water. Illegal pumping from canals and excessive losses add to the inequity in distribution.

ii) O&M and Cost Recovery

Irrigation and drainage systems have been deteriorating due to deferred maintenance and utilization beyond design capacities. At present, the recoveries are so meager that they cannot even take care of the normal operation and maintenance expenses. As a result, the allocations for the operation and maintenance have not kept pace with the increasing costs and this has resulted in the progressive deterioration of the system (13). The overall gap between requirement and expenditure was more than 24 percent in financial year 1992. Similarly, the gap between O&M expenditure and recoveries through water charges has been increasing, reaching 44 percent in financial year 1992. The overall gap of 44 percent increases to 57 percent if recoveries are compared with O&M requirements instead of expenditure (22). The gap between O&M and cost recoveries amounted to Rs. 3062.7 million during 1991-92 (26).

iii) Environmental Degradation

a. Waterlogging/Salinity

The extensive system of artificial irrigation has also been responsible for some of Pakistan's principal environmental problems, such as waterlogging, salinity and sodicity. The continued recharge to the groundwater aquifer through seepage from water sources, canals, rivers and irrigated lands without adequate drainage, has resulted in the steady rise of water tables, which has at places, even reached the surface. Salinity and sodicity which usually follow waterlogging in regions with high temperatures and evaporation rates are also claiming significant tracts of fertile land in the irrigated areas. Presently, about 30 percent of the irrigated area is water-logged, 13 percent highly waterlogged, while soil salinity is estimated to rob farmers of 25 percent of potential production of major crops (22).

b. Secondary Salinization

The observation has been made that in medium groundwater quality zones, those areas which lie at the tails of distributaries and where canal supplies are limited due to silt deposition in the canals, or diversion of greater quantities of water in the upper reaches of the canals, groundwater of marginal quality is used for irrigation in large quantities. It has been observed that continuation of this practice over long periods of times gives rise to secondary salinization in the soils of the area. For sustainability of irrigated agriculture in these areas, secondary salinization should not be allowed to occur and the normal canal supplies should be provided to these areas.

c. Salt Balance in the Indus Plain Aquifer

In arid and semi-arid regions, the greatest threat to the sustainability of irrigated agriculture comes from the accumulation of salts in the soils. Under ideal conditions, the salts must be removed from an irrigation system at the same rate at which they are added to the system. If this does not happen, the salinity in the soils and in the aquifer will continue to increase and it is only a matter of time when salinity shall become intolerable to plants.

Presently, about 130 Bm³ (106 Ma⁹) of water is diverted from the rivers into the canals of the Indus Plain for irrigation over 11.5 mha (35 ma). This water contains about 28 million ton (mt) of salts, if the average salinity of river water is taken to be 200 ppm. As such, 28 mt of salts are being added to the system every year. Except for the LBOD Project, drainage effluent is being recycled within the system in one form or the other (25).

d. Saline Water Intrusion

Possibilities of saline water intrusion in fresh groundwater (FGW) areas from adjacent saline groundwater (SGW) areas also exist in the Indus Plain because FGW is found near to the rivers and in those areas where rainfall is heavy, while areas away from these sources of recharge have SGW. If the groundwater table in a FGW area adjacent to a SGW area is depressed by pumping, intrusion of SGW into the FGW area will occur. This is more likely to happen at those places where the transition from FGW to SGW is rather abrupt and the interface between fresh and saline GW is steep. Intrusion of saline groundwater in fresh groundwater areas has already occurred at a few places in the Indus Plain as Allahabad Unit of SCARP-VI.

e. Pollution of Groundwater

Due to the growing population of the country, extremely poor condition of the municipal facilities including the disposal of human and other municipal wastes, the growing use of fertilizers, pesticides and insecticides in agriculture, and the disposal of industrial wastes in drains and ponds, the chances of pollution of groundwater with municipal, agriculture and industrial pollutants has greatly increased. Besides, its use for agriculture and industrial purposes, groundwater is being used in Pakistan for municipal purposes on a large scale.

f. Watershed Management

The sediment load in the Indus river is the 5th highest in the world. The Tarbela catchment alone is estimated to produce about 167 m³ of sediment per sq. km. annually. This silt is transported and deposited throughout the system of rivers, storage facilities and irrigation channels and results in a variety of environmental implications.

