

## **Assessment of Farmer's Attitude towards Participatory Irrigation Management in Punjab-Pakistan**

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### **Abstract**

**Water is very essential for agriculture and it is being provided to the farmers through canal irrigation system. The designed cropping density in Pakistan was 60-70% while at present it is about 120%. The canal irrigation system of Pakistan is one of the best and largest irrigation systems in the world. This system is very old and needs major improvement to make it efficient and to meet the present demand of the irrigation. This system can be managed well if the farmers are involved in its operation and maintenance. After all, the managers, planners and administrators in Pakistan have realized that the farmers' participation is very necessary and many projects of such nature are at different stages of implementation in different irrigation zones in Pakistan. Moreover, the Provincial Irrigation and Drainage Authorities (PIDA) have been established under formal acts in each province and these authorities have formally initiated a policy of Participatory Irrigation Management (PIM) in the country. In anticipation of these more participatory institutional changes in the irrigation sector, several pilot projects to organize farmers at the minor or distributary or canal level already have been initiated by the Government departments, Non Government Organization (NGOs) and Community Based Organizations (CBOs) in the country. The present paper is about assessing the farmers' attitude towards this envisaged package of roles and responsibilities of farmers for operation and maintenance of irrigation system in Punjab.**

**The results of the research revealed that farmers are ready to accept the responsibility of operation and maintenance of irrigation system up to minor and distributary level. They will be happier to undertake the responsibility of collecting the abiana (agriculture revenue). Some suggestions for effective and efficient participatory canal irrigation system are also presented at the end of the paper.**

**Key words:** Irrigation, abiana, minor, distributary, watercourse, participatory Irrigation Management, operation & maintenance.

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### **Introduction**

Water is key input for agriculture and is made available to farmers through irrigation system. Total cultivated area of Pakistan is 21 million hectares (ha). Pakistan's agriculture is almost wholly dependent on canal irrigation. The designed cropping intensity of our irrigation system was pitched low in the order of 60-70%, but now cropping intensity is more than 120%. On the other hand the supply of irrigation water from canals is limited, therefore, the gap between demand and supply of irrigation water is widening day by day. This sheer increase in water requirement demands an efficient canal irrigation system. Such a canal irrigation system can only be managed with the proper operation and maintenance (O&M). In Pakistan the duty of operation and maintenance of irrigation system is entrusted to the Pakistan Irrigation Department (PID). The Government of Pakistan is spending major chunk of its budget on the operation and maintenance of irrigation system every year, but still a shortage of funds is major problem. The shortfall in O&M funding was estimated to be more than 24% (World Bank, 1994). This situation has resulted in the deterioration and poor maintenance of irrigation canal system in Pakistan and especially in the Punjab.

Although the share of agriculture in the economy has been slowly decreasing, it is still the backbone of the economy, employing more than 50 percent of the labour force and earning (directly or indirectly) 70 percent of export revenue. As the poor O&M has direct effect on the productivity of agriculture, indirectly it affects the whole economy. Therefore, in recent years, Pakistan policy makers, planners, technical experts and politicians have realized the necessity of organizing farmers at minor and distributary level to control the distribution of canal water in a better way. The objective may be achieved by involving the farmers' organizations in the operation and maintenance activities along with the provincial irrigation department.

The government has started the work towards this direction. In 1997 the four provincial legislatures of Pakistan passed legislation that has begun the process of changing the institutional relationships between the provincial irrigation departments (PID) and farmers that had been previously established by the Irrigation and Drainage Act of 1873. The passing of the Provincial Irrigation and Drainage

Authority (PIDA) Acts in each province has formally initiated a policy of Participatory Irrigation Management (PIM) in the country.

It is expected that formal organizations of farmers will become actively involved over time in the day-to-day tasks of secondary canal operations and maintenance as well as in mobilizing the financial resources that will be required to carry out the sustainable O&M of canal irrigation systems. In addition, farmers will be given representation in the new agencies that will be created to replace the PIDs, a Provincial Irrigation and Drainage Authority (PIDA) comprised of Area Water Boards (AWB) formed for each canal system. New rules and regulations for irrigation management at secondary canal command and above will be developed to incorporate these changes.

In anticipation of these more participatory institutional changes in the irrigation sector, several pilot projects to organize farmers at the minor or distributary canal level already have been initiated by the government departments, NGOs and CBOs in the country. Moreover, the Government of Punjab has also constituted the first Water Area Board on the Lower Chenab Canal East (LLC East) and the Governor of the Punjab formally inaugurated its constitution on 10<sup>th</sup> February 2000 in a farmers' forum organized at Faisalabad. Similarly, recently the second Water Area Board on the Upper Chenab Canal West has also been formed. Moreover, the PIDA has started work on different levels and farmers' organizations are being formed and the responsibility of operation and maintenance is being entrusted to farmers.

