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Socio-economic Impact of Waterscarcity on the Economy of Pishin Lora Basin in Balochistan

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Abstract

Water is essential for life. Water is crucial for sustainable development, including the preservation of natural environment, alleviation of poverty and hunger. Many countries are facing the challenges of rapidly growing demand, driven by increasing population and economic growth. The present study has been undertaken to analyze the current situation of water resources and its socio-economic impact on farmers' agricultural production in Pishin Lora Basin (PLB) of Balochistan. The study is based on primary data which have been collected from farmers through questionnaire. The collection of data, a sample of 300 farmers has been selected through stratified random sampling method. The main findings of the study are that the current situation of surface and ground water is very scarce; it has been found out that the available supply of water is short against the required annual demand. Water shortage led to the decline in land cultivation, drying of trees, loss in farmers' income, unemployment, losses of livestock etc. On the basis of the result of study it has been recommended that the construction of new dams, educating the farmers about the use of high efficiency irrigation system, solution of electricity problem and giving knowledge to the farmers about the modern technique of production are some measures for reducing the burden on available water resources and increase farmers production

Key words: water scarcity, poverty, sustainable development, efficiency, modern technique

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INTRODUCTION

Water is essential for life. Water is crucial for sustainable development, including the preservation of our natural environment and the alleviation of poverty and hunger. Water is indispensable for human health and well-being (Halcrow, 2007). Most of the world's food production depends on water for irrigation (Ward and Velaquez, 2008). However, many countries have to face the challenge of rapidly growing water demands, driven by an increasing population and economic growth, linked to urbanization, industrialization and mechanism (king, 2004). The resulting water scarcity is one of the most pervasive natural resource allocation problem faced by development planners. Hence, water resource management seems to have become one of the important political, social and economic issues of the present century and economists face new challenges of growing water demands and changing laws and institution (Louw, 2002). The need for efficient, equitable and sustainable water allocation policies is evident which needs to be based on innovative strategies to yield more efficient water allocation as discussed by (Walter et al., 2011).

The agriculture economy of Pakistan is facing sever challenges due to rapidly growing demand for water resources.Water is a scarce resource in Pakistan but especially in the province of Balochistan. Climatically, Balochistan ranges from semi-arid to hyper-arid condition characterized by scarce and spatially scattered rainfall, and high evaporation rates.The spatial availability of water in the province is 23 percent of Pakistan. However, most of the water runs

rapidly due to high stream gradients (Bhatti et al., 2008).

Agriculture and livestock production are the two dominant sectors contributing to the Balochistan economy, accounting for more than fifty percent of the provincial GDP. The wide agro-ecological diversity of the province permits cultivation of a large number of crops, vegetables, deciduous, and tropical fruits (Bajoi, 2004). Irrigated agriculture is depending both on surface and ground water resources. The Khirthar and Pat Feeder canals of the Indus Basin irrigation system and flood water that flows through the stream are the important sources of surface water. The ground water is available for irrigated agriculture through Karezes, Springs, Wells and Tubewells. With the availability of electricity in the 70's from the national grid system, there has been tremendous increase in the number of tubewells, which lowering the water table of ground water. Inefficient water use, wastage of surface water and indiscriminate exploitation of ground water aggravated the situation, making management of water a real complex, and a difficult task in Balochistan. The persistent drought during the last decade of 20th century had created negative impact on the availability of water and livelihood of rural communities.

