SPCRD GLOBAL
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Sustainable Solutions

REAL

Review of Education, Administration and Law

Journal homepage: <http://real.spcrd.org> ISSN (Print): 2708-1788 ISSN (Online): 2708-3667

Effects of Climate Change on the Small Landholder's Livelihoods: A Study of Tehsil Rajanpur, Punjab

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ARTICLE DETAILS

History:

Accepted 16 May 2020

Available Online 30 June 2020

Keywords:

Climate Change, Holistically,
Qualitative Research, Disease

JEL Classification:

Q54, C25, C29, I18

DOI: 10.47067/real.v3i1.17

ABSTRACT

Pakistan is an agricultural country and majority of the population are agrarian in its nature. It is evident that due to climate changes the sector is strongly affected. Mainly the small landholders are more affected by these climate changes. The focus of the study is small landholders. To study the area holistically the objectives of the study were to find out means by which climate change affects small landholders' livelihoods, to study socio-economic problems faced by small landholders and to know cultural beliefs of small landholders regarding climate change, to see adaptation techniques opted by small landholders to survive the harms of climate change. To accomplish the objectives, qualitative research approach was used in which thematic research design was followed. Data was gathered through focus group discussion. Purposive sampling technique was used to select respondents. In it interviews were conducted from 70 respondents. The study resulted that extensive floods, changes in the rain pattern and increased temperature are the means by which crops are being more vulnerable to the disease. It was also found that small landholders strongly believed that the climatic changes were divinely controlled and regulated so these changes are the result of their sins and cruel deeds and they could not control it and they did not use the new technology.

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1. Introduction

Climate change is generally thought as the most multifaceted and severe environmental problem

that human society faces (O'Brien, St. Clair & Kristoffersen, 2010). Earth climate is now altering more rapidly than at any end in the past. Internationally climate change has previously resulted in a broad variety of harmful impacts on the sector of the economic life that is likely to develop in the upcoming decades. Climate Change is the alteration in weather conditions in a numerical way over the period of time. This change in weather conditions may be natural or artificial in its nature. In under developed and low-income countries, a majority of folks live in country area where climate changes have great affect their daily lives.

The oceans have captivated most of the increased temperature; the top 700 meters (about 2,300 feet) of ocean had showed warming more than 0.4 degrees Fahrenheit since 1969 (Levitus et al. 2012). The Greenland and Antarctic ice sheets are decreased in accumulation. Data from NASA's *Gravity Recovery and Climate Experiment* demonstrate Greenland that lost a standard of 286 billion tons of ice per year between 1993 and 2016, while Antarctica lost about 127 billion tons of ice per year throughout the similar time phase. The speed of melting of Antarctica ice accumulation tripled in the previous decade (Wagner, 2018). Worldwide sea level has risen to about 8 inches in the recent century. The pace in the last two decades, however, is almost double that of the very last century and is being accelerated slightly every year (Nerem et al., 2018).

According to NASA (2001) due to the flaming of fossil fuels like coal, natural gas and fuel due to ocean and trees about half of the carbon dioxide is absorbed and the rest of it remains in the air.

On the Earth, human actions are altering the usual greenhouse. Over the previous century the flaming of fuels like coal and oil had been greater than before the absorption of distinctive carbon dioxide (CO₂). This happened since the coal or oil flaming process combined carbon with oxygen in the atmosphere to create carbon dioxide. To a minor level, the deforestation of land for cultivation, manufacturing, and other human actions have been greater than accumulation of greenhouse gases.

Worldwide climate change has previously had visible special effects on the surroundings. Glaciers have shrunk, ice is breaking up on the rivers and lakes, plant and animal ranges have shifted, and crops are ripening sooner. Effects that the scientists predicted recently due to climate change are occurring now: melting of sea ice, accelerated sea level and longer and more intense heat waves. An important warming tendency of about 0.57°C in the annual mean temperature was experiential in the last century from 1901 to 2000 in Pakistan. This boost is lesser than the mean annual temperature increase of 0.75°C in the recent century in the South Asian region (Ahmed & Suphachalasai, 2014).

A faster trend of warming, with the rise of 0.47°C, was observed from 1961 to 2007. The warmest year recorded till 2007 was 2004, and the maximum rise in temperature was experiential throughout winter while the temperature has ranged from 0.52°C to 1.12°C. This is in agreement with the distinct pace of warming which was observed over the South Asian region in the decade 1998–2007 which was credited to boost in winter temperature and post monsoon (rain system in the South Asia) changes. According to the Pakistan Meteorological Department (PMD) station statistics from 1951 to 2000 an increasing trend in the yearly mean surface temperature was experiential all through the country (Farooqi, Khan & Mir, 2005).

