

**FARMERS' PERCEPTION ON THE IMPACT OF CLIMATE CHANGE  
ON FARMING ACTIVITIES IN DANDUME LOCAL GOVERNMENT AREA OF  
KATSINA STATE, NIGERIA**

**BY**

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## CERTIFICATION

This project work titled: “Farmers’ Perceptions on the Impact of Climate Change on Farming Activities (In Dandume Local Government Area of Katsina State, Nigeria)” by Usman Rabiu Mahuta (0711606010) has met the requirement for the award of Bachelor degree in Forestry (B. Forestry) of the Usmanu Danfodiyo University, Sokoto and is approved for its contribution to knowledge.

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## **DEDICATION**

All thanks are due to Almighty Allah, for the Source of life, knowledge and wisdom. This work was dedicated to my parents and my senior brother in person of Musa Rabiu Mahuta and his family.

## **ACKNOWLEDGEMENT**

In the name of Allah, the Most Gracious, the Most Merciful.

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May this research be of benefit and inspiration to all those who read, use it and almighty Allah (SWT) forgive our errors and guide us on right path, Amen.

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## **ABSTRACT**

This study on the impacts of climate change on farming activities was conducted in Dandume Local Government Area of Kastina State. To capture data on the impact of climate change on farming activities based on the perceptions of the farmers, 150 questionnaires were administered and retrieved. The data were analyzed using descriptive statistics (percentage, bar chart, etc.). About 57.33% of the respondents percept that, there was increase in rainfall while 20% of the respondents believed that, there was decrease in rainfall, however, 22.67% were on the view that, the rainfall was normal. Regarding the temperature, the study showed that, about 53% of the respondents agreed that, the temperature was too hot while 33.33% of the respondents believed that, the temperature was cold and 13.34% of the respondents proved to be normal temperature. The study observed that, there was increase in crop production as a result of high increase in rainfall as well as the increase in the degree of hotness or coldness of the temperature. Moreover, the government and nongovernmental organization (NGOs) should make any possible efforts using this study to promote and educate the farmers in their area.

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background of the Study**

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC, 2006). Climate change refers to a change of climate variables that is attributed directly or indirectly to human activities which alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods by UN Framework Convention on Climate change (UNFCCC, 2006). Man is the major cause of the current global climate change (Thick Tri Quang, 1996). In Nigeria, facts on climate change as reported by the Nigeria Environmental Study and Action Team (NEST, 2007) include issues such as poor nutrition, low Agricultural yields, poverty, proliferation of diseases vectors and insects, malaria, sleeping sickness, dengue fever, schistosomiasis etc. Other impacts of climate change include desertification and soil erosion in Northern and southern part of Nigeria (Okali, 2007). At present, the earth appears to be facing a rapid warming, which most scientists believe result mostly from human activities (Hart, 2006, Ehrenfield, 2005, Rosenbaum *et al.*, 2004).

Essentially, forest ecosystems are an important consideration in the development of climate change mitigation strategies because they can both be sources and sink of green house gases (Dinicola *et al.*, 1997).

In agricultural sector, climate change will lead to reduction in soil fertility, change in the availability of feed and fodder, decreased livestock productivity, increased incidence of Pest attack and the manifestation of vector born diseases. Similarly, heat stress and drought are likely to have a negative impact on animal health, production of dairy products, meats, and reproduction (SCBD, 2007). This in turn could impact on food security leading to protein deficiency and malnutrition (McCarthy *et al.*, 2001).

The implication of this is that the rural people based on their knowledge of climate change involving of weather variable like temperature, rain, humidity, visibility emanating from fog or dust storm as they affect their farming activities (Chapman, 2010).

The impact of climate change on farmers in the study area were evident with increased growing season of crops, low soil moisture content, and low yield from farm produce. They claimed that all these problems were as a result of change in timing of rainfall. It is no longer easy to predict the onset and cessation

period of rains. This claim was confirmed by the finding of Omotosho (1992) that, the prediction of onset and cessation date determine the cultural practice of farmers.

## **1.2 Statement of the Problem**

Climate change adversely affects the population and variety of plant and animal species, resulting in the scarcity or outright extinction of many important plant and animal species. In these areas climate change has greater negative impacts on poorer farm households as they have the lowest capacity to adapt to changed climatic conditions.