As the work of handing over the O&M responsibility and involving the farmers' organizations in other activities with provincial irrigation department has been initiated, some powers along with the burden of financing these activities will also be delegated to these organizations. This paper is about the assessment of farmers' attitude towards undertaking the envisaged responsibilities of operation and maintenance of irrigation system. The farmers' community in Sargodha zone and author conducted this research on a very small scale to find out the farmers' attitude towards this new horizon and to assess/gauge their attitude about the level or degree and type of participation in participatory irrigation management.

### **Material and Methods**

The collection and analysis of data both from primary and secondary sources was carried out. As a pre-requisite to the study research it was necessary to study the different documents having information on participatory irrigation management in the world in general and in Pakistan in particular. Different documents of International Irrigation Management Institute (IIMI),

International Water and Salinity Research Institute (IWASRI), OXFAM, World Bank and other donor agencies and NGOs were studied in detail in order to have the first hand information on the work already done on this aspect.

**Selection of the Universe:** Government of Pakistan and the World Bank funded the Punjab Private Sector Groundwater Development Project in Punjab from 1997 to 2002. There were many components of the project and approach of the project was participatory one. Farmers' Organizations (FOs) were formed at watercourse level as well as at minor and distributary level for improvement and lining of the watercourses and minors and distributaries. Most of the work of lining of minors and distributaries was completed in Sargodha zone in the saline area. One among the improved minors is the Nangiana minor, off shooting from Behk distributary, which is originating from Lower Jehlum Canal, situated towards west of Sargodha city at a distance of about 20 km. There are 4 watercourses on this minor and watercourse association on each watercourse has already been formed and registered with On-Farm Water Management Directorate (OFWM), Department of Agriculture, Government of the Punjab under Water Users' Association Ordinance 1982. As the farmers had already contributed in cash and kind for the lining of minor, therefore the same minor was selected (a real situation) for present research study to explore further that what is the attitude of the farmers toward participation in participatory irrigation management, at a higher level activity in the irrigation management.

**Selection of Watercourses:** There are four watercourses in total on Nangiana Minor and all were selected in order to have true representative population from head, middle and tail sections of the minor.

**Selection of Farmers/Respondents:** A sampling frame was prepared and for this purpose a list of all farmers on each watercourse i.e. 4 in total indicating the name of each farmer, father's name, caste, agriculture land owned on respective watercourse and their designation in watercourse association was prepared with the help of revenue department. Keeping in view the time, resources, and financial limitation, sampling technique was applied. Using stratified random sampling technique from the population of 138 farmers drew a sample of 36 farmers. Each watercourse was divided into the head, middle and tail reaches/sections. Three farmers from each section of the watercourse were selected randomly and interviewed in order to make the sample more and more representative of the population.

**Data Collection:** A pre-coded Interview Schedule was designed for this research. A discussion was held with many colleagues in University of

Agriculture Faisalabad, and from IIMI, IWASRI, PID and Punjab Private Sector Groundwater Development Project etc. in order to incorporate the views of different professionals in the design of the Interview Schedule. Moreover, a pilot survey was conducted in the field in order to test the survey instrument for its improvement before starting the actual survey. During this survey data about the tenancy pattern, major crops, present sources of irrigation, conditions of watercourses and minor or distributary, satisfaction level with present canal water supply system, past experiences of farmers for participation in communal works, type and level of participation in future as envisaged by the farmers, their roles and responsibilities as well as the suggestions for further improvement of present canal water supply system etc. were collected.

**Data Analysis:** The following methods were applied to analyze the collected data.

1. The computer package programme, the Statistical Package for the Social Sciences (SPSS) was used to obtain the simple frequency tables and other related statistical measures.
2. Yeh's Index of Satisfaction (YIS) was used to analyse the people's satisfaction level regarding the present canal irrigation water supply system. In comparing YIS, the scale of satisfaction was converted into three point Likert's scale, identifying three levels of satisfaction i.e. satisfied; no opinion (indifferent) and dissatisfied. Subtracting the number of respondents who were not satisfied from the number of satisfied respondents and then dividing it by the total number of responses obtained the index number.

Putting it into a symbolic form, the YIS, can be written into the following expression:

$$YIS = \frac{S - D}{R}$$

Where

- S = the number of respondents satisfied with present canal water supply system
- D = the number of respondents dissatisfied with present canal water supply system
- R = the total number of respondents

The index ranges from +1 to -1. A positive value indicates that there are more respondents who are satisfied than those who are not satisfied. The larger the value, the more intensive is the degree of satisfaction or dissatisfaction.