Agriculture in Pakistan is considerably harmed by short-term and long term climate inconsistency. In the Global Climate Risk Index Pakistan is one of the most climate vulnerable countries. Pakistan has a wide range of characteristics and climate. Due to the arid climate and dependency on water from the glacial melting in the northern areas, the climate change threats are exacerbated in the

country. Due to the climatic changes economy of the southern Punjab which is mainly based on agriculture is affected very badly. Most of the inhabitants are associated with the crop growing and domestic animals so both of these fields are severely affected due to climate change as described by Rehman et al. (2018). Numerous folks consider agriculture as the most affected sector due to climate change (IPCC, 2007). According to Kurukulasuriya and Rosenthal (2003) due to increased climatic changes such as flooding, droughts and temperature variability, agricultural losses have increased.

According to Strauss and Orlove (2003) anthropology has given voice to local account of climate change by emphasizing combined experience and cultural framing, increasing the debate away from the vast spheres of earth sciences, policy debates, and media narrative. Visionary and sensory perceptions are the fundamentals of the folk epistemology of climate. Important folk narrative was related to the traditional perceptions about the climate change. Majority of the folks responded observances to old ways in which they believed that climate change was due to the evil deeds of the people. Modernization all the way through Western world has changed the perceptions that the climate change is a scientific phenomenon. However, about all participants identified climate change as divinely regulated system, regardless of whether the source was air pollution or deforestation. The local people in the rural areas perceive that climate was changing due to curse of and disobedience to Allah as has been described in the Holy Quran at different places in Surah Al-Baqara, ayat 102 and in Surah Hijr, ayat 22. Vulnerability to the severe natural stresses is the main reason for the acceptability of religious perspectives.

The knowledge of what human civilization calls 'primitive' religion might be disintegrated and dissolve the scepticism of the intimate connection of early religions to food production. This necessitates the studying of tribal rituals in orienting and shaping other social practices (Gose, 1994). Gordon (1936) maintained that societies had subliminal, progressive and conservative tendencies, self-destruct and re-creative abilities for triggering new environmental paradigm by including elements of social change. According to Jenkins (2013) and Bergmann (2009) climate changes construct the perceptions about God and the holly images and related practices.

Fafchamps (2000) states usually food security depended on the access to the resources and income so that they can fulfil their needs of agriculture. Climate changes not only upset the livelihoods of people but also lessen the development of the poor countries. Intense rainy season at the time of harvesting crop affects the whole crop and causes the worse impact on the livelihoods.

Like the Himalayan glaciers and the Indus River Pakistan's climate change includes increase in the variability of monsoon season which has decreased the water storage capacity during harsh drought years and the severe events like floods (Islam et al., 2011). Prevention and future concerns for climate change as described by Chaudhry (2017) are development or the uses of the verities of the crop like mustard that can tolerate the heat. Increase in the use of adequate irrigation methods can improve the water distribution system. Improved water distribution system with an adequate awareness can support in these climatic changes.

According to Luqman et al. (2017) for the people that reside in the rural areas and are related to the agricultural sector and experience the heavy rainfall patterns are affected by the harshness of the climatic changes.

The rural livelihood of the people in Pakistan totally depends on the agricultural activities in direct or indirect ways like the other south Asian countries. Pakistan is the seventh most vulnerable country due to climate change. People are facing problems due to the natural hazards, slow yielding

crops, soil erosion and decreasing the size of farm under management. The study is planned to access the impacts of climate change on the rural livelihoods especially in the district Rajanpur of Pakistan (The Express Tribune, 2018).

Table. 1. Codes and Sub Codes

Domain	Final Codes and Sub Codes
Knowledge and Belief about Climate Changes	Knowledge and Belief about Climate Changes (KBCC) - KBCC-Religious and Cultural Beliefs - KBCC-Pollution
Socio-Economic Problems	Socio-Economic Problems (SEP) - SEP- Food Insecurity - SEP-Devastation of Crops - SEP- Financial Problems - SEP- Social Isolation - SEP- Education of Children - SEP-Health Problems
Prevention and Future Concerns	Prevention and Future Concerns (PFC) - PFC- Preventive Mechanism - PFC-Crop Diversification - PFC-Change in Crops - PFC-Off-farm Jobs - PFC-Decrease of the Size of Farm Under Management - PFC-Increase of the Size of Farm Under Management - PFC-Change in PlantingDate - PFC-Planting of Short Season Variety Plants -PFC-Use of Fertilizers (Extensive) -PFC- No Adaptations

Table. 2. Demographic Characteristics of Respondents (N=70)