Pishin Lora Basin lies in the uplands of Balochistan. Its total area is about 18,133 Km^2. On hydrological basis the basin is sub-divided into eleven sub-basin; Pishin, Kuchlagh, Quetta, Kolpur, SardarKhel, Mastung, Shirinab, Patki Shaanawz, Mangochar, Kalat and Kapoto (Halcrow, 2008). According to the census 1998 the population of Pishin Lora Basin was about 2,178,792 of which about 45% lived in Quetta city. Agriculture, livestock and fruit productions are the major sources of income in the basin. Surface and ground water is the major sources of water supply for the fulfillment of both the domestic and non-domestic needs. However due to depletion of groundwater and over-abstraction of groundwater the depletion rate of groundwater increased and the current estimates indicate an annual decline of 1-3 m per year in the alluvial aquifer and up to 20 mm annual draw down in the hard rock aquifer in Pishin Lora basin. Moreover, it has been estimated that the aquifer storage in the Quetta sub-basin will be exhausted in next 13 years in case if no appropriate measures are taken for conservation of groundwater in Pishin Lora basin (Bhatti et al., 2008). Similarly Shah et al., (2002) pointed out that although the agriculture sector is highly dependent on irrigation water in the research area of Balochistan; however because of its overexploitation and mismanagement the farmers are facing severe water shortage. Nasurullah et al., (2011) study socio-economic effects of water scarcity in Tehsil Karezat District Pishin Balochistan and pointed out that the annual rate of water table depletion is taking place in the range from 10 to 60 feet per annum. The main reason is that the traditional irrigation system like Karezes, streams and rain water harvesting have been changed; now majority of farmers irrigates their agriculture fields and orchards through tube wells pumping. Khair et al., (2010) assessed that groundwater levels in the upland Balochistan are declining at an alarming rate of 2 to 3 meters annually. They suggested that a more comprehensive sustainable groundwater management policy with the involvement of all the stakeholders is needed.

The above literature shows that water scarcity is a problem in the study area of Pishin Lora Basin. The present study has been undertaken is an initiative to quantify the socio-economic impact of water scarcity on the economy of Pishin Lora Basin in Balochistan.

METERIALS AND METHODS

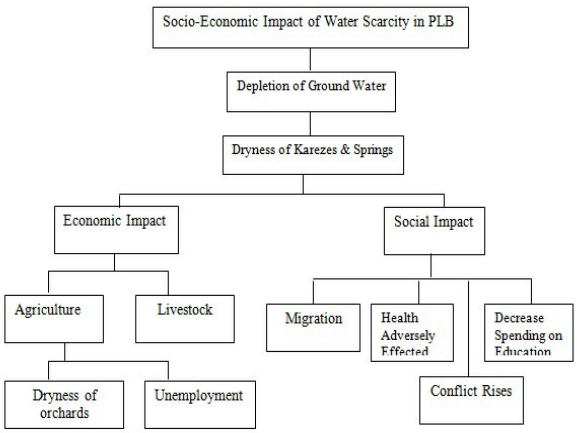
The present section provides information about the source of data, instruments of data collection, sampling techniques and methodology used for analysis of data. The study is confined to the analysis of water scarcity and its socio-economic impact on the economy of Pishin Lora Basin in Balochistan.

Sample Size

The data has been obtained from the farmers through a well-structured and comprehensive questionnaire, interviews and group discussion. As the aims of the present study were to analyze the socio-economic impact of water scarcity in Pishin Lora Basin (PLB),

the farming community of the area of PLB has been taken as a target population. PLB is consisting of five districts namely Pishin, Quetta, Killa Abdullah, Mastung and Kalat. The total population in the study area of Pishin Lora Basin is about five thousand farmers, but we have collected data from three hundred household through stratified random sampling. One hundred and five farmers were interviewed in district Pishin (Pishin district was divided into two areas, fifty five farmers in Barshore, tehsil Karezat and fifty farmers from tehsil Huramzai. Fifty five farmers in district Quetta, fifty farmers in district Killa Abdullah, fifty farmers in district Mastung, and forty farmers were interviewed in district Kalat. Each district was further divided in the clusters of Union Councils. The farmers within Union Council were selected randomly. This strategy gave the spatial coverage of the area.