## Results and Discussion

### 1. Socio-Agriculture Profile of the Area

The study of socio-agriculture conditions is essential in order to understand the area. The data was collected about the household size, farmers' level of education, farm tenancy, land ownership, major crops in the area and on-farm annually income of farmers. It is revealed from the data collected that the farm household size varies from 3 to 8 members per household. About 50% households have more than 6 members per household and 33% households have 8 members per household (Table 1). Level of education is another variable that contributes towards farmers' attitude for participation in community development activities. It is very high in this area and 75% farmers are literate (primary-graduate level). This is a good sign that they will be more flexible towards communal work and it will be easy to motivate them for participation in irrigation management. All the farmers are owner and they are small to medium size farmers. The data indicated that 25% farmers owned land up to 12.5 acres and 33% farmers owned 12.5 to 25 acres land and the remaining 42% owned land more than 25 acres (Table 1). Major crops in the area are wheat, fodder and orchids. It is interested that 97% farmers (respondents) have orchids of citrus and this area seems to be well off. The on farm annual income (savings) of farmers varies from Rs. 5000 to more than Rs. 9000 and majority of them have income more than Rs. 9000 (Table 1).

**Table: 1 Distribution of Respondents According To Socio-Agriculture Indicators**

<b>Household Size</b>							
1 member	2 members	3 members	4 members	5 members	6 members	7 members	8 & above
0	0	6	3	6	3	6	12
<b>Education Level of Farmers</b>							
Primary	Middle	Sy. School Certificate	Intermediate	B.A/B.Sc.	M.A/ M. Sc.		
3	12	3	3	6	0		
<b>Types of Farm Tenancy</b>							
Owner		Owner cum tenant			Tenant		
36		0			0		
<b>Land Ownership Pattern (acres)</b>							
Up to 12.5		>12.5 – 25			>25		
12		9			15		
<b>Major Crops in the Area</b>							
Wheat	Sugar can	Rice	Cotton	Orchids	Kharif Fodder	Rabih Fodder	
36	0	0	0	35	36	36	
<b>On-farm Income-Savings (Rs.)</b>							
<5000		5000-6000	6000-7000	7000-8000	8000-9000	>9000	
21		3	0	0	0	12	

## 2. Reflection of Farmers about Present Irrigation System

**Farmers' Level of Satisfaction with Present Canal System:** It was explored that whether the farmers are satisfied or dissatisfied with the amount, regularity and reliability of the present canal water supply. Further composite indices were developed to give an overall picture of the present canal water supply system. This composite index was obtained by averaging the value of the satisfaction indices for various elements of the

present system. As discussed earlier that the index ranges from +1 to -1. A positive value indicates that there are more farmers who are satisfied than those who are dissatisfied. Similarly the negative value indicates that there are more farmers who are dissatisfied than those who are satisfied. The larger the value, the more intensive is the degree of satisfaction or dissatisfied. The following table depicts the farmers' level of satisfaction with various elements of the present canal water supply system.

**Table: 2 Indices of Satisfaction with Present Canal Water Supply**

Sr. #	Elements of Canal Water Supply System	Index of Satisfaction
1.	Regularity of Water Supply	-1
2.	Reliability of Water Supply	-1
3.	Getting Water on Their Fixed Turn	-1
4.	Amount of Water Supply	-1
	<b>COMPOSITE SATISFACTION INDEX</b>	-1

It is clear from the above table (Table 2) that very low-level of satisfaction is estimated for the present canal water supply system. The negative value indicates the total farmers are dissatisfied and -1 indicates that farmers are extremely unsatisfied with present availability of canal water. The reasons are: First, the designed cropping intensity of present canal system was kept in the order of about 60-70%, but the now the cropping intensity is more than 120%. Second, the operation and maintenance of irrigation system is very poor. It resulted into not proper functioning of the system and the discharge is less than the designed discharge at outlets. Moreover due to deposit of silts and creeping up of weeds, grass and shrubs on the minors' banks the conveyance of water has reduced and there are frequent breaches.

**Present Cleaning Activity of Watercourse:** The cleaning of watercourses is very common activity among the farmers' community. They have devised

very good accountability system at local level for smooth running of this activity. The successful running of this act gives a historical indication of farmers' attitude toward community participatory development initiatives. The survey results of this research indicate that 66.6% respondents told that the cleaning of watercourse is often done and other 25% informed that it is seldom happened and other 8.4% said that it is a regular activity (Table 3).