This silt not only reduces the storage capacity of reservoirs but also affects river structures, and raises the bed levels of rivers and canals. In rivers, these increases in bed level results in higher elevations of water for any given flood, with correspondingly greater areas of inundation. In canals, this sediment deposition reduces its conveyance capacity, with all attendant adverse consequences.

Sedimentation is resulting in a loss of storage capacity of Tarbela at the rate of about 14 percent every decade (12).

g. Soil Erosion

Soil can be eroded by water or wind. Water erosion is most severe on hillsides, and along river banks. Some of the erosion is the result of long-term natural processes, but it has been accelerated by various abuses, notably the depletion of natural vegetation and excessive tillage. Over 11 million hectares are estimated to be affected by water erosion. Similar practices have also made wind erosion a serious problem, affecting about 5 million hectares (23).

h. Disposal of Saline Drainage Effluent

Drainage Projects may also involve the disposal of saline effluent into or through existing wetlands, increasing levels and changing water quality. The connection of wetlands to large catchments increases the risk of pollution by dumping of chemicals, particularly agricultural chemicals, which could trigger an environmental disaster.

Besides the potential impact of saline drainage effluent on wetlands, there is the water environmental concern about the disposal of salinity into evaporation ponds or back into the river or canal system. Evaporation ponds can, in any case, deal with only relatively small amounts of water, especially as evaporation rates tend to reduce as salinity reaches a high concentration. Such ponds are a hazard, particularly when subject to rainfall or storm water inflows which could cause them to overtop or spread. Lateral seepage and the contamination of groundwater and low lying land may be a problem in some localities.

iv) Coordination Between Irrigation & Agriculture Departments

The link between the two departments at present is at two levels i.e. at District/Divisional Coordination Committees and at the Provincial Government level. Both of these coordination levels are too distantly placed from the farmer. The result is that techniques and the advice provided by the Agricultural Department is independent of the canal water supplies, while water rationing by the Irrigation Department is independent of advice by the Agriculture Department. The water supplies by the Irrigation Department are fixed according to a time schedule, irrespective of actual needs of the end users, while technical advice rendered by the Agriculture Department is general in nature without accounting for factual water supplies through canals and other sources. This results in either wastage of water in the form of excess supplies to the farmers who do not need that, or under stress conditions to crops where supplies cannot be made in excess due to rigidities of the system. In both ways, there is a colossal national loss. This situation demands a very close coordination between the two departments (1).

v) Water Delivery Efficiencies

Efficiency of water use includes operation, conveyance, distribution and field losses. It varies significantly from project to project and depends largely on the physical situation for each canal, distributary, minor and watercourse. The overall irrigation efficiency ranges from 35 to 40 percent (22). Watercourse average delivery efficiencies, as established by WAPDA survey are about 55 percent. Based on WAPDA survey results, delivery efficiencies for different situations range from 44 to 64 percent (21).

SECTION II

APPRAISAL OF WORLD BANK APPROACH

1. World Bank Approach

A review of water management programmes and issues indicates that system sustainability to maximize agricultural production is still a far cry. The World Bank has produced a report titled "Pakistan Irrigation and Drainage: Issues and Options, March 1994". The major problems highlighted are - waterlogging and salinity, over-exploitation of fresh groundwater, low efficiency in delivery and use, inequitable distribution, unreliable delivery, and insufficient cost recovery. The sources of these problems are treating irrigation water as a public good, lack of well defined individual property rights, and the illegality of sales of surface water constraining informal irrigation water markets, the Governments failure to make adequate budgetary provision for operation, and inappropriate institutional framework.

The World Bank wants Pakistan to commercialize or at least 'autonomize' the supply of irrigation water to farmers through a market mechanism. The bank believes it is time that farmers are given "property rights" to their water and are allowed to **sell/** buy it and the whole thing is managed through a market mechanism. The bank believes that legalized water markets based on individual water property rights make the opportunity cost of water transparent, leading to greater efficiency in use. Individual rights to water property, are necessary to ensure equity in distribution, thus addressing the problem of tail enders. The bank believes that the roles of Government and the private sector need to be redefined.