Theoretical Framework of the Study



RESULTS AND DISCUSSION

This section is based on the result and discussion of the study. The section is divided into two sub-sections.The first sub-section depicts farmers' perception about the social impact of water scarcity in the study area of Pishin Lora Basin (PLB), the second sub-section presents the information about the economic impact of water scarcity on different agricultural sectors of the economy. The details are as follows:

Social Impact

Migration from Native Place

Water scarcity has caused widespread migration. This has converted a large population of settled villagers into migrants termed as refugees. A large number of traditional seasonal migrants / nomads have been forced to settle in and around places having regular supply of water. As per survey data, based on group discussion with farmers group, around 30% population migrated from their villages to other areas in the province where water and agriculture was satisfactory. Within the remaining 70%, a significant number (25-30%) is in process of thinking to migrate from the area. This migration off course has doubled the pressure on host villages giving birth to the process of depletion of their water sources. The competition of course for local work added to pressure on the job market, and the relations between the local population & the migrants has led to the situation of conflicts in the area. Since most of the family income is spent on the purchase of food, there is usually no cash surplus for buying other essentials (clothing, bedding, soap). This, together with the lack of water for cleaning purposes, has led to very unsanitary and unhygienic conditions prevailing in the houses and shelters of affected families.

Health Situation Adversely Affected

Water scarcity causes poor state of human health. A social assessment carried out in the field through group discussion indicates the overall status of health as poorer than before in PLB districts. The scarcity of water has resulted in the increase of the communicable diseases, especially water borne diseases and also in nutritional disorders in the area. The information revealed by the informants in group discussion, indicates that spending on health has decreased approximately 50% as compared to the situation before water depletion/scarcity. As a guess, the farmers mentioned that they used to spend 20% of their income on health which declined to around 10% at present. The existing health facilities in the PLB suffer from lack of adequate quality staff, poor infrastructure and the shortage of funds. Sanitary, sewerage and solid waste management facilities are almost absent in the study area of PLB.

Decrease in Spending on Education

Water scarcity causes decrease in spending on education. A social assessment carried out in the field through group discussion indicates that the overall spending on education decreases than before in PLB

districts. The scarcity of water has resulted in decreasing expenditure on education and increase in the expense on basic necessities of life such as; food. The information revealed by the informants in group discussion, that spending on education has decreased approximately 40% as compared to the situation before water depletion/scarcity. As a guess, the farmers mentioned that they used to spend 25% of their income on education which declined to around 10% at present. The reason for decreasing expenditure on education as information revealed by farmers that primary school available at village level while middle school are rare and at long distance, and the high school are at district head quarter. Children of the remote villages have to travel by bus or van. The high school at district head quarter will be at higher distance where higher cost of transportation, books and uniform plus boarding and lodging. The decrease in income due to water scarcity will leave the poor farmer community with a problem of meeting the cost of transportation, books and uniform plus boarding and lodging.

Conflicts on Rise

The water scarcity has caused a rise in conflicts among the farmers in the study area of PLB. When water was sufficient, there was no problem of conflict among the farmers, while the situation has changed and conflicts among farmers have increased due to shortage of water. As per information revealed during survey through group discussion with farmers, indicate that around 30% water conflict like water theft or free-riding has increases among farmers.

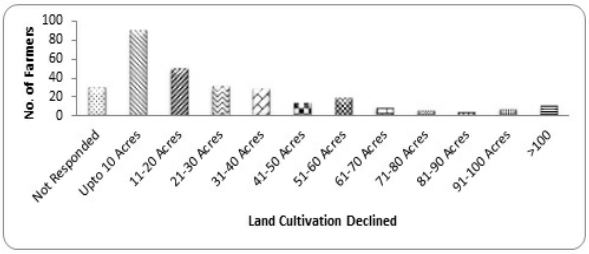
Nasurullah et al., (2011) conducted study socio-economic effects of water scarcity in Tehsil Karezat District Pishin Balochistan, and pointed that majority of people are migrated from the Tehsil to the urban centers to get jobs especially in government services and businesses, in some households few members are left their homes in search of jobs, the farmers having their own land now working as daily wages workers in other farmers' fields, Especially small landowners. Increase in poverty rate are another effect that results on the one hand the implications for provision of social services like spending on children education, health services, local traditions and on the other hand people of the Tehsil are evident of increase in crime. Majority of the crimes are robbery, dacoits and Rahzani.

