

Effects of Climate change on the Rural Livelihood: A Sociological Study



Muhammad Nafees Ashraf	M. Phil Scholar department of Rural sociology University of Agriculture Faisalabad nafeesashraf929@gmail.com
Muhammad Kamran	M.Phil Scholar, Department of Rural Sociology, University of Agriculture Faisalabad jhammatkami@gmail.com
Laiba Tahir	M.Phil Scholar, Department of Rural Sociology, University of Agriculture Faisalabad laibatahir641@gmail.com
Muhammad Arqim Ghumman	M.Phil Scholar, Department of Rural Sociology, University of Agriculture Faisalabad charqimghumman@gmail.com

Abstract: *Current study has been designed to check the effects of climate variations on rural livelihoods. The development of nations around the world is proven to be at risk from climate change. The production of agriculture in Asia's developing nations is predicted to suffer significantly from climate change in the future. Pakistan is one of those nations that are suffering from climate change. The country is already struggling with issues like poverty and food security, which pose a threat to the expansion of agriculture. Climate change is worsening these issues because it causes water shortages to last longer and slow down economic growth. The economy of Pakistan is heavily reliant on agriculture, and climate change is a major source of worry. In these days' changes of climate have bad impacts on the sector of agriculture, due to climate changes Agriculture and livestock sector is affected badly. Change in climate condition's also effect to our social, natural and cultural resources. It also becomes the reason of rising temperature and lot of other problems for human beings as well as for agriculture and environmental sustainability. Furthermore, it also a major cause to lack of food availability, accessibility, production of food related items and soil erosion. On the other hand, rise in temperature push to agriculture and livestock disease. Due to climate changes Due to their reliance on the output of their farms, which is having a significant negative impact, Pakistani farmers are dealing with a great deal of hardships. This study was helped out to understand and identify the influences of environmental changes particularly in district Layyah. This study was conducted in district Layyah. Multistage sampling was used for the collection of data. Three union councils was selected at first phase by using convenient sampling methods at second phase six villages was selected. At third phase, 150 respondents were designated randomly and get data (25 respondents from each village). Data was gathered by using interview schedule and was analyzed by using SPSS and presented in the form of descriptive and inferential statistics. Data shows that 62.0% respondents observed the effect of climate change on reproduction for the some extent while 5.3% respondent observed no change. findings reveals that 46.7% respondents observed the influence of environment variation to chance of disease occurrence on livestock for the great extent 76.7% respondents observed that crop productivity badly affected due to climate change. On the bases of findings it was concluded that Pakistan is facing is climate change that affects the crop productivity and ultimately livelihood of farmers that is directly associated with the crops and livestock.*

Keywords: Climate Change, Livestock, Livelihood

Introduction

Climate change is a major threat to Pakistan at present. Climate change has exacerbated the threat to cattle, crops, and human livelihoods. Due to its adverse effect on human health and food security, climate change disproportionately affects the poor (Huq et al., 2006). Agriculture is a major economic sector in Pakistan. Approximately 70% of Pakistan's population resides in rural areas, where most people depend on agricultural production. Pakistan and other developing nations are currently affected by land deprivation and other environmental issues such as soil erosion, loss of soil fertility, flash floods, and deforestation due to climate change (GOP, 2021). The increase in temperature might result in an increase in pests, diseases, and crop attacks. Due to this condition production in agriculture is badly affected. These results produced food insecurity in rural areas. Another condition the increase in temperature, severe rainfall cause produced disturbance in the climatic condition and puts negative impact on the livelihood of rural areas people, for their livelihoods those are directly and indirectly depend on the agriculture crops (Sadat *et al.*, 2011).

In Pakistan there are two different seasons for growing crops Rabi and Kharif. Tobacco, wheat, legumes and mustard included in Rabi crops and Rabi fields crops season is start from November and end April. Rice, cotton, sugarcane and maize consist of Kharif crops fields and start from May to October. Pakistani farmers are elderly and have limited academic education. In villages, adolescents pursue nonfarming activities in place of the traditional farming methods practiced by their ancestors; Pakistan is characterized by these traits (Siddiqui *et al.*, 2012). In 2007 according to 4th evolutionary report variability (IPPC) the increased in average global observation by warming unequal, ocean temperature, melting of ice well-known and increase global exactly the temperature of sea surface (Annon 2007).