Although the issue of climate change and biodiversity is not a recent development, there has been a little or no effort aimed at scientifically documenting the existing situation among aggregation communities in northern Nigeria as regards the various indigenous innovative technologies and adaptation measures to combat the negative effects of climate change.

The vicious circle of poverty among these farmers has led to the unimpressive performance of the agricultural sector in general. As a result of rapid population growth, there is an increasing pressure on naturally endowed forest resources, while traditional fallow periods are diminishing at a faster rate which

makes the country particularly vulnerable to the adverse impact of climate change on crop and livestock production.

Without giant saying, climate change is a serious challenge facing the entire world today. Its impact is felt in all facets of life.

### **1.3 Objectives of the Study**

The main objective of the study is to investigate the impact of climate change on farming activities, while the specific objectives are;

- To examine the rainfall and temperature change in the study areas.
- Examine the level of climate change awareness in the area
- To identify change in crop production of farmers over time.
- To determine the impact of climate change on farming activities.

### **1.4 Justification of the Study**

It is important to note that impacts of climate change on farming activities are global and local. Climate change will affect agricultural food system in all countries, including exporters and importers as well as those at subsistence level (FAO, 2008). Change in mean rainfall and temperature as well as the increase in

extreme events will affect agriculture and livestock (IPCC, 007). These farmers are poor not because of their small size operation but, not because of improper operation, but because of their farming system is characterized by low and declining productivity due to so many factors of climate change. It is therefore, pertinent to investigate the impact of such change on farmers' productivity, so as to make policy recommendations and planning for mitigation and adaptation strategies.

There is an urgent need for advocacy on climate change in order to enlighten people on the dynamic of climate change; this cannot be done effectively without any evidence. Research on climate change would therefore promote evidence based advocacy.

### **1.5 Scope of the Study**

The study was covered the impact of climate change on farming activities in Dandume Local Government Area of Kastina State.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Climate Change

According to Thick Tri Quang (1966), man is the major cause of the current global climate change. The global phenomenon of the climate change is one of the most significant challenges facing humanity in the twenty first century at the present, the earth appears to be facing a rapid warming, which most scientist believe result mostly from human activities (Hart, 2006; Ehrenfield, 2005; Rosenbaum *et al.*, 2004).

The burning of the fossils fuel and deforestation add carbon (iv) oxide (co<sub>2</sub>)and other greenhouses gases (GHGs) to the atmosphere, many human systems are already being affected, particularly, agriculture, water resources, industries and human health (Mc Carthy *et al.*, 2001).

Essentially, forest ecosystems are an important consideration in the development of climate change mitigation strategies because they can both be sources and sink of Greenhouse gases (Dinicola *et al.*, 1997). Climate change refers to any change in climate over time, weather due to natural variability or as a



result of human activity (inter-governmental panel on climate change, 2001). The definition given by the UN Framed work convention on climate change (UNFCCC), refers to it as change of climate that is attributed directly or indirectly to human activity which alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (UNFCCC, 2006).

In fact, the planet would be colder 33<sup>0</sup>c as against its current average surface temperature of 15<sup>0</sup>c (Hart, op. cit). Thus, while the current concentration of CO<sub>2</sub> in the atmosphere, 370 parts per million (PPM), is about 35 percent higher than it was in pre-industrial time (280ppm), industries word wide now add about 6.3 gig atones of carbon as CO<sub>2</sub> to the atmosphere each year (Rosenbaum *et al.*, 2004). Consequently, the average global temperature has increased by 0.6<sup>0</sup>C and a rise in the global mean sea level of between’’ 10 to 20cm, (IPCC, 2001).

In Nigeria, small-scale farmers occupy a central position in the nation’s agricultural policy. They represent substantial proportion of the total population and produce between 90 and 95 percent of the total agricultural output in the economy (Ajibefun and Abdulkadir, 2004).

Many communities in Nigeria are living on forest resources for survival. Their daily livelihood is through tanga farming system, hunting and fishing (Adejuwon, 2006). According to Myers (1992), the tropical forest provides habitat for two-thirds of all identified terrestrial species, these plant and animal species serve as sources of food, medicine and fuel in most rural communities in developing countries.

Climate change adversely affects the population and variety of plant and animal species in the forest, resulting in the scarcity or outright extinction of many important plant and animal species (Sohngen *et al.*, 2001). Some plant and animal genetic resources that could be used in producing new pharmaceutical or traditional medicine are lost as a result of the destruction of forest cover by climate change (Eastaughy, 2008).