Demographic Variables	Total Sample N	%
Gender		
Male	57	81.4
Female	13	18.5
Age		
< 30	7	10
31-40	43	61.4
41-50	16	22.8
>50	4	5.7
Education Attainment		
Illiterate	62	88.5
Primary	05	7.1
Secondary and above	03	4.3

Monthly income in PKR		
< 5000	2	2.85
5001-15000	9	12.85
15001-25000	13	18.57
25001-35000	32	45.71
>35000	14	20
Type of House		
Kacha	31	44.28
Pakka	23	32.85
Mixed	16	22.85

2. Theme 1: Beliefs about Climate Changes

In this research, lack of knowledge was emerged as dominant theme. Majority of respondents demonstrated lack of awareness about climate change and its management. Across the research, the respondents were unable to give a correct definition of the climate change. The researcher asked the questions to the participants to know their beliefs about the climate changes. Different participants had different response about the climate changes but religious beliefs were the most frequently used code of the theme. The respondents expressed that climate changes were due to their sins and their disobedience to the will of Allah. One of the respondents said,

‘When we did evil deeds, Allah punished us. Our crops became destroyed due to pest attackers, the flood etc. When Allah is happy He sends to rain and when He is angry then first He stopped the rain or sends to rain so heavily that destroyed the crops.’

Another respondent said

“When Allah is happy He sends to rain and when He is angry then first He stops the rain or makes rain so heavily that causes crops to be damaged. Allah is the creator of the whole world and He Himself regulates the whole system. When we do evil deeds, Allah punishes us. Crops are destroyed or there comes the flood”.

It was also found that the respondents were claiming that pollution was another reason for climate change. Pollution from the vehicles and factories directly polluted the air and consequently the whole sphere of earth was harmed.

There was another group of people in the targeted area. They claimed that there were not any changes in the climate. To them this was a natural phenomenon and occurring in cyclic way. One of the respondents said that

‘I do not observe any changes in the weather. The summer season is the same as was the last year because the crops take the same time to reap as in the last year.’

3. Theme 2: Socio-Economic Problems

To see the effects of climate changes on small landholders, the respondents were asked different questions. It was found that there were a considerable amount of effects on the lives of small landholders. They claimed that they were facing food insecurity during the last decade. Majority of the respondents were agreed that due to the climate changes their crops and livestock were more

vulnerable to disease. One of the respondents said that

“I sow cotton as secondary crop and due to the weather changes the cotton crop has become more vulnerable to the disease and pests”.

The climate changes overall disturb the crops of the small landholders. One of the respondent said that

“Flood is the hard-hitting source of crops devastation when the secondary crop is ready to harvest flood destroys the crop and we are with empty hands”.

In this research it was found that due to these climate changes the majority of the respondents faced financial loss. During the data collection it was found that majority of the respondents were relying on the agriculture and suddenly climate changes affected their lands and they faced the economic deprivation. One of the respondents said

“Our children are working in Karachi due to the crop failure. They could not join us in different ceremonies of happiness and sorrows. I have become old and now it is difficult for me to run the family while my children are out of station”.

In our research, education of children was another important sub-theme. The respondents discussed that availability of education for their children was their basic right but they were unable to provide basic needs to their future generation. One of the respondents said that

“Due to lack of financial assets my children are working in the field or with the cattle and are not going to school. So the children grow the cattle big. When they produce their offspring they divide the animal by 50 per cent. I consider it more productive activity than sending my children to schools and educating them for years. At the end they will be unemployed”.

In the research, a health issue among the small landholders was another theme. The respondents discussed that due to climate changes their health was also affected and majority of the respondents did not have the enough economic resources that they could cure the diseases. One of the respondents said that

“I am suffering from respiratory disorders (i.e. asthma), my wife is affected by eye diseases and my son is affected with the skin diseases. These diseases are common in our area but due to low economic status majority of the people could not have access to health facilities.

4. Theme 3: Prevention and Future Concerns

The respondents cooperated with the researcher and actively participated in the process of data collection process. The researcher asked the different questions regarding the prevention of the climate changes and its effects on the small landholders. The respondents highlighted the different mechanisms to tackle the issue. The most important theme that was placed first was the Crop Diversification. Majority of small landholders were not diversifying the crops due to unawareness. One of the respondents said that

“I have diversified the plantation of crops with Daal Moong and seasonal vegetables from which I am earning more money than from the traditional crops. So, I have shifted from cotton to the seasonal

vegetables. Most of the farmers of our area donot shift to the vegetables because they are unaware of the modern techniques of vegetation”.