Effects of climate changes largely spread on socio-economic and environmental scenario

that's contain on resources of water and food security, human health, biodiversity and type of earthly environment. Severe shortage of water or flooding come from the changes in climate. Causes of melting of glaciers are soil erosion and Flooding. Crops growing seasons is badly effected by rise in temperature, that's put bad effect on food safety and take many disease factors. These factor putting on severe risk on the life of people in the result of malaria and dengue fever like diseases (Husain and Rao, 2014). The greenhouse gases are the mixture of CO₂, CH₄ and NO₂. The increase in heat of sun in the earth atmosphere, because the greenhouse gases is increased after this condition the heat is return back in the space. The increase in heat is follow the greenhouse gases, that's all climate change result. The most extreme change in environment is understood in flood of 2010& 2011. During the flood of 2010 & 2011 thousand villages of Pakistan is damaged, round about 3.4 million hector area of agriculture land is destroyed. A loss of 1764 human life and 1.85 million houses were damaged. Totally 8.9 billion rupees was used in reestablishment off effected area. In statistically result KPK province is most hit in flood. The 1156 people vanished their lives, 0.2 million houses smashed and 2356 people were affected. Country is faces problem socially, politically and economically in the result of economic disturbance (Mustafa, 2011).

Approximately 70% of the labor force is dependent on agriculture. As a result of climate change, impoverished farmers are confronted with a variety of obstacles to their subsistence. As a result, they have increased the adaptability of the forming sector, ensured food security, and reduced rural poverty through their efforts to properly implement an alternative climate change mitigation strategy (FAO, 2011). More than 600 million people of rural areas affected by climate change that is depend on the livestock and their source of income is livestock. Rain fed crops and hunting production is reduced by climate change. Due to this common shortage of water is badly affected on the livestock production and this situation can take different

disease on the livestock. Related to livestock major crops grown and system of livestock is badly affected by major changes in climate changes (Thornton *et al.*, 2002).

Climate change affects crops in three ways. First, variations in precipitation length and temperature affect soil moisture. Second, an increase in temperature has an effect on agricultural productivity. Suitable environmental conditions are required for plant growth. A little variation in temperature has a negative influence on crop yields. Thirdly, an increase in carbon dioxide levels enhances the development of certain crops (Houghton *et al.*, 2001). In Asian countries, Measures the consequences of environmental changes easily. In those days' change of temperature tells about the change of climate change in all Asian countries in next year. The Cooler area all of the world change in to the warmer seasons. This situation can take many changes in the agriculture. During wet season chances of rainfall are increased, due to increase of rain falling is cause of flood. As many countries become drier in those days. These all changes in climate change are threat for agricultural productivity and economic growth of Asian countries (ADB, 2009).

A successful economy depends on a number of factors, including agriculture, fishing, the ecosystem, infrastructure, water resources, and human health. Environmental change has a significant impact on these, which completely disrupts the manner of life in the afflicted area.

Climate variation is the term used to describe a shift in weather over a given time period brought on by changes in the environment or human activity (Anon, 2007). As a result of human activity that alters the atmosphere, such as greenhouse gas emissions, it also refers to a shift in climate that lasts for decades or more (Oxfam, 2009). Human activity has increased the number of gases in the atmosphere, which has increased atmospheric heat. The ocean and trees absorb half of the gases, with the remaining gases building up in the atmosphere (Afzal and Akhtar, 2013).

Due to the impact of season-related harm events,

Pakistan is ranked 12th on the global weather hazard map for 2014 (Snoke *et al.*, 2013). Since the first part of the nineteenth century, the average temperature along Pakistan's oceans has increased by 0.6 to 1.0oC, while rainfall in ocean areas and uncultivated land south of 30N latitude has decreased by 10-15 mm (Farooq *et al.*, 2004). Over the past 40 years, precipitation during the hot and cold seasons has increased in Pakistan's northern portion, particularly in the Himalayan mountains.