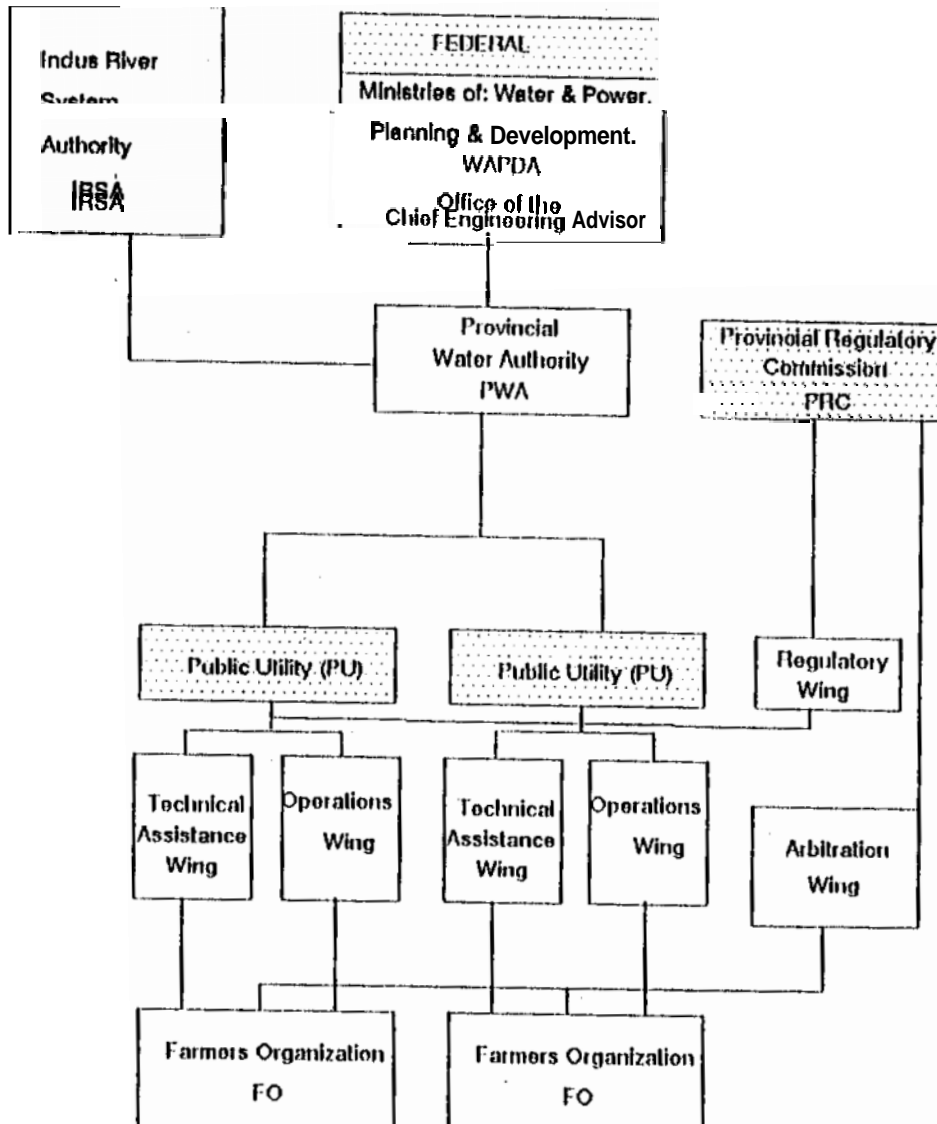
The bank suggests creation of autonomous public utilities (PUS) - one for each of the 43 canal commands in the country. The PUS would, in their territory, sell water to farmers - individuals or preferably to farmer organizations, and charge them tariffs determined by the (provincial) government. The PUs in turn would also be free to buy water from another PU or sell to another PU. A proposed institutional structure is given in Fig I.

The role of farmers organizations (FOs) is critical to the success of commercializing irrigation water. In the short term, they would act as a counter balance to PUs. In the long term, they may even come to own the PUs and operate the whole system all by themselves.

The World Bank envisages the new system to be put in place in four phases spread over **15** to 19 years. Phase-I comprising enactment for PUs, FOs, water rights and water markets; Phase-II defining the structure of PUs and Provincial Regulatory Commission (PRC), and selection of one pilot canal command; Phase-III would be to improve delivery efficiency and expand water supply; and Phase-IV converting the rest of the canal commands to PUs and forming PWAs (16,17).

Figure 1

PROPOSED INSTITUTIONAL STRUCTURE
BY
WORLD BANK



2. Critique on World Bank Approach and Recent Actions

The World Bank report titled "Pakistan Irrigation and Drainage Issues & Options" was debated in Pakistan at various forums.

