FARMERS IRRIGATION STRATEGIES AT IMPROVED AND UNIMPROVED WATERCOURSES

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Farmer focused research has been conducted on wheat crop in order to identify differences in irrigation strategies at improved and unimproved watercourses. Irrigation farming was studied in fields of farmers with respect to stratification of selected watercourses by middle and tail. Data were collected through observations and farmer's interviews on specific wheat farms. The results indicate that there is no difference in method of irrigation and number of irrigations applied to wheat crop on improved and unimproved watercourses.

INTRODUCTION

The Indus Basin irrigation network consists of dams, barrages, headworks and canals which divert more than 11 million ha m of water from the rivers to the head of the watercourses. Water is supplied to the farmers through the watercourses according to a certain time roster. This time roster is based on a 7 or 10 days fixed rotation. The water is supplied to the farmers, through the farm outlet and each farmer receives all the flow from the channel during his turn which is largely determined by his farm area. Pakistan's Indus Basin water budget shows that only 5 million ha m of water is available for crop use (Shahid, 1980). The available water supply is short by about 30% on annual basis. The system losses particularly beyond the 'outlet' further worsen this shortage (Arshad and Mukhtar, 1986).

For increasing the agriculture production in the past, the investment in the water sector was mainly focused on water resources development and control of the menace of waterlogging and salinity. However, recently the management of water at the place, where it is always perceived to be insufficient, has been considered and given due attention. For improving water conveyance beyond the outlet, a watercourse improvement programme was launched with USAID under the on-farm water management project (OFWMP) by the Punjab Government. OFWMP initially commissioned in 7 selected tehsils of the Punjab has now been expanded to cover almost all the major canal irrigated areas of the province under the assistance.

Evaluation of watercourse improvement programme by WAPDA suggests that agriculture benefits have not been as great as expected (Hassan *et al.*, 1990). Increase in cropping intensity has been modest and in some cases has not materialized at all. Yield data show a similar ambiguous pattern. WAPDA (1984) did an evaluation study of USAID funded OFWMP Pilot Project. The study found a reduction in conveyance losses, increase in cropped area, rise in the area under high delta crops and increase in the yields of major crops. It was required to determine what farmers are doing with water which resulted in increased supplies and

in improved reliability of those supplies on improved watercourses. This study has been carried out to look at the existing farm level irrigation practices of farmers to see how they are utilizing water on both improved and unimproved watercourses. It has evaluated the changes in method of irrigation, water application time and number of irrigations.

Punjab under traditionally unimproved conditions. During the year 1981-82, in most of the area, a campaign known as 'Crash Programme' (heavy cleaning and maintenance) was carried out. The watercourses thus, were mostly found in a better condition. These may have undergone some sort of improvement or reshaping and were not suitable for such comparison. To overcome

Table 1. General information on selected watercourses

Description	Watercourse characteristics			
	Improved		Unimproved	
	Medium size	Large size	Medium size	Large size
Village	Rameana	Lakhu	Bungha	Herdusa hari
Mogha No.	62008-L	62309-L	57360-R	52812-L
Design discharge	40 l/s	60 l/s	40 l/s	70 l/s
Command area (ha)	199	345	219	316
Total length (km)	6.8	9.6	7.1	12.3
Length of lining (m)	812	895		
Total number of shareholders on watercourse	126	76	55	113
Holding < 2 ha	93	22	17	80
2-4 ha	30	17	14	28
4-10 ha	3	22	21	4
> 10 ha	-	15	3	1

MATERIALS AND METHODS

In order to study the changes in farmers irrigation strategies, the data were collected personally from the area by visual observations and through interviews. The field survey was conducted in Kasur tehsil of the Punjab province. The selection of Kasur tehsil was made due to the fact that this area was considered manageable with accessible resources for research activities.

It was very hard to find too many watercourses in the irrigated districts of the this problem life expectancy of one year of such an improvement provides us an opportunity to consider watercourses operated under such programme during the year 1981-82 as unimproved one. It was further decided that regular improved watercourses should be taken from the list of watercourses operated during the year 1981-82 providing a period of 5 years for adapting to any change. In order to 'make with and without improvement' comparison, two pairs of watercourses were selected. A brief description of the selected watercourses is

given in Table 1. Each pair consisted of one improved and one unimproved watercourse.

Water application time per irrigation: Water application time is presented in Table 3.

Table 2. Number of basins per acre (median of 10 observations)

	Improved watercourse			Unimproved watercourse		
	Medium size	Large size	Overall	Medium size	Large size	Overall
At mid of the watercourse	6.0	3.0	4.0	3.0	3.5	3.5
At tail of the watercourse	4.0	5.0	4.0	3.5	5.0	4.0
Overall	4.5	4.0	4.0	3.0	5.0	4.0

Table 3. Time (minutes) allocated to irrigate an acre

	Improved watercourse			Unimproved watercourse		
	Medium size	Large size	Overall	Medium size	Large size	Overall
At mid of the watercourse	108	67	86	89	90	90
At tail of the watercourse	163	145	149	80	108	90
Overall	121	104	111	84	96	90

RESULTS AND DISCUSSION

Number of basins per acre: The number of basins per acre examined in each field and a median of 10 observations is presented in Table 2. The results show that there is a trend of making four basins per acre on improved and unimproved watercourses. It indicates that because of less flow rate under both conditions, the farmers divide an acre into small plots in order to improve the physical condition of the field to avoid the wastage and achieve better control on their supplies.

Each value in this table is an average of observations that range from 7 to 33 based on the number of times water was applied from canal. Table 3 indicates that farmers on improved watercourse allocate water about 20% more in terms of time to irrigate an acre as compared to that on unimproved watercourse. Similar results were found by Hafeez and Ahmed (1990) who found that the farmers having less discharge, practice deficit irrigation.

Table 4. Estimates of standard 't' statistics regarding time applied per acre

	Variance		Degree of freedom	Value of 't'	
	Improved	Unimproved		Calculated	Tabulated
At mid of the watercourse	1237	414	90	-1.2100	2.00
At tail of the watercourse	3329	948	59	0.0098	1.98
Overall	3200	644	139	0.0001	1.98

Table 5. Number of irrigations applied to the wheat crop

	Improved watercourse			Unimproved watercourse		
	Medium size	Large size	Overall	Medium size	Large size	Overall
At mid of the watercourse	2.5	2.0	2.0	2.0	2.0	2.0
At tail of the watercourse	2.0	2.0	2.0	2.0	2.0	2.0
Overall	2.0	2.0	2.0	2.0	2.0	2.0

To test the significance of difference of time applied per acre per irrigation between improved and unimproved watercourses, student 't' test was applied. The results of 't' test given in Table 4 show that the value of 't' is less than the tabulated value for the tail reach and for the whole watercourse. Hence, the proof of test suggests to accept that average time applied per acre on improved watercourse is greater than on improved watercourse at 5% level of significance.

Number of irrigations: Number of irrigations applied to wheat crop are presented in Table 5. This table shows that the number of irrigations given to wheat crop are equal in case of improved as well as unimproved watercourses. It was stated by Khan and Wlser (1990) that there is no relationship between the amount of irrigation water applied by the farmers and the water requirements of the crop. To test the significance of difference between mean values, standard *t*-test was carried out at 5% level of significance. The results of analysis show that values of calculated *t* are smaller than the tabulated value. Hence, it may be said that mean number of irrigations are equal on improved and unimproved watercourses at 5% level of significance.

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