Although the overall drop in output is predicted to be between 3 and 16%, developing nations may experience a 25% decline by 2080. By 2080, product increases of 8% to 6% will be milder or even positive in European nations with lower temperatures. India and other South Asian developing nations may experience product declines of between 3% and 40% during this time (Mahato, 2014). People all throughout the world have been impacted by the current weather changes since they are affecting climate change and, for some, are a matter of life and death. It is a fact that although annual carbon dioxide emissions in developing nations have not increased, they are suffering more from its effects (Daze, 2011; Van Aals, 2006).

The frequency and intensity of extreme weather events such floods, droughts, storms, and cyclones are predicted to rise due to weather variance (Mirza, 2003; Field, 2012). This is a result of some sensitive regions' limited exposure, which helps with both maladaptation and rapid population expansion (Hay and Mamura, 2010). Global climate change will have an impact on food production, and an increase in heat will specifically shorten the growing season for crops and reduce yields. Products may be directly impacted in nations where temperatures are close to the physiological maximum warming (IPCC, 2007).

Food insecurity could be a sign of global warming's impact on agriculture products, developing country commerce, and the prevalence of hunger when determining the impact of climate change. The number of people who are hungry has increased recently, and according to UNO population estimates, the world's population will reach 9.1 billion by

2050. However, due to climate change in emerging nations in Asia and Africa, agricultural productivity would decline by 15 to 30 percent (Hoffmann, 2011). Pakistan, the second-biggest nation in South Asia and the 36th largest in the world, has 79.6 million hectares of land, of which 22 million are used for agricultural agriculture, of which roughly 19 million hectares are used for the cultivation of rice and wheat. About 86% of farmers own less than 5 hectares of land, and only 5% own more than 10 hectares (Govt. of Pakistan, 2010). When it comes to both population and agricultural output, Punjab is the largest province. Punjab has a developed canal system for irrigation and is surrounded by five rivers.

In Pakistan, Rabi and Kharif are the two most well-known harvesting times. Kharif crops are grown from May to October, and Rabi crops are planted from November to April. These two seasons influence Pakistan's agricultural sector. 9.05 million hectares of wheat, the Rabi crop, were planted in 2016–17, yielding a total of 25.750 million tons. In 2016–17, 6.849 million tons of rice were produced during the Kharif season on 2.72 million hectares. The production of grains like wheat and rice is crucial for ensuring food security, and wheat makes up 9.6% of all agricultural value added. The majority of the area used for the cultivation of rice and wheat is unfavorable, and this unfavorability is caused by the lack of water, changes in the monsoon's pattern, and government plans for subsidized prices for crops and support prices for raw materials (Govt. of Pakistan, 2017).

Climate of Pakistan

Pakistan is located to the north of countries that are classified as tropical, between latitudes 23 and 38 north and longitudes 60 and 80 east. The climate is characterized by a significant amount of fluctuation in temperature across all months and days of the year. In the winter months, Pakistan is known for its extreme cold, while in the summer months, it is known for its extreme heat. Two thirds of the farmed land is located in climates ranging from semi-arid to desert, while the remaining one third is located in a small region of north-east Punjab that is related to Kashmir and experiences sub-humid to humid weather. The survey region falls inside the semi-arid to sub-humid Agro Climatic region, according to the moisture map (M1) (Chaudary and Rasul, 2004). July and August experience the hottest monsoon conditions. The weather during the monsoon season, which lasts from July to September, is typically influenced by patterns created over the Bay of Bengal. Due of their westward war pattern relying on their power, they enter Pakistan through India. The south western stream of moisture from the Arabian Sea is another factor in hot month precipitation. Both monsoon and moisture rain elements drive precipitation and produce heavy rainfall. The rice crop depends heavily on the monsoon days' 10 mm of rainfall. The annual rainfall and average temperature are depicted in Fig. 1.1 as they varied from 1981 to 2022.