According to Klaus *et al.* (2007), indigenous people are often among the world's most marginalized and impoverished people and will bear the brunt of the catastrophe of climate change.

Adaptation measures are therefore important to help these communities to cope with the extreme weather conditions and associated climatic variations (Adger *et al.*

2003). Adaptation has the potential to significantly contribute to reduction in negative impacts from change in climatic condition as well as other changing socio-economic condition, such as volatile short-term changes in local and international market, (Kandlinkar and Risbey, 2000).

## **2.2 Impact of Climate Change on farming activities**

The impact of climate change on farming activities cut across all region of the world the polar region to the forest land through series of marine and coastal ecosystems, the impact are pervasive and quite alarming. Various scientific reports have highlighted the negative impact of the steady change in the global climate (UNFCCC, 2006, IPCC, 2001).

The lateu settlement, located in the pacific island chain of Vanuatu, and the shishmaref village, located on a small island in Alaska, were recently relocated the former to escape rising sea levels, the latter degrading permafrost as a result of climate change impacts (Secretariat of the convention on biological diversity, 2007).

In the agricultural sector, climate change will lead to reduction in soil fertility, change in the availability of feed and fodder, decreased livestock

productivity, increased incidence of pest attacks and the manifestation of vectors borne diseases. Similarly, heat stress and drought are likely to have a negative impact on animal health, production of dairy products, meat and reproduction (SCBD, 2007). This in turn could impact on food security leading to protein deficiency and malnutrition (McCarthy *et al.* 2001).

### **2.3 Climate Change and Forest**

The association between climate and forestry has been widely discussed in the literature (Nwoboshi, 1982 and Amusa, 2002). It is now widely recognized that climate change is likely to have strong influences on the structure and function of forest (Watson *et al.*, 2001; IPCC, 2007).

The climate offers a potential for additional carbon in the atmosphere to enhance the growth of trees and other forest products (Boisvenue, 2006; Running, 2006). However, some studies have suggested that inter-annual variation in temperature and precipitation could have positive or negative effect on annual growth, depending on the direction of change (Tian *et al.* 1998; Schimel *et al.*, 2000).

Thus, carbon fertilization effects may be limited both by change in annual weather or by other limiting nutrients (Melillo *et al.*, 1993) besides, other carbon fertilization effect could reach saturation point for particular species and ecosystems (Gitay *et al.*, 2001). Apart from this, some authors have suggested that climate change could lead to dieback in existing or future forest due to water stress, insect's infestations, or fire (Solomon and Kirilenko, 1997; Bachelet *et al.*, 2003; Bachelet *et al.*, 2004, Scholze *et al.*, 2006).

The climate change may already be causing more intense fire in some regions of the world (Westerling *et al.*, 2006). Their relatively low cost, compared with non-forest offset option, may make them economically attractive (Dayal, 2000). Already, Nigeria is experiencing incursion of the Atlantic ocean in the southern parts of the country while the Sahara desert is encroaching southward at a rate of about a kilometer per year (FAO, 1979).

In Africa food security constitutes a fundamental challenge for the welfare of the people and economic growth (Badejo, Aluko, Igboanugo *et al.*, 2008). According to (FAO, 2008), statistic, food price rose from 24 percent in 2007 to 53 percent in 2008. The increase in the price of food is threatening food security of developing countries, Nigeria inclusive, where people spend about 70 percent to

80 percent of their budget on food. The main factor underlying the increase is decline in food stock due to low food stock, drought and floods linked to climate change.

Heat stress in hot regions and seasons, is invariably unfavorable, it adds discomfort and even contribute to death especially among the age areas of constant malnutrition (Oke 1982, Okpara, and Adekunle, 1997). The inter-governmental panel on climate change (IPCC, 2001) maintained that geographic zones of potential malaria transmission would spend in response to global mean temperature increase. The increased ultraviolet radiation resulting from depletion of the stratospheric ozone layer could raise the incidence of skin cancer (Awosika and Florunsho, 2006).

The vector-borne diseases such as malaria and other insect transmitted diseases are related to climate and their distribution and seasonality (Rita, 2008).

## **2.4 Mitigating climate change**

The application of forest technologies in combating climate change is the most feasible and plausible approach for solving the