Provincial governments responsible for the operation and maintenance of the irrigation systems raised serious objections to this report. Pakistan has one of the largest irrigation systems and its transition to public utilities and ultimately to farmers organizations is an ironic change and will dismantle the well established irrigation department. The majority of the farming community is uneducated, inexperienced and prone to feudal rivalries (19) and without government intervention seems incapable of managing the system.

Pakistan's experience with farmers organizations is kind of a mixture of successes as well as failures. Water users associations created in connection with On-farm Water Management projects have been failures (26). WUAs became dormant or remained no longer viable after watercourse improvement. They need permanent and constant organizational support (7). The success of decentralized and participatory irrigation management (WUAs) in Argentina is associated with technical disadvantages. The lack of technical training among those who manage the water has negative repercussions, like incapability to manage pollution and environmental degradation and gauge flows accurately (6).

Well established Irrigation Departments are apprehensive of losing their jobs. Hence, irrigation agencies may be hesitant to encourage the formation of associations. There seems to be a lack of visible incentives either to agency staff or farmers. On the agency side, there are no professional rewards for promoting farmers participation. On the farmers side there is little incentive for farmers to demand a greater management role when this would imply additional costs over and above the existing charges. Trading surface water through water markets is an important component of the approach. Much evidences of canal water trading are not available in the literature. However, groundwater trading is reported in all of the provinces. About 21 percent of sample owners reported ground water selling on Pakistan basis (8) and the prevailing rates vary from **Rs 30-60/hour** (18). There is a need to further study the scope and potential of surface water markets in Pakistan.

While reviewing the applicability of the Mexican Model in Pakistan's setting, discrete considerations will be required in view of the basic differences in the size and design of the irrigation systems, socio-political perspectives, cultural values, literacy rates, agricultural practices, and status of the existing administrative structure. A comparison of the salient features of the basic economic and technical indicators presented below clearly bring out the differences in the technical and socio-economic environment of the two countries. This suggests that the Mexican experience would not be directly replicable to Pakistan's case (10).

Table 1. A Comparison of Irrigation in Mexico and Pakistan.

Indicator	Mexico	Pakistan
Irrigation System		
Size	small-medium	very large
Characteristics	independent, flexible	integrated, little flexibility
Storage capacity	43%	less than 10%
O&M Expenditure (\$ per ha).	60	5.5
Literacy Rate	87%	35%
GNP per capita (US \$)	3030	400
Share of agriculture in GDP (‰)	9	26
Social cultural perspective	Cohesive	Stratified
Agricultural Practices	Advanced	Subsistence level to developing.

2. Past Experience of Farmers Organizations (FOs)

In Pakistan, the history of FOs is not very encouraging. FOs formed under OFWM Projects were not able to sustain themselves after a one-time construction activity had been completed. The post evaluations carried out by various agencies have expressed concerns and reservations about the sustainability of FOs in taking up collective responsibilities. The views of the World Bank on their experiences with the role of FOs in Pakistan are given below.

World Bank. (1990).

- o Most WUAs do not have institutional sustainability and did not do much after watercourse lining.

World Bank, (1993).

- o WUAs failed to assume many of the post improvement responsibilities, including maintenance of works.
- o Cost recovery from beneficiaries has been a problem and a major concern. FOs failed to collect the dues, so the responsibility for collection had to be given to the Revenue Department.

World Bank, (1994).

- o Though well-intentioned, the OFWM approach to develop **WUAs** did not work well/sustain.

This evaluation brings out severe weaknesses in the continuity and sustainability of FOs, once the Government support and subsidies are withdrawn. It also shows the inability of FOs to **collect/recover** the installments of capital investment on watercourse lining. This aspect, being of vital importance for canal system maintenance, raises serious concerns about the ability of FOs to take over Irrigation System Management (9).

A participatory approach does not offer a quick-fix solution and certainly does not reduce the need for skilled operational staff in the main distribution network. One must not expect miracles from a participatory approach, as, like other management approaches, it will have certain advantages and disadvantages. It is to be noted with caution that if it is not implemented in its true spirit (i.e. with honest, serious and long-term commitment), some of the existing problems (such as conflict of management among the end-users and policy twisting by pressure groups) may get multiplied. It is also possible that some new problems may arise, but this doesn't mean that the participatory approach should be disqualified for fear of such apprehensions. It should rather be designed with a sincere pragmatic approach that could solve the problems more effectively than any other management approach (15).