(a) Annual Rainfall (mm)

b) Annual Mean Temperature (°C)

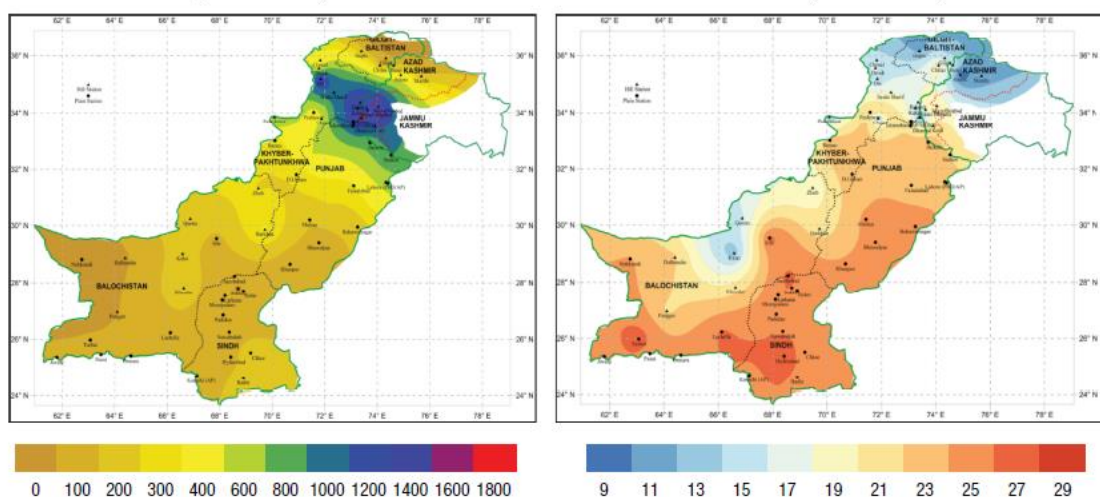


Fig. 1.1: Pakistan's Climate variation from

1981–2022

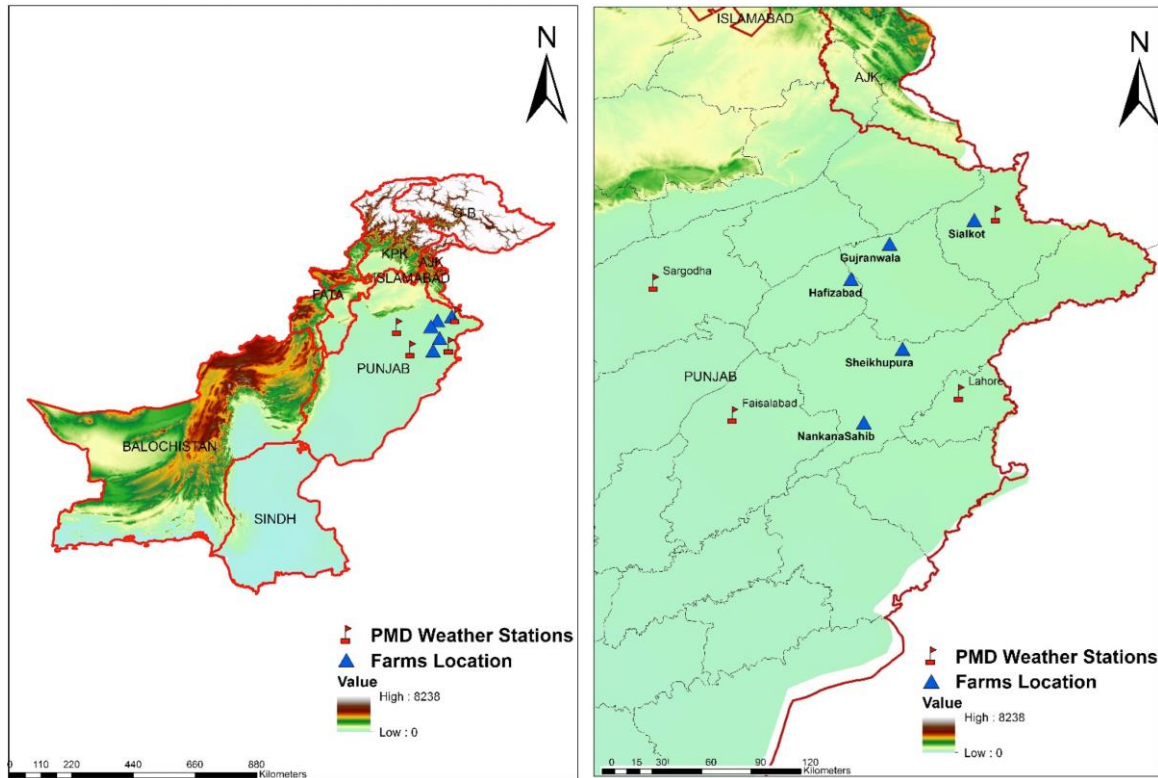


Fig. 1.2: Location and elevation of integrated assessment study region

Climate Issues and Problems for Agriculture in Pakistan

Weather change and Agriculture are interconnected (Parry *et al.*, 2007). According to Funk *et al.* (2008) and McCarthy *et al.* (2001), global warming has had a significant impact on the ecosystem, hurting agriculture through rising precipitation and glacier melting. Agriculture places a significant load on the weather by supplying it with food and fiber, even while the weather is a key determinant of agricultural output. The risk that weather change may significantly affect agricultural yield has been stated by federal institute and others, assuming the fundamental significance of agriculture in human wellbeing. Over the past few years, research on weather change and agriculture has focused a great deal of emphasis on this issue (Lobell *et al.*, 2008; Fischer *et al.*, 2005).

Pakistan, like other developing countries, is primarily dependent on its natural resources for income. Poor management of these natural resources will have an impact on the economy and income security of the country, widening the gap between the rich and the poor. Scientists

predict that weather change would have an impact on agriculture, the economy, and the income of the population of developing countries like Pakistan, where the majority of the population depends on weather-sensitive industries like agriculture and forestry for a living. Inequalities in access to food, water, and health are caused by the poor quality of fresh water supplies, their biodiversity, and desertification. These factors mostly affect the most vulnerable members of society. The capacity to alter circumstances depends on having access to resources, technical and scientific knowledge, information, expertise, infrastructure, institutions, and equality; as a result, it varies by region and socioeconomic class. The major environmental issue related to weather change is sustainable development (Wolfe *et al.*, 2005).

More over two thirds of Pakistan's population lives in villages, where agriculture continues to be the main source of income, contributing 18.9% of the country's GDP and employing 42.3% of the labor force. More than 75% of the value of the entire crop product is made up of the