A related subtheme was changes in crops to avoid the harms of climate change. During the Focus Group Discussion it was found that majority of the respondents did not have the mental capability to change their crops and cultivate another resistible crop. One of the respondents said

“I have changed from cotton crop to the sugarcane crop because the cotton crop was most vulnerable to heat and pests. The sugarcane was not harmed easily by the changes unless the changes are more diverse”. He further said that majority of the people were attached with the traditional crops and did not change the crops.

The researcher probed that due to climate changes, were they attached with secondary source of income. It was found that some family members did off farm jobs to fulfil the needs of their family. One of the respondents said that,

‘I take care of the land and the crop and my sons are providing services in Karachi and working in the mills to run the breed of the family.’

In our research, decrease of the size of farm under management was the other key subtheme. The respondents discussed that they had not decreased the farm under management as their farm was the surety for their yearly food. Another respondent said that,

‘My land is the source of wheat and animal food for the whole year. I do not get any financial advantage from the land but the land is important for the survival of my family.’

A related subtheme was an increase of the size of farm under management. During the focus group discussion (FGD) the respondents discussed that they got some extra land on lease for agriculture. One respondent said that,

‘I was inherited the land from my father. This land is home and grave for my family. I also work on percentage of the crop and sometimes pay rent for the land. My son is working on land as Mustajir and pays the owners with money at the end of the season or divides the crop. But due to climate change his economic condition has become very weak.’

Change in the planting date emerged as another important subtheme. The respondents discussed that they had changed the date of planting the crops to compete with the climatic changes. Changes in the climate were causing the crops to ripe early.

‘I have started to sow the seed late to harvest the crop on time. Due to changes in season the crops are ripped earlier so the cropping and harvesting time and duration are changing.’

Planting of short season variety plants was another important subtheme. The respondents discussed that shorter season variety plants were more compatible with the area although the practice was very less popular. In this way they could get more profit and less harmed by the frequent floods in the area. One respondent said that,

‘I have adopted short season variety plants to adopt to be climate change effects during the last year (2017-18). Seasonal vegetables and daalmoong are more profitable than the traditional crops

(wheat, cotton, sugarcane) and the land condition is the most suitable for the vegetables.'

Extensive use of fertilizers was the most common subtheme. The respondents discussed that they used extra fertilizers in the crops but they were getting no satisfactory results. One respondent said that,

'I have used two extra bags of fertilizers in the field but the productivity of the crop is getting low years after year. Extensive use of fertilizers can manage the nutrition in the soil but severe weather condition is the actual factor behind the decreased productivity.'

A related subtheme used during the research was no adaptation. During FGDs very few respondents (n=4) discussed that they did not adopt any technique to minimize the harms of climate change.

"I have not adopted any technique to lessen the harms to the crop. All the happenings are from Allah and man cannot change the divine writings".

5. Discussion

The purpose of this research was to make dugout for the cultural and religious understandings of climate change, effects of climate change and the techniques used by small landholders in tehsil Rajanpur. Religious and cultural understandings of people were discussed in FGDs. The researcher selected the 70 respondents for gathering the in-depth view of the respondents. The questions were divided into three domains (i) Knowledge and Belief about Climate Changes (ii) Socio-Economic Problems and (iii) Prevention and Future Concerns of climate changes. The secondary themes were highlighted in the coding scheme. It was found that majority of the respondents had non-scientific knowledge or lack of knowledge about the climate changes (Rehman et al., 2018). They believed that climate changes were the result of their sins.

Climate change affects the small landholders through less or no rain and also through the usual rain during the year. Many of the rural areas are surrounded by the Indus river and facing the problem of flooding every year. Temperature is increasing and due to the increase in the temperature crops are more vulnerable to the disease. Skin and eye diseases are getting more common. According to Schlenker and Lobell (2010) climate change has a great variability on the agriculture it is expected to manifest through changes in water regimes and land specially changes in frequency and intensity of flooding, water shortage, plant diseases, livestock, low and weak crop production directly cause decrease in the livelihood of rural farmers.

There were a number of socio-economic problems faced by the small landholders such as food insecurity due to devastation of crops. Small landholders had to face social isolation due to financial issues. Schooling of children and health problems were the basic issues faced by the small landholders due to emergence of financial problems due to unpredictable climate changes in Rajanpur, Pakistan.

6. Conclusion

The results pointed out the culturally based conceptualizations of climate change as punishment of their sins (saza). To the small land holder of tehsil Rajanpur this condition could be treated by seeking mercy of the divine powers and it is rarely believed that pollution and manhandling of climate were the main causes of climate change. Adaptations to climate change were entirely based on the beliefs of the folks. NGOs were also working in the rural areas of tehsil Rajanpur which were

influencing the small landholder by cropping pattern and crop diversification. Climate change was affecting the social ties when small land holder had to leave off farm jobs in the industrial cities, due to which they could not take part in the social events.

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