The World Bank took the initiative to start a dialogue on participatory Irrigation management (PIM) a few years ago. Since then, it is continuing at various levels to develop solutions which are economically feasible and socially acceptable under Pakistan conditions. In May 1993, World Bank staff organized a study tour to Mexico to gain first hand experience of management turn-over from **Govt.-Administered** Irrigation Districts to WUAS. Following the visit, the Bank staff developed a training programme by using the Mexican case as a model for policy makers from other developing countries.

To generate national dialogue, a one-day workshop on the subject issue was arranged in Lahore on November 3, 1993 jointly by WAPDA and World Bank. The participants from provinces and other agencies did not endorse the views of the World Bank and perceived its success under the shadow of doubts and apprehensions. The practicability of the World Bank model under Pakistan conditions is not perceived like cited successes in other countries with democratically developed farmers organizations (19). The EDI of the World Bank earlier prepared a 3 part seminar programme on PIM viz a 5 day National Seminar, a one week international study tour, and a follow up national seminar. It was later extended to five phases including execution and monitoring phases. As part of the EDI seminar, the MOWP and EDI jointly organized a five day seminar at Islamabad in Oct. 1994 inviting senior level policy makers, irrigation engineers, **NGO's**, researchers and farmer leaders. The net outcome of the seminar was the Indicative Action Plans by the Provincial Governments. The deliberations of the seminar were published in the form of a proceedings in January

1995. As Phase-2 of the programme, a group of 16 participants from Pakistan joined the international seminar in Mexico in Feb. 1995 to examine the management transfer programme in Mexico. The third activity was the 2nd National Seminar in **Bhurban** during Oct. 1995 to produce detailed action plans for implementing PIM at the National and Provincial levels and to identify the training and monitoring needs for implementing the action plans and discuss Pakistan's involvement in INPIM. The action plans were prepared to implement the PIM programme on a pilot basis in all of the four provinces.

In August 1995, the President of Pakistan, as a policy to decentralize the irrigation system, issued an ordinance with the main salient features as below **(14)**.

- i) The Provincial Irrigation Departments (**PIDs**) shall be transformed into autonomous bodies, namely, Provincial Irrigation and Drainage Authorities (**PIDAs**) under statutory arrangements having independent revenue collection and spending authority. The process would be completed by the Provinces in a manner that the **PIDAs** become functional by July 1, 1996, the latest.
- ii) Below the **PIDAs**, financially self-accounting Area Water Boards (**AWBs**) on the pattern of Area Electricity Boards (**AEBs**) of WAPDA shall be created, preferably around canal commands.
- iii) Below the **AWB** level farmers shall be encouraged to form Water Users Formations at the distributary and minor level on a pilot concept basis. These formations would play an important role in the operation and maintenance of distributaries and minors using a participatory approach. Based upon the results of such pilot projects, a workable model would be evolved for adoption on a country-wide basis.
- iv) The newly created **PIDAs** shall not increase staff strength till such time as they have attained financial self-sufficiency.
- v) It was also decided that since the existing **PIDs** will be converted into financially and operationally autonomous bodies, it would be for the Provinces and the proposed Provincial autonomous authorities to formulate a schedule of annual increases in "abiana", such that the gap between water charge recoveries and the O&M costs is reduced in order to eliminate eventually the provincial subsidy for O&M in its entirety.

Public Awareness was created through the above seminars, meetings both with govt. and later govt. and donor agencies, then beginning the report of development projects like CRBC, LBOD, Sukh Beas, NDP, etc.

The Government decided that the ordinance would become effective from July 1996, but yet considerable spade work needs to be done before the PIDAS become functional.

3. Future Options - Need and Basis for Change

To make the irrigation system sustainable, O&M gaps need to be bridged by adopting appropriate measures like cost effective O&M, and increasing water rates according to the paying capacity of small farmers. The present water charges constitute a small fraction (3-7%) of the net income per acre of various crops (5). Even then, farmers are reluctant to accept any increase in water charges. Solutions suggested by the World Bank address only filling the gap between O&M and not the measures to enhance crop production for which this system is being run. Therefore, an approach which will ensure the recovery of increased water rates after enhancing crop production will be practicable under Pakistan conditions and will make irrigated agriculture sustainable.

