Socio Economic Impact of Water Crisis on Agrarian Community in District Faisalabad, Pakistan

Muhammad Asim

Department of Sociology, Government College University Faisalabad, Pakistan
Correspondence Email: masim202@gmail.com

Ali Hassan Vains

Institute of Agri. Extension and Rural Development,
University of Agriculture Faisalabad, Pakistan

Haroon Yousaf

Institute of Agri. Extension and Rural Development,
University of Agriculture Faisalabad, Pakistan

Muhammad Azam Ramzan

Institute of Agri. Extension and Rural Development,
University of Agriculture Faisalabad, Pakistan

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Abstract: Agriculture plays a pivotal role in the national economy of Pakistan. 65% of total population of Pakistan is living in villages and their major source of livelihood depends upon agriculture. Pakistan has the largest world irrigation system its irrigation strength three times more than that of Russia. But unfortunately, Pakistani farmers are facing serious water shortage problem in these days. The main objectives of the present study were to explore the effects of scarcity of canal water on the yield of different type of major crops and assess the affect of ground water on crops and its socio economic implication on the farmers' lives. A sample of 160 household farmers was selected through multistage sampling techniques. Specifically through this study, farmers' survival due to the shortage of irrigation water highly depends upon tube well water. Due to this phenomenon not only farmers have to pay lot of money in the form of fuel but also tube well water negatively affects the crops yield. The researchers also found out the socio economic problems due to the water crises such as irrigation water disputes, less cultivation, lack of interest of livestock and these notions also badly affect their crops yield as well as their socio economic condition.

Key words: farmers, irrigation, water disputes, crops and yield

1. Introduction

Water resources system is the life line for Pakistan. It is a source of life and energy. It is the most critical factor of production in Pakistan's agriculture resources. Pakistan is an agriculture country and water is the back bone of economy of the country. Pakistan has the marvelous and contiguous irrigation system that currently irrigates over 16.23 million hector of land, out of 36.00 million of cultivate land available. Out of 16.23 million hectors, 11.42 million hectors are irrigated by cannels and 4.03 by tube well and rest of 0.78 hectares by miscellaneous systems (WAPDA, 2009). During the last fifty years, water used for irrigation has increased due to increase in cropping intensities. The success of sustained agriculture in arid and semi-arid regions of the world depends on availability of the water (Ullah *et al*., 2001). Global population growth is expected to increase the demand for cereals including wheat by 1.27% annually between 2000 and 2025 (Rosegrant and Cai, 2000). To meet the projected demand for food, irrigated agriculture will require an increase of 17% in freshwater resources (Seregeldin, 1999). According to the World Bank and Asian Development Bank of Pakistan repotted that Pakistan is one of the most "water stressed" countries in the world; it is likely to face an acute

water shortage over the next five years due to lack of water availability for irrigation, industry and human consumption. India got the right to fully utilize water from the three eastern rivers; Ravi, Bias and Sutlej, while Pakistan was to utilize water from the three western rivers; Indus, Chenab and Jhelum under the Indus Water Treaty (IWT). Many intellectuals and economist argued that, if Indian's strategy of building dams on Chenab and Jhelum rivers, then there would be serious implications for Pakistan's agriculture and national security (Sharif, 2010). Pakistan is one of those 17 countries, which can face water shortage problems in the near future. According to World Bank report, Pakistan needs to build new reservoirs urgently, citing the dearth of water in the near future. (Pakeezahs, 2010).