following crops: cotton, wheat, rice, sugarcane, maize, fruits, and vegetables (Govt. of Pakistan, 2018).

Food security is ensured by the agricultural sector, which also reduces poverty. Evapotranspiration rises due to atmospheric heat, increasing the need for irrigation and crop warming pressure. The development of short-term crop types and timing of sowing may lessen the detrimental impact of weather risk. In Pakistan's semi-arid and dry regions, particularly Sindh and Baluchistan, the low/poor land fertility is particularly vulnerable to weather change because low rainfall increases evapotranspiration, which causes drought. According to Aggarwal and Sivakumar (2011), a temperature increase of 1°C could result in a 5-7% decline in wheat productivity. According to another report, wheat output grew in the humid part of Pakistan while it climbed by up to 6-9% in the semi-arid and sub-humid zone (Sultana & Ali, 2006). Swat district, KPK, Pakistan's wheat production could decrease by 7% and 21% with a 1.5°C and 3°C heat increase, but Chitral, Pakistan, saw increases of 14% and 23% (Husnain & Mudassar, 2007).

Rice production would decrease by 15% with rise in heat in semi-arid region of Pakistan (Ahmad *et al.*, 2013). Low rainfall may have a negative impact on agricultural yield in addition to the rise in temperature. The 6% decrease in rainfall will have a negative impact on Pakistani farmers and may increase net water supply by up to 29%. Because of the lesser rainfall, fewer fruits, vegetables, and cereals are produced.

Farmers who raised livestock and those who raised crops employed various ways to mitigate the risk of climate change. These adopting procedures are made to adapt the timing of planting for various crops in order to reduce the danger of weather change. In an effort to mitigate the risk posed by climate change, they are also attempting to employ crop types that are stress-tolerant (Smit & Skinner, 2002). Adoption metrics include planting dates, fertilizer applications, irrigation system plant kinds, and cultivation techniques (Challinor *et al.*, 2014). Using these adaptation strategies presents challenges for the farmers (Porter *et al.*,

2014). These proactive steps could lessen the impact of weather volatility. As opposed to individuals who do not employ these adoption tactics, peasants and farm households who apply them may be able to cover the economic risk associated with agriculture and animals.