In the water sector, mostly engineering solutions were employed to solve these problems. The institutional and social aspects of the irrigation system were neglected. Any future strategy has to address these issues. The present system has to be changed to ensure sustainability of the irrigated agriculture.

We have pondered over this issue and have come to the conclusion that the same objective can be achieved by incorporating certain changes of a fundamental nature through integrating the departments and farmers participation.

Successful coordination activities of the nation building departments and farmers participation require a strong commitment and devotion on the part of politicians, task managers and higher levels of agency management. Institutional reforms in the irrigation system alone, in isolation of agriculture, cannot address the sustainability issues. A total approach comprising sustainable irrigation supplies, technical guidance, supervised credit, supply of inputs, marketing facilities, etc., need to be launched.

An effort has been made in this paper to achieve this objective through certain institutional reforms to improve irrigated agriculture on an environmentally sustainable basis through better coordination between farmers and the nation building departments (Agriculture, Irrigation and Local Government and Rural Development). Keeping this in view, a model based on integrating these departments has been developed. The major emphasis will be laid on farmers participation through union councils.

SECTION III

FARMERS PARTICIPATION * A SUGGESTED MODEL (3)

1. Institutional Linkages

Promoting peoples participation is fundamental to the provision of services and resources for human development. People participation brings previously marginalised sections of society into a relationship with modern economic, political and social institutions on viable and equitable terms (11). Farmers participation in irrigation management is being recognized as a means of improving the performance of costly irrigation investments. Similarly, the need for coordination between the provincial irrigation and agriculture departments is evident as recommended by various studies (14,15). Local government institutions are effective vehicles for bringing about positive changes in rural areas. The amelioration of rural masses is the basic objective of the local government and rural development department (LG&RD). The departments present functions are limited to provide physical infrastructure and provision of basic needs. The department has long experience of working with the rural masses. The coordination of these three nation building departments, along with farmers participation, can play an important role in irrigated agriculture development.

The accelerated development of irrigated agriculture cannot be achieved without developing proper linkages between LG&RD, agriculture and irrigation departments and farmers. It is therefore essential that a strategy to develop rural agriculture and water institutions simultaneously must be evolved. Keeping this in view, an effort has been made to develop a model based on integrating LG&RD, Agriculture and Irrigation Departments and farmers in the process of irrigated agriculture development.

2. The Model

The proposed structure of the model is given in Fig.2. Three nation building departments will work in close collaboration among themselves and with farmers. The functions of LG&RD will be extended beyond the provision of basic needs and physical infrastructure to promote irrigated agriculture. The officials of the LG&RD Department will act as coordinator among the departments of agriculture, irrigation and farmers at respective horizontal levels. The main theme of this approach is organizing a Farmers Association at the village level through efforts of LG&RD and Agriculture Departments. Chairman, Union Council will look after the interests of the farmers regarding Agriculture and Irrigation. Revenue (land and water rates) will be collected at the Union Council level through elected members of the Union Council under the supervision of the Chairman, Union Council. For this service, the Union Council will earn commissions previously given to Larnbardars.

A high level Board comprising the Provincial Secretaries for Agriculture, Irrigation, LG&RD, member Board of Revenue, representative of farmers and Chairman P&D department as Chairman of the Board will be empowered to decide water rates and other related matters of exemptions in case of calamity.

The farmers are the recipient of irrigation water, farming technology and farm inputs. The major emphasis will be on farmers active participation in agriculture development through cooperation with nation building departments in decision making and operation and maintenance of the irrigation system. The Union Council will be considered as the basic development unit and timely availability of farm inputs will be ensured at the Union Council level. The approach will help increase farm production through integrated efforts of serving departments and farmers, while farmers will be in a position to pay full service charges (water rates and other cess), eliminating government liabilities.

3. Operational Framework of the Model

The proposed model has been developed on the principle of "integrating the provincial departments presently serving irrigated agriculture and rural development with minimum creation of new institutions/posts". The major emphasis will be laid on farmers participation through Union Councils.

At the provincial level, institutional reforms are suggested by assigning LG&RD with the role of coordination among the departments of Agriculture and Irrigation and Farmers. The three departments depicted in Fig.2 will work in close cohesion with farmers and among each other. Secretary, LG&RD will act as Coordinator of the Board and will be redesignated as Secretary, LG&RD and Coordination. The brief functions of the above proposed institutions are discussed below.

i) Provincial Board for Irrigated Agriculture (BIA)

The board, headed by Chairman P&D will work under the guidance of the the Chief Minister and will be the principal coordinating body at the provincial level to direct and coordinate the departments of Agriculture, Irrigation and LG&RD and all concerned public agencies.