Economic Impacts of Water Scarcity

From the result of survey it was revealed that water scarcity has great impacts on the economy of people in PLB. Following are the main economic impactsof water scarcity in the study area of PLB

Decline in Land Cultivation

During survey it was noted that most of the area remained uncultivated due to water scarcity. When the farmers were asked about the decline in their land cultivation for agricultural purposes. The responses of the farmers were as follows:



Source: Field survey

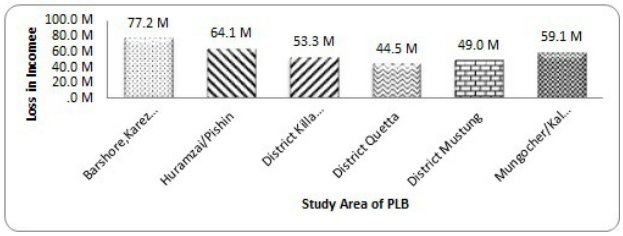
Figure 1: Farmers perception about the declined in land cultivation

Figure 1 show the decline in the land cultivation of the farmers in study area. It can be seen that up to 10 acres of more than 80 farmers is uncultivated because of the shortage of water. Similarly, 11 to 20 acres of land remaining uncultivated of more than 40 farmers, 21 to 40 acre land of at least 60 farmers turned uncultivated and 41 to 60 acre land remained uncultivated of about 40 farmers. Furthermore at least 10 farmers mentioned that more than 100 acres of their land becomes uncultivated because of water shortage.

Loss of Farmers' Income over the last ten years due to water scarcity

Due to decline of land cultivation and other several reasons of water scarcity result in the loss of farmer's income. The details are given in figure 2. It can be seen that there is a huge loss of income to the farmers in all the district i.e. Pishin, Killa Abdulla, Quetta, Mastung and Kalat districts. The results show that the combine losses in all the district of the farmers increased more than 300 million

rupees. The fall in income of the farmers has been based on the information gathered through interviewing the farmers in PLB. The rise or fall in income was assessed through the perception of farmers based on their past experience. The collection of the numerical data seemed to have posed a problem because it was difficult for the farmers to recall the exact numbers of the past as there was no record of production, cost on production and the related income etc. Therefore, simple device of farmers' perception was opted for.



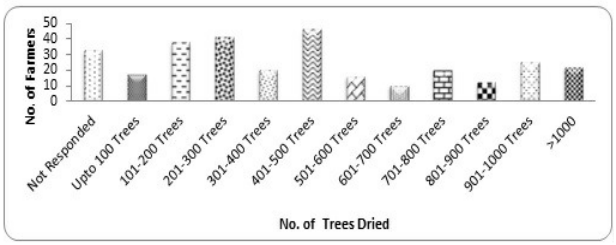
Source; Field Survey

Figure 2: Farmers perception about the loss in income in PLB (Rs in Millions)

In Barshore/Karezat tehsil of district Pishin 55 farmers said that their loss in income due to water scarcity is Rs. 77.2 million. In Huramzai/Pishin of district Pishin 50 farmers said that their loss in income due to water scarcity is Rs. 64.1 million. In Killa Abdullah district 50 farmers said that their loss in income due to water scarcity is Rs. 53.3 million. In Quetta district 55 farmers said that their loss in income due to water scarcity is Rs. 44.5 million. In Mastung district 50 farmers said that their loss in income due to water scarcity is Rs. 49 million. In Mangochar of district Kalat 40 farmers said that their loss in income due to water scarcity is Rs. 59.1 million.

