

Sustainability of Water Users Associations as Groundwater Irrigation Managers: A Case Study under On-Farm Water Management, Punjab, Pakistan

Muhstaq Ahmad Gill⁵⁴

ABSTRACT

THE PAPER DISCUSSES the water users associations; their organization and operation after the reconstruction/remodeling of small-scale community irrigation schemes (watercourses), with special reference to their sustainability as groundwater irrigation managers. Watercourses carrying canal and groundwater (tubewell water) renovated under three different categories, i.e., managed by water users associations, a government organization and a tubewell owned by a single farmer have been discussed and compared.

INTRODUCTION

Pakistan ranks fifth in the world and third among the developing countries in the size of irrigated area served by the largest contiguous canal system. The irrigation system of the Indus Basin comprises of three major reservoirs, 19 barrages, 12 link canals and 43 major canal commands. The total length of irrigation canals is 49,500 km. Tertiary irrigation unites watercourses numbering 89,000 with a total length of about half a million kilometers. The irrigation supplies are augmented by 15,500 large public tubewells and over 300,000 private tubewells.

Poor irrigation efficiency resulting from huge water losses has been identified in the century-old community watercourses at farm level resulting in low per acre yields (1 acre = 0.40 hectare). A diagnostic analysis of the Indus Basin Irrigation System, particularly at tertiary level, inspired the planners to take some immediate steps to consider the improvement of irrigation efficiency at watercourse level by commissioning an On-Farm Water Management (OFWM) Project.

Watercourse improvement envisages complete remodeling and reconstruction of community watercourses with partial brick lining and fixing of water control structures. This task is accomplished through the active participation of farmers. The water users are organized into water users associations (WUAs). The main functions of the WUAs are to arrange labor, settle all types

54 Director General Agriculture (Water Management), Punjab, Lahore, Pakistan.

of disputes amongst the shareholders, make arrangements for alternate watercourses, supervision of work and post-construction maintenance. This unique experience of farmer participation has proved very successful in the Punjab Province.

Canal irrigation is supplemented with groundwater in the Indus Basin. There are about 315,500 tubewells in public and private sectors, tapping the aquifer and serving the dual purpose of irrigation and drainage. Large size deep turbine tubewells have been installed since the sixties by the government under the Salinity Control and Reclamation Projects (SCARP). Their operation, management and maintenance are being undertaken by the provincial Irrigation Departments. The acute problem of high operation and maintenance (O&M) cost has, however, compelled the government to disinvest through transitioning. The private tubewells are more or less fractional; centrifugal pumps are installed and they are operated and managed by individual farmers.

Looking at the success of the implementation of the watercourse improvement program through WUAs, an effort for managing groundwater exploitation has also been introduced. Ten tubewells operated by WUAs were installed on a cost sharing pilot basis in Dera Ghazi Khan. The idea of installation of such tubewells would be their replication in other areas upon the success of the scheme. The present study was conducted to compare the results of different management techniques.

LITERATURE REVIEW

Malik (1981) reported on an evaluation of the private diesel tubewells provided to the farmers by the government under a subsidy scheme. The study concludes that about fifteen percent of the tubewells have been identified to be installed in the open without proper shelter, thereby, increasing the wear and tear of the machines and decreasing their operational efficiency. The study further indicates that these privately owned tubewells were mainly used for their personal requirements by the owners as only five percent of the farmers sold the tubewell water to the adjacent farmers.

Ashiq (1981) reported that during the peak demand period the SCARP tubewells remained closed either due to repairs or replacements. The study has further shown that the operators reach efficiency in their tubewell operation targets during the low demand periods. Moreover, the tubewell operators do not take an interest in their assignments. Some of them have been reported to join other private businesses and pay occasional visits to their original place of posting while others have never been seen at their job.