Significance of Study

In Pakistan climate change is occur by increase in human population and migration of people rural to urban areas. Value of livestock is rise because this is necessary for food security. Change of climate change is severe threat for Agriculture and livestock. Farmers of Pakistan are badly affected by climate change. Rural household farmer's faces many hardships of food security. An estimated that, temperature will increase two to three degree centigrade in next years. The duration of rainfall is change, annual ratio of rainfall increased total in future. Assume that from the Asian countries Pakistan is more affected by environmental. The agricultural sector of Pakistan's economy is heavily dependent on agriculture, and climate change has had a negative impact on its output.

The primary source of food and a means of subsistence for the majority of the population in Pakistan, agriculture accounts for 18.9% of the country's GDP. However, one of the major factors affecting the production of crops and feed is climate change. Pakistan had extreme meteorological conditions, such as heat stress, a prolonged dry season, and erratic rainfall. The monsoon rains are crucial to the cultivation of most of the land. Reduced rainfall will increase the risk to food security, lead to famine, and shorten life expectancy.

Pakistan is the ideal location for research on the effects of climate change on natural and socioeconomic systems, and such research would be helpful in identifying the scope of changes and their effects on a global scale. research on perceptions, local knowledge, and the adoption of strategies at the household and community level would give the framework for comprehending the ideas and processes for assessing the impact of climate change. This foundation would be provided by the research on perceptions. Keeping in mind the importance of

the research, the focus of the research would be to investigate the ways in which people in the research region have adapted to the effects of climate change on their way of life and the effects those changes have had on agriculture.

Objectives

- To probe the determinants of climate variation in the study area,
- To analyze the effect of change in the climate on agriculture sector and rural livelihoods and to identify the relationship between climate variation and the rural livelihood.

MATERIALS AND METHODS

It refers to processes for constructing scientific knowledge, making reliable observations, evaluating results, and generalizing those findings (Bhattacharjee, 2012). For social problem analysis, methodological approaches are crucial. A flawless approach is essential for creating a sequence of information and practical proof of the hypothesis. The methodology describes the instruments used to perform research. The scientific method is a system of clear rules and processes for research and evaluating claims of knowledge (Bhattacharjee, 2012).

The universe for the present study was district Layyah. Layyah district has contained on twenty-three union councils which designed the village sampling structure. For the study a convenient sampling was used in selecting the villages. Total four villages were nominated of which four were from highland areas. Through used the random sampling for the selection

methods of village. Because the number of villages is greater than hundred, each village was allocated with two-digit number. Find out the impact of climate change on agriculture through farmer's perception is the main goal of this study. Three union councils (UC-Kot sultan, UC- Bukhri Ahmad khan, UC- Bait wasawa shomale) were selected from district Layyah, then six villages were selected from three union councils (take two villages from every Union Councils) i.e. Mauza Ali Dasti, Mauza jam rid thal, Mauza Bait Guji, Mauza Shah wala, Mauza wnjhara thal, Mauza jaisul Nashaab were selected. Selected randomly 150 respondents and 25 farmers selected from the both village for getting data. The flow of Indus River of south Punjab on the side of Layyah district Dera Ghazi khan, Muzaffargarh are south districts. The climate of Layyah is mostly hot. Maximum temperature of Layyah in summer is 53 degrees (Haye, 2019).

Moreover, a planned interview schedule is used for the collecting of quantitative data and SPSS used for the purpose of data analysis.

RESULTS AND DISCUSSIONS

The main component of the research is the analysis and interpretation of data. Generalization and prediction, which are the goals of scientific study, cannot be made without following these procedures. Based on the traits and attitudes of the respondents, generalizations and conclusions are derived.

Hypothesis 1: Higher the education of respondents lower was chance of climate change effect on the growth of crops that decrease the rural livelihood

Table no 1: Association between the education of respondents and effect of climate change on growth of crops.