Orchard Trees Dried

Because of the water scarcity thousands of trees of different fruits dried. According to the Agriculture department of Balochistan, more than 40% of apples, peach and apricots trees have dried in the different parts of the uplands of Balochistan. During the survey when the farmers were asked about the number of their orchard trees dried. The following were the responses of the farmers



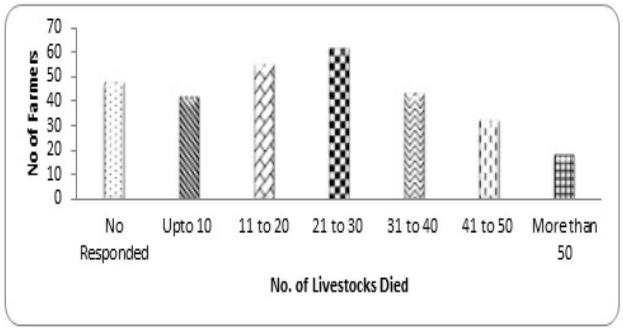
Sources: Field Survey

Figure 3: Farmers perception about the trees dried

Figure 3 shows the number of trees dried because of the water scarcity in PLB. Around 40 farmers mentioned that the number of their trees dried is in between 401 to 500. Similarly, at least 30 farmers mentioned that the numbers of their trees dried are among 201 to 300; more than 25 farmers mentioned that between 101 to 200. Likewise, 30 farmers mentioned that among 801 to 1000 of their fruit trees dried. Similarly, about 15 farmers pointed out that there more than 1000 trees are dried because of water scarcity.

Impact on Livestock

According to Ahmad *et al* (2004) that almost 92% area of Balochistan is providing grazing for around 20 million of ruminants. However because of water shortage the farmers also suffered from the loss of their livestock. The details are given in figure 4 which is as follows.



Sources: Field Survey

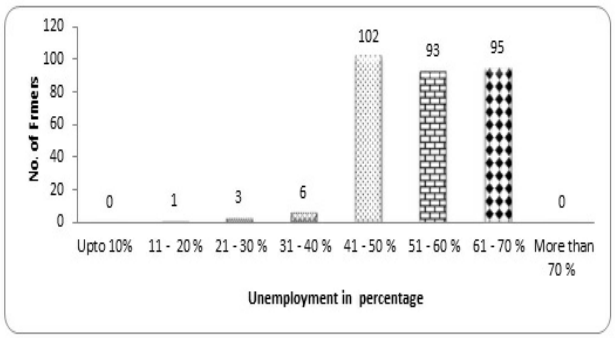
Figure 4: Farmers perception about the Livestock dried

The figure results show that because of the persistent and long period of drought in the area and water scarcity the livestock of the farmers have been died. Around 60 farmers mentioned that the deaths of their livestock are remained among 21 to 30. Similarly, 50 farmers stated that they loss 11 to 20 livestock, 40 farmers mentioned in the range of 30 to 40, and 20 farmers stated that their livestock losses are between 41 to 50.

Similarly, around 10 farmers mentioned that they lost more than 50 livestock.

Impact on Employment

Water scarcity also affected the employment rate in study area of PLB. The farmers perception about the unemployment is given in figure 5 which are as under:



Sources: Field Survey

Figure 5: Farmers perception about unemployment

Figure 5 show the unemployment rate in PLB resulted because of the water scarcity. It has been noted that 102 farmers figured out that because of water scarcity the unemployment rate in the region is in the range of 41 to 50 percent. Similarly, 188 farmers stated that the unemployment rate is in the range of 51 to 70 percent.

CONCLUSION

The main findings of the study are that the current situation of water is very poor in PLB. Regarding the impact of water scarcity, it has been found out that the available supply of water is short against required annual demand for agricultural production. This water shortage led to the migration of farmers from their native place, the health of farmers adversely affected, expenditure on education of farmers' decreases, and conflict among the farmers arises due to water shortage. Similarly water scarcity also adversely impact the economy of inhabitant of Pishin Lora Basin, which led to dryness of tubewells, declined in land cultivation, dryness of trees, loss in farmers' income, loses of livestock and unemployment etc.

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