Shahid et al. (1990) concluded that, on an overall basis, the extent of SCARP tubewell closure in a year due to mechanical faults was estimated as 4.05 months. It was further concluded in the study that although the government is responsible for the expenses on operation of SCARP tubewells, the farmers had to pay an amount of Rupees (Rs) 245 (US\$9.8) on an average, to keep the SCARP tubewell running in order to fulfil irrigation requirements at critical stages of the crop growth. The study further reveals that farmers on 5.5 percent of the totally closed SCARP tubewells and 12.5 percent of the running tubewells were ready to take over the SCARP tubewells, out of which 56 percent were ready to take them over jointly. The reasons identified for being unwilling to take over the SCARP tubewells are indicated as high electricity bills (68 percent), lack of cooperation (51 percent), owning private tubewells (46 percent), small holdings (40 percent), high O&M costs (31 percent) and apprehension about repair and maintenance (30

percent).⁵⁵ The report further reveals that none of the associations has been found willing to buy the SCARP tubewells jointly.

Chaudhry and Yong (1989) have pointed out that the pumping schedules of the SCARP tubewells were never made compatible with estimated canal supplies and crop water requirements. The operators remain frequently absent from tubewells and allow the farmers to operate tubewells themselves. This practice resulted in the damaging of electric motors and protective devices. The pumping capacity of the SCARP tubewells has not only declined, but up to 40 percent of the tubewells are not operating due to maintenance-related defects. Maintenance has been reported to be seriously constrained due to lack of availability of funds, and when funds are available, a slow, cumbersome and centralized decision making process caused unnecessary delays in solving the problems.

METHOD AND PROCEDURE

To conduct the present study, three tubewells operated under different management systems, i.e., WUA operated, privately owned and government managed through SCARP, were selected in Dera Ghazi Khan. The idea was to compare the performance under different systems of management. The Watercourse No. 7665/L managed by a WUA located in Shahbazpur, Tehsil Alipur, Muzaffargarh District had 95 shareholders. A nearby SCARP tubewell (No. AP 366) in Punjaiwala Village located on Sabaliwala Distributary contributing to two Watercourses (7205/R and 6550/L) had a total number of 137 shareholders (51 on 6550/L and 86 on 7205/R). A private tubewell owned by Mr. Rahim Ali had five beneficiaries at the head of Watercourse No. 824/R Sultanwala, Phulan Tehsil Alipur. The shareholders irrigated through one out of every five consecutive turnouts were interviewed. However, the availability and capability of the respondents to answer the contents of the questionnaire were kept in mind while selecting the respondents.

DISCUSSION

The shareholders of Watercourse No. 7665/L, Shahbazpur were motivated to organize a WUA and improve their watercourse with the active participation of the shareholders. This WUA, was provided with a tubewell for installation at the head of the watercourse and a small agricultural machinery pool with OFWM-related implements, including land scraper, rigger, ditcher, border, disc, tractor operated rabi and kharif drills and chisel plough for their joint use under the management of the WUA.

The site for installation of the tubewell was selected by the WUA. The owner of the selected land donated one *kanal* (1/8 acre) of land to the WUA to install the tubewell. The shareholders of the watercourse arranged the well drilling at the site and contributed all the expenses in this connection. The concept of cost sharing through provision of labor (skilled and unskilled) by the shareholders and materials by the government under the Watercourse Improvement Programme, were utilized in installation of the tubewell, construction of a pump house and a water tank.

55 Percentages indicated against these reasons are not mutually exclusive.

Contributions of the beneficiaries in monetary terms created a sense of ownership and responsibility amongst the shareholders. It was experienced only in the case of tubewells managed by WUAs. All the members of the WUA considered the tubewell as their joint property. As indicated earlier, the tubewell operated by this particular WUA benefits 95 shareholders and it was operated for 1,182 hours during the last year.

After installation of the tubewell and handing over of the package of farm implements to the WUA, the management committee of the WUA was trained in book keeping, administration and management of tubewell and farm implements. The WUA had hired a full-time operator who permanently stays at the pump house and receives a monthly salary amounting to Rs 800 (US\$32).

The WUA fixed the tubewell water charges at the rate of Rs 45 (US\$1.8) per hour for tubewell with 1.80 cusec discharge as compared to the tune of Rs 60 (US\$2.4) for 1.25 cusec discharge charged by private owners. This rate has been fixed to generate the funds for the salary of a permanent operator, O&M and depreciation. Since sufficient funds are available with the association for operation, repair and maintenance, the tubewell is repaired quickly in case of any breakdown. The tubewell water is provided to the shareholder strictly at the time of their turn for canal water due to rigid *warabandi* (turn of irrigation) system. However, during canal closure periods, water is supplied on first-come first-served basis.