In Pakistan, growers mostly face two problems; the efficiency of water use in crops is low under the existing irrigation practices and shortage of irrigation water which significantly affects the crop yield (Cassman, 1999). At present, per acre yields of various corps were far less than the international standards despite a very favorable combination of climate, temperature, soil and water resources. Some thinker claimed that this crisis is not brought either by nature nor by India; it is home made and we have no option except to find ways and means to face it off (Mujtaba, 2010). The Government of Pakistan's Vision for the welfare, poverty alleviation and well being of people is being come true through GDP enhancement. Water is a key source for GDP growth and poverty alleviation; therefore, the water sector gained major focus throughout the last decade. In this context government is giving special attention toward augmentation of water resources, Protection of infrastructure from onslaught of floods, significantly enhanced public sector investment and construction of small & medium dams (GOP, 2010). Many parts of the world are confronted with water scarcity, for both irrigation and human needs. Since 1950, the amount of irrigated land in Pakistan has tripled to increase agricultural production; land is not a limiting factor as there is more cultivable land available that can ever be properly irrigated. Agriculture is the main stay of Pakistan's economy, contributing 35 percent to the gross domestic product and providing 60 percent of the labor force. Moreover, nearly 60 percent of the total export of the country originates from agriculture (Alam, 2000). Irrigation has been practiced for at least 4,000 years, primarily because it allows for increased in production. It is projected that around 5 percent of agricultural land globally (264 million ha) is irrigated, with South Asia (35%), Southeast Asia (15%) and East Asia (7%) exhibiting a high dependency on irrigation water. China and India constitute 39 percent of the global irrigated area and Western Europe and United States have 13 percent, while sub-Saharan Africa and Oceania have less than 1 percent of their agricultural land irrigated (Galbraith, *et al.* 2005).

2. Importance of study

Agriculture is the back bone of Pakistan's economy and agriculture needs water as we need air to breath, but now a days Pakistan is facing crucial circumstances in this regard. India is continuously occupying all the important rivers of Pakistani farmers due to the shortage of irrigation water, if there is scarcity of irrigation water, there will be socio-economic implications. Our purpose of conducting this study was to explore the socio-economic implications on the life of the farmers due to water shortage.

3. Material and Methods

Sociology is the scientific study of behavior, attitude and perception of human being in various social setups. The present study was conducted in rural areas of Faisalabad, Pakistan. There are four rural towns in Faisalabad district i.e. Chak Jhumra Town, Samundri Town, jaranwala Town and Tandaliwala Town. A sample of 160 respondents was selected systematically from Faisalabad through multistage sampling techniques. At the 1st stage one Town names Samundri Town out of four rural towns selected randomly. Then, from the total 27 union councils (U.C) of Samundri Town 4 U.C. were selected randomly at the 2nd stage. At the 3rd stage two villages were selected randomly from each union council, and the 4th stage 20 respondents were selected each village by using systematic random sampling. A well structured questionnaire consisting of open and closed ended questions was prepared. Descriptive analysis such as frequency distribution percentage distribution, mean and standard deviation was made by using SPSS to describe the data.

4. Result and Discussion

In Pakistan both male and female have hefty and active role in agricultural development. In this study 77.6% of respondents were males and 22.4 were females in which simple majority 60% of the respondents were married. Most of the respondents 43.7% belonged to 46+ years age group and 39.6% respondents belonged to less than 35 years of age. Data regarding the family system revealed that most of the respondents 75.6% were living in the joint family system, whilst, 24.4% of respondents were living in nuclear family system. In joint family system matters are mostly headed by the males and they are responsible for the fostering of the dependents. Rural women of the joint families were occupied in

the home based work as well as agricultural activities. More than one fifth of the respondents 23.1% had above 11 years school education and 39.4% of the respondents were illiterate. Rate of women education is relatively low as compared to male. Women were 60% illiterate, if we compare with male 50.1%. This phenomenon shows that in rural area of Pakistan the education of women were not properly addressed and female were more illiterate than that of man. Momsen (2010) also investigated that women education in all developing countries is lower than man. In South Asia the figure were 66% of female adult literacy and 79% of male youth literacy. Amin, *et al.* (2010) also has consonance with present findings, he found that majority of the rural people live in joint family system in Pakistan and women participation in agricultural and livestock responsibilities were higher than those of male, but in our male dominant society women works were not only be acknowledged but also they were not given to proper weight.