**Condition of Existing System and Other Sources of Irrigation:** The condition of present irrigation system in the area (condition of structure -bridges, falls, culverts, outlets, superstructure and banks etc.) directly affects on the efficiency of the irrigation system. It is reflected from the data collected that the condition of structures is not satisfactory. As 91.66% farmers expressed (Table: 3) that the present condition is very poor and the breaches are very common. Due to unreliable irrigation water supply and scanty amount the

farmers have developed other sources of irrigation water to meet the current demand. It is clear from the data that 100% farmers (Table 3) have installed private tubewells to extract the groundwater.

**Demand for Irrigation Water:** Since the farmers have increased the crop intensity to meet the food and other requirements of their large size families.

Therefore, the demand for more water is enhanced. It appears from Table: 3 that 50% farmers indicated that there is much demand for irrigation water in the area and remaining 50% told that there is less demand. It may be due to the fact that these farmers may have good supply from their private tubewells.

**Table: 3 Reflection of Farmers about Present Canal System Satisfaction Level with Present Canal Water Supply**

Satisfied	Indifferent	Dissatisfied	
0	0	36	
Present Watercourse Cleaning System			
Regularly	Often	Seldom	
3	24	9	
Condition of Present Canal System			
Very Good	Good	Fair	Poor
0	0	3	33
Other Source of Irrigation			
Private Tube-wells	SCARP Tube-wells	Any Other (specify)	
36	0	0	
Further Demand for Irrigation Water			
Too much required	Much required	Less required	Not required
9	9	18	0

**3. Assessment of Farmers Attitude for Participatory Irrigation Management**

About 58.33% respondents do not belong to any formal or informal association and they have never taken part in community participatory activities. There are some cooperatives and old Water Users Associations (WUAs) but they mostly do not function. This confirms the observations from other sources that in Punjabi Society (in Pakistan and India) spontaneous formation of voluntary associations, cooperatives, NGOs, welfare Associations and Public Service Groups are rare. Group farming and group labour is almost absent. This makes formation of WUAs difficult, but not impossible.

**Farmers' Attitude Towards Participation in Irrigation Management:** Despite the above situation, 75% (Table: 4) of the respondents said that the farmers would accept the participation in the management of irrigation system, during discussion they informed that they have already participated in lining of their minor and they actively participated in the design, cash contribution for cost sharing and supervision during the execution of work. Now they have a farmers' federation as common platform and experience of working in communal work related to irrigation system. Therefore, they can handle this work efficiently. Though forming voluntary associations is not part of rural Punjabi culture, we can have guard optimism that participation of farmers in irrigation management can be successful on this point, provided there is sustained social and organizational input. Different projects and agencies in Pakistan have similar experience.

**Level and Type of Participation:** It is revealed from the Table: 4 that 75% respondents said that

farmers can participate up to minor level and 16.66% expressed that farmers can participate up to distributary level and remaining 8.44% said that farmers can participate only at the watercourse level. We can conclude that farmers will more efficiently participate up to minor level. It was also discussed that what type of participation will be accepted by the farmers. The results of the data collected (Table: 4) show that 33.33 % respondents said that farmers will accept the abiana (agriculture revenue) collection components, 41.67% respondents said that farmers will successfully run the water distribution aspects and remaining 25% said that farmers will be more able to carry out the operation and maintenance of the irrigation system.

**Suggestions for Successful Participatory Irrigation Management:** At the end of survey the suggestions of the farmers were ascertained that how this activity can be further improved or in other words how the efficiency of irrigation system can be improved and enhanced agriculture production achieved? Following were the suggestions:

1. The farmers will properly do Operation & Maintenance.
2. Look after of trees situated on the minors and canals should be given to the farmers.
3. The improvement/lining of distributaries will help more.
4. We can get rid of different departments if the system is handed over to the farmers.
5. The farmers should carry out communal work of irrigation system.
6. Lining of watercourse by participation of farmers will improve conveyance of the water.

7. Cost of Agriculture inputs is too high therefore, farmers have no savings.
8. Irrigation water must be increased and watercourses must be improved.

**Table: 4 Assessment of Farmers Attitude for Participatory Irrigation Management  
Farmers' Past Experience of Community Work**

Always	Most of Time	Some of Time	Rarely	Never
0	3	3	9	21

**Farmers Attitude towards Participation in Irrigation Management**

Agreed	Indifferent	Disagreed
27	0	9

**Farmers Level of Participation**

Watercourse Level	Minor Level	Distributary Level	Branch Level	Canal Level
3	27	6	0	0

**Type of Participation**

Abiana collection	Water distribution	Operation & Maintenance	Any other (specify)
12	15	9	0

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