The shareholder intending to purchase the tubewell water deposits the amount according to his requirement on an hourly basis to the cashier of the association at least one day in advance to his turn/requirement. The cashier can keep an amount up to Rs 2,000 (US\$80) with him to cater to the current expenditure. Any amount exceeding Rs 2,000 (US\$80) is deposited in the bank. A joint account (A/c No. 1029) is being maintained in the names of the secretary and the treasurer of the association in the *Bani*. All members of the executive committee attend the office for one hour daily to enable the shareholders to place their demands for tubewell water or farm implements. The daily office opening schedule is widely publicized during monthly WUA meetings and is written on the notice board of the office of the WUA for the information of all the shareholders.

A sufficient stock of diesel, oil and lubricants are kept in store for avoiding shut downs of tubewell. In case the tubewell goes out of order, the operator informs the president of the WUA who arranges the repairs/spares immediately. The WUA tubewell was run from March 1991 up to the end of February 1992 for 1,182 hours with a total income of Rs 37,080 (US\$1,483) against overall expenses of Rs 36,202 (US\$1,448). Overall expenditure and income are given in Table 14.1.

The operation, management and maintenance of tubewell and implements through the WUA have made this institution viable, active and effective for undertaking other activities. All the shareholders of the association, under the case study responded positively to carrying out the activities besides watercourse improvement in order to convert it into a multi-purpose farmers' institution. All the shareholders are satisfied with the working of their WUA. About 95 percent of the shareholders work together for post-improvement maintenance despite there being eight types of different caste/social groups of farmers in the village. The meetings of the WUA are held regularly on the first Friday of each month and are attended by most of the shareholders.

The private tubewells are not essentially installed near the head of the watercourse, that is why the tubewells have lesser beneficiaries. There is no chance for the upstream shareholders of the watercourse to get water out of the tubewell as it is constrained by the slope of the watercourse. Such a private tubewell therefore, remains under-utilized.

The tubewell selected for this case study was located in the middle of the watercourse and has only five beneficiaries including the owner. The tubewell remained under operation during the last year only for 190 hours. The owner himself is handling the operation and maintenance of the tubewell and no independent person has been engaged by the WUA to operate the tubewell. The owner is not available most of the time as he is engaged in his personal assignments and the

shareholders cannot reach him to get water to irrigate their fields. This is another reason for the tubewell to remain under-utilized. When the private tubewell is out of order, the owner himself is responsible for its repair. He may not have the required funds and time to get it repaired immediately. It interrupts the irrigation schedule planned by the nearby beneficiaries.

Table 14.1. Monthly details of operation of WUA and SCARP tubewells, from 1991 to 1992.

Month	Water users association			SCARP tubewell monthly working hours			
	Working hours and income		Expenses (lubrication, etc.)				
	(hours)	(Rs)	(Rs)	1988	1989	1990	1991
Jan	0	0	700	981	354	236	20
Feb	15	686	1,357	00	290	210	127
Mar	8	225	180	472	252	10	00
Apr	121	4,035	3,291	339	6	30	00
May	128	3,853	4,967	190	2	20	00
Jun	140	4,202	3,812	00	00	00	00
Jul	98	2,969	3,128	00	00	00	00
Aug	226	7,079	4,913	00	00	00	00
Sep	8	289	1,394	00	00	00	00
Oct	214	5,989	4,700	00	00	00	00
Nov	23	704	1,540	360	340	00	00
Dec	201	7,049	6,220	131	20	112	255
Total	1,182	37,080 (US\$1,483)	36,202 (US\$1,448)	2,473	1,264	618	402
Net income Rs 878 (US\$35)							

Notes: SCARP = Salinity Control and Reclamation Project.

0 = No demand due to rains.

00 = Tubewell remained out of order.

Due to the monopoly of the owner, cooperation amongst the group is poor. It was noticed during this study that 83 percent of the respondents felt difficulty in getting water from private tubewells when they required. The water users of the privately owned tubewell spent less time for maintenance of their watercourse due to the inactiveness of the group as compared to the WUA included in the case study.