Table 1: Socio-economic characteristics of the respondents

Age of the Respondents	Frequency	Percent	Mean	Std. Dev.
Less than 35	59	36.9	30.33	3.45
35-45	31	19.4	41.52	3.18
46+	70	43.7	52.85	4.55
Total	160	100.0	47.85	7.62
Education of the Respondents				
Illiterate	63	39.4		
1-5	32	20.0	4.12	0.45
6-10	28	17.5	8.82	1.45
11+	37	23.1	11.88	2.12
Total	160	100.0	8.22	2.06
Household Annual Income (R.s)				
≤ 100,000	31	19.4	87,832	7,124
100,001 to 150000	39	24.4	141,687	6,542
≥150,001	90	56.2	175,896	9,858
Total	160	100.0	139,845	12,458
Marital Status of the Respondents				
Married	127		79.4	
Unmarried	33		20.6	
Total	160		100.0	
Type of Family				
Nuclear	121		75.6	
Joint	39		24.4	
Total	160		100.0	

Data reveals that 70% of the population acquired 60,000 and above profit in rupees (local currency) per acre, when the researchers asked the lodger farmers how many amount they had to pay for per acre in the form of rent. The mean rent was 26,000 rupees per acre. In this way total income per acre was round about 34,000 rupees. Data indicates that 30% farmers had no access to their own land; they cultivate crops as a lodger and sharecroppers. Zadi (2011) pointed out that 67% of household in Pakistan had no access to land. The problem in Pakistan is not just low levels of land holdings but also highly unequal land distribution leading to a class of "land haves and have-nots". Data reveals that majority of the respondents were small farmers such as 67.2% farmers had (1-10) acre land for cultivation, while 3% farmers had 25 plus acre for cultivation. Anonymous (2005) also demonstrated these facts that about 1.7% of the farms comprised of more than 25 percent of the total agricultural land. Many owners of large holdings were absentee landlords, contributing little to production but extracting as much as possible from the sharecroppers who farmed the land. About 39% of the land was cultivated by tenants, including sharecroppers. The major source of irrigation water is canal system in Pakistan but the shortage of canal water compelled the farmers move towards tube well water. Data shows that 88.1% of the respondents claimed that irrigation water did not fulfill our required demand and now, we feel absolute water shortage for agricultural production. Wang *et al*. (2007) also found out that the most obvious response by farmers to increase water shortages was to dig tube-wells. According to International statistics, the installation of tube-wells began in the late 1950s around the globe. (Anonymous$_{2,}$ 2012) concluded that In Pakistan the total water channels available to agriculture came from three major sources i.e. surface water from the rivers, rainfall and the earth water, and also some what from sewage water and sea water. Ground water is the second major source for irrigation. About 75% farmers irrigated through canals,

l9% through tube wells, 2% through wells and remaining 4% through tanks and other sources. Because of shortage of water a large majority 85.8% of the respondents argued that their income was badly affected, due to the scarcity of irrigation water. The farmers were compelled to use modern water saving techniques and modern land leveling methods in the fields. Data exhibited that about 35% of the respondents used water saving techniques such as drip irrigation, mulching plant in blocks rather than rows, control weeds, traditional methods and group plants with similar water needs. Whilst majority of the respondents 65% had no any interest and motivation about the saving irrigation water. Wang *et al.* (2008) identified that although water-saving technologies for agriculture had been emphasized by many policymakers and researchers, the adoption rate was still very low. Despite a relatively high initial level of adoption (35% in the 1950s), in 2004, only 52% of villages adopted traditional water-saving technologies in China.

It has also been found that 76.1% of the respondents tried to use laser land leveling for saving water. Only 30% of the farmers attended the extension meetings for keeping them update for modern and innovational techniques. A majority of the farmers 70% had no any interest in such types of government awareness initiatives.

Table 2: perception of the respondents with regard to shortage of irrigation water

No	Response categories	Yes		No		Total	
		Freq.	%age	Freq.	%age	Freq.	%age
1	Feel water shortage for your crops	141	88.1	19	11.9	160	100
2	Low income due to water shortage	121	85.8	28	14.2	141	100
3	Adopt water saving techniques	56	35	104	65	160	100
4	Use Precision land leveling	123	76.1	37	23.9	160	100
5	Attend extension education meetings	48	30	112	70	160	100
6	Satisfaction with the amount of canal water	43	26.9	117	73.1	160	100
7	Ground water is suitable for your crops	128	80	32	20	160	100
8	Face water disputes with other farmers due to water shortage	65	40.6	95	59.4	160	100