Education		Rural livelihood		Total
		Yes	No	
Uneducated		22	26	48
		45.8%	54.2%	100.0%
5-8		38	38	76
		50.0%	50.0%	100.0%
Matric		5	10	15
		33.3%	66.7%	100.0%
Above Matric		10	1	11

		90.9%	9.1%	100.0%
	Total	75	75	150
		50.0%	50.0%	100.0%

Chi-square= 105-13 P-value= .03

Gamma= .634

Table no 1 show the relation of respondent's education and influence of climate change on agriculture production. Show the value of chi-square (.03) important relation among respondent's education and influence on the growth of crops by climate changes. The value of Gamma (.634) shows the solid relation among variable. So, the theory of education of respondents higher, chance will be lower the influence of climate change on the growth of agriculture crops. Livelihood is one of the most note able and important features in rural life. Livelihood can be defined as a process through which people develop and organize their daily life and social relations and varied activities to improve their income level as well as to better survive and strive in emergency situations (Iftikhar et al., 2009)

The very first sustainable livelihood asset is Human Capital, it consists of expertise, knowledge, skills, labor, condition of health of that particular person to perform livelihood strategies. Second asset of sustainable livelihood is social capital and this comprises of networking, links with other groups and member of those groups, trust relations, approach and contact with large number of institutions of the society in chase of better livelihood. Third sustainable livelihood asset is physical capital and it is consisting of basic infrastructure which includes, modes of transportation, water access, land, energy, mode and methods of communications, the equipment used for production, shelter for sustaining their livelihood. The fourth sustainable livelihood asset is financial and it comprises of capital, income, savings, credits, cash, pensions which help than improve their livelihood (Mokgokong, 2010).

Livelihoods are a significant piece of country individuals' approach to everyday life. Additionally, it should be understood and perceived that livelihoods are implanted in individuals' narratives, societies, customs, connections and the climate, all of which change after some time (Israr & Khan 2010).

Hypothesis 2: Higher the adoption of greenhouse farming lower was chance of effect of climate change on the growth of crops.

Table no 2: Relationship between adopt greenhouse farming and effect of climate change on growths of crops that increase the livelihood.

Adopt farming activities	Livelihood		Total
	Yes	No	
To great extent	51 60.0%	34 40.0%	85 100.0%
To some extent	29 59.2%	20 40.8%	49 100.0%
Not at all	13 81.3%	3 18.8%	16 100.0%
Total	93 62.0%	57 38.0%	150 100.0%

P-value=.243 Gamma= .334

Table no 2 shows the relation of adopt greenhouse farming and the influence of environment change on the growth of agriculture crops. The value of chi-square (.243)

show the relation of non-significant among adopt greenhouse farming and environment change influence on the growth of crops. The value of Gamma (.334) shows the strong relation

among variable. So the theory of complex the adoption of greenhouse farming, the chance will be lower on the influence of climate change on the growth of crops is not recognized. Farming livelihoods is related with rural farming activities, for example, crop farming, livestock farming, on-farm small scale post harvesting, and processing activities. Farming is a routine activity in rural areas families; it is viewed as the significant method for surviving. Farming contributes definitely to life of a nation and country since it save the country from food instability, poverty. Moreover, it has its antagonism which is related with the withdrawals of basic work inputs from the family farms it might likewise take advantage of women and kids by overburdening them with an excessive amount of work like planting, growing, watering and weeding the crops (Cai, 2012).

The yields are generally connected with fundamental food varieties like maize, beans, spinach, beetroots, carrots and cabbages and are basically for self-consumption. Much of the time crops are offered to other local area individuals as an approach to producing n income. In crop creations there are culture strategies and procedures that are utilized, those specific techniques are simple and basic and their efficiency is low as well. This might be because of lack of access to assets, for example lack of access to watering system and its frameworks Domestic animals farming is also a usual farming practice. Cattles, sheep, goats and a few more for example, chickens etc. are being kept for farming (Babulo, 2008; Jost et al., 2011).

Conclusion

The result of this study showed that many changes were occurred in environmental condition, due to change in climate agriculture and livestock completely disturbed. Respondents had learned about local environmental change and think about their mitigation because these environmental changes were harmful for agriculture crops, in the previous two years' agriculture sector is completely depend climate changes. This study contains on the observation of farmers about the influence of environment change on the

agriculture production and the livelihood of farmers totally depends on the agriculture crops. As they know about the slightly changes of climate. Mostly farmers well educated and most of them listen the programs on radio and television and read newspaper, these all are helpful for knowing the current condition of environment. Tells to farmer about the impact of environment changes is the main aim of this study. The overall findings is that the phenomena of livelihood diversification describe how people and households in rural developing nations go about generating revenue and surviving. The variety of livelihoods is another crucial aspect of rural survival that policymakers frequently ignore.

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