The third alternative observed under the case study is the SCARP tubewell, installed at the head of the two improved watercourses. It is run by the Irrigation Department under the SCARP Program. A full-time operator has been provided for the tubewell but he takes little interest in his work. Ashfaq (1981) also reported that very often some of the shareholders of the SCARP tubewells have not seen the operators at all. Moreover, some of the operators are engaged in private business rather than performing their own duties at the tubewell. Repairs of the SCARP

tubewells is a time consuming job. A lot of time is wasted on the decision making process by the government offices. Sometimes it takes even months before the SCARP tubewell is repaired. The tubewell water is provided to the shareholders strictly at the time of their turn according to Warabandi. A comparison of installation, operation and maintenance of three different tubewell categories observed under the case study is given in Table 14.2. The Table indicates that the tubewell operated by the WUA is more successful, economical and effective in terms of the hours operated annually and cost.

Table 14.2. Comparison of three tubewell operational modes in the case study.

Sr. Number	Details	Private tubewell	WUA tubewell	SCARP tubewell
1.	Source of power	Diesel	Diesel	Electrical
2.	Measured discharge	1.25	1.79	2.80*
3.	Designed discharge	na	na	4.00
4.	Annual working hours	190	1,182	1,108
5.	Utilization factor	0.026	0.16	0.12
6.	Beneficiaries	5	95	137
7.	Capital cost (based on 1991 prices)	Rs 45,950 (US\$1,838)	Rs 116,874 (US\$4,674)	Rs 1,033,785 (US\$41,351)
8.	Life assumed (years)	10	10	20
9.	Operating cost per acre-inch (Rs)	54.00	30.00	63.48
10.	Water rate charged from the beneficiaries (Rs/hour)	60	45	na
11.	Operating cost per csf per hour	48	25	na
12.	Water rate per acre-inch	74.38	79.90	na

* @ 70 percent of designed discharge.

Notes: na = Not available.

1 acre-inch = 1.03 hectare-centimeters.

WUA = Water users association.

SCARP = Salinity Control and Reclamation Project.

Possibility of disinvestment of SCARP was also explored in the case study in order to lessen the burden on the public sector. It was however observed that only 20 percent of the farmers had shown their willingness to take over the SCARP tubewells under a WUA with a cost of Rs 10,000 (US\$400) on annual installments of Rs 2,000 (US\$80). When their opinion was sought about engaging the same operator, they disagreed to do so due to high pay of the operators and their inefficient performance. The remaining 80 percent of the respondents disagreed to take over the tubewell due to high O&M costs, less cooperation amongst the farmers, poor efficiency of the tubewell and the heavy electricity charges.

RESULTS AND CONCLUSION

- i) The tubewell-owned and operated by the WUA supplies irrigation water at 30 percent less cost as compared to that of private tubewell.
- ii) The availability of water to shareholders is ensured by WUA according to the demand as compared to private tubewells where it depends on the good will of the owner and SCARP tubewells where it is attributed to luck.
- iii) Repair and maintenance of the WUA tubewells is quicker due to social and obligatory pressure of the shareholders as compared to the financial and time constraints of private owners and bureaucratic approach of the public agencies in case of SCARP tubewells.
- iv) The WUA tubewell operator, being an employee of a private entrepreneur or a nongovernmental organization (NGO), is bound to perform his duties punctually as compared to private tubewells where the owner has to perform his duties himself. In case of the SCARP tubewell operator, his salary and services are protected by the government irrespective of his absence from duty. Accordingly, this operator is far less efficient than that of the WUA.
- v) Involvement of the WUA in operation of the tubewell enhanced cooperation amongst the shareholders and thus made the WUA more active, effective and viable for taking up other activities like maintenance of watercourse, irrigation scheduling and use of implements. This, in turn resulted in better and efficient use of available water leading to increased crop yields. The WUAs are also capable of generating their own funds to carry out functions such as operation, management and maintenance of small-scale community irrigation, drainage schemes, operation of machinery pools and distribution of nonwater agricultural inputs, thus ensuring their sustainability.

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