Regarding the satisfaction about the amount of canal water data exhibited that 26.9% of the respondents were satisfied and majority of the respondents 73.1% were not satisfied about the amount of canal water. These results are analogous with Wang *et al.* (2008) who observed that most villages in Northern China were facing acute water shortages, and the farmer's outlook was not satisfactory. Survey results demonstrated that in 2005, 70% of the farmers reported that they were facing water shortage, whilst 16% of villages were facing severe water shortage problems. They also found that now water shortages had become more serious in the past decade. Survey results showed that from 1995 to 2004, the degree of water shortage continued to increase. The researchers also found that a huge majority of the farmers 80% told that, ground water was not suitable for their crops but we had to use for our survival because we had no any other option without it. About 54% farmers claimed that ground water had negative affect on crops while 24% farmers reported that ground water had positive affect on crops. One of the researchers Mir, (2008) found that there were total 565,000 tube wells in Pakistan; nearly 70 percent were now pumping solid water or salty water, because sweet water has been exhausted. He further argued that many water experts had warned the government that the exploitation of fossil water could lead to a disaster. More than one third 36% farmers had water disputes with other farmers due to the water shortage and these disputes were often resolved by the local political leaders and *Numberdar* (Traditional authority).

Table 3: Distribution of the respondents according to their sources of irrigation and land

Source of Irrigation	Frequency	Percentage
Canal	48	30.0
Tube well	13	8.1
Canal and Tube well	99	61.9
Total	160	100.0
Tube well Status		
Owned	100	62.5
Shared	60	37.5
Total	160	100.0
Cultivated land		
1-5	85	53.1

6-11	38	23.7
12-17	31	19.4
18+	6	3.8
Total	160	100.0

Table 4: Distribution of the respondents according to the effect of water crises on their yield

Impact of water crisis on the yield of major crops	Decreased		Increased		Unaffected		Total
	Freq.	%age	Freq.	%age	Freq.	%age	
Wheat	123	76.9	27	16.9	10	6.3	160
Rice	139	86.9	19	11.9	2	1.3	160
Sugarcane	127	79.4	27	16.9	6	3.8	160
Cotton	139	86.9	19	11.9	2	1.3	160

Data exhibits that 30% respondents utilized only canal water, 8.1% farmers irrigated their land by only tube well water. In some areas the farmers had not any access of cannel water, that's why farmers of those areas cultivated their crops on tube well water. Whilst, half and above farmers 61.9% were used both canal and tube well water for their agricultural survival. These findings line up with Anonymous$_3$ (2002) who reported that 45 million acre feet of water were added to the irrigation system from the ground water in the country. He further argued that during the last three years massive pumping out of ground water had taken place. In the past, a tube well which used to work for four hours, now pumps water out 20 hours a day," he said that this practice is unsustainable. Majority of the farmers 62.5% had their own tube well while 37.5% farmers had shared tube well connections. Regarding the cultivation of the land in acres, data showed that more than half of the respondents 53.1% farmers cultivate (1-5) acres of land, while 3.8% of the farmers cultivate 18 and plus acre land. This data shows that majority of the respondents had less area for cultivation and in real sense in Pakistan majority of the people have small pieces of land. A large majority 75% and above farmers claimed that due to the water shortage their major crops like wheat, rice, sugarcane and cotton had decreased their yield and they suffer lot of socio economic burden. Similar result found by (Anonymous$_2$, 2012) who explained that the major crops grown were wheat, rice, cotton, maize and sugarcane in Pakistan. These crops covered about 63 per cent of the total cropped area. Production of three important crops rice, cotton and sugarcane as well as 90 per cent of wheat and most of maize is virtually confined to irrigated areas due to the shortage of water these major crops affected badly.

5. Conclusion

Water scarcity is a matter of grave concern in Pakistan that affects everyone's life directly or indirectly. It is obvious that Pakistan has experienced bad strategies, bad governance, and corruption in its water management and usage system. Pakistan's large and rapid growing population and the country's existing water shortage might lead to the hunger and famine in the near future. There is need to develop all the available water resources by making small/medium and large storage reservoirs and then use this available water with out wasting a drop of water. Government should give the incentives to the farmers who have not enough investment for their agricultural purposes for enhancing the production per acre. It is also suggested that government should introduce some policies for the betterment and rehabilitation of the farmers which can reduce or minimize the rural to urban migration of the farmers.

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