The major functions of the Board will include:

1. Aggregate budgetary claim for irrigated agriculture and inter departmental re-allocation;
2. Coordination among departments serving irrigated agriculture and rural development;

3. Policy formulation and implementation;
4. Water rates assessment and collection procedures; and
5. Canal command water apportionment in case of water deficit/surplus.

ii) Provincial Development Committees (PDC)

The committee will be comprised of the Director General, LG&RD, OFWM and Agriculture Extension Departments, Chief Engineer (Irrigation) and farmers representative such as from the Chamber of Agriculture. The committee will implement the decisions made by the Board and review the progress while its members will ensure the directives of the Board for downward transmission and compliance. The committee will assist the board in plan formulations and other technical matters, The cooperation and coordination among members will help develop better institutional linkages. Director General, (LG&RD) will act as coordinator of the committee.

iii) Regional Development Committee (RDC)

The committee comprising of regional heads of nation building departments i.e. Superintending Engineer (Irrigation), Director (LG&RD), Director OFWM and Director Agriculture (Extension) will be responsible for implementing the decisions of the higher committee and Board. Operational procedures and problems pertinent to the region will be discussed and solved by the committee. Director, (LG&RD) will coordinate and convene the committee meeting.

iv) District Assessment & Water Rate Recovery Committee (DA&WRC)

The Committee will be comprised of the Assistant Director (LG&RD), Deputy Collector (Revenue), Deputy Director Agriculture, XEN Irrigation, Members District Council and Chairman District Council as Chairman of the Committee. The committee will monitor the irrigated cropped area assessment and water rates collection, exemptions of the water rate in case of crop failures due to calamities etc., formulate plans and strategies to improve recoveries, and minimize concealment in recording cropped area.

v) Water Rates Collection Committee (WRCC)

This committee will be the lowest tier in the proposed model and will be comprised of Overseer (Irrigation), OFWM field team representative, Agriculture Officer, Secretary Union Council and Chairman Union Council as Chairman of the Committee. The main functions of the committee will be to collect revenue from farmers and 10 percent of the total revenue will be reserved for raising the funds of the Union Council. Members of the Union Council, who will be directly collecting revenue from farmers of

their electorate, will be given 5 percent of the revenue as incentives for the job. The Committee will also assess the farm inputs, water and credit needs and assist the farmers in receiving these inputs. The Committee will also examine the local problems relating to agriculture, irrigation, rural infrastructure and marketing, then and seek/suggest possible solutions. Watercourse cleaning, improvement and maintenance and assistance in cropped area assessment will be ensured through the farmers associations.

vi) Farmers Associations (FA)

Experience with effective and viable WUAs in Pakistan, and elsewhere in the world, shows that those WUAs that are involved in additional activities for the benefit of their members and build up their financial position often become viable for undertaking sustained development. The additional areas that the farmers feel the WUAs should turn their attention to is agribusiness support services like purchasing diesel for tractors, procuring seed, marketing agriculture produce etc. for farming operations (7).

Farmers Associations organized at the village level will be responsible for watercourse cleaning and maintenance; procurement of farm inputs under the leadership of democratic representatives (members, Union Council). Farmers Associations will cooperate at the village level with nation building departments in receiving farm technology, establishing demonstration farms, model farms, etc.

Pre-requisites to the Model

High-Level Commitment: A firm commitment from political leadership, top policy and decision makers is the prime requirement for implementing participatory approach. It is important that right signals are relayed at the right time to national leadership so that a favourable atmosphere could be created;

Training: Training of members and representatives of beneficiary groups is an essential element in the implementation of this approach. Intensive training is required in the technical aspects of the operation and maintenance of physical systems and in the organization and management of organizations. Such training could prove to be a vital link between agricultural and non-agricultural activities to be handled from the same platform at the later stages.

Coordination: Strong coordination at all management levels (high, medium and low) is required in this approach. Moreover, coordination among farmers themselves is very crucial. Since the approach requires a maximum of contact with beneficiaries, therefore, effective coordination becomes the prime requirement of the model.

Regulatory System: An effective regulatory system has to be in place in order to regulate the management and financial affairs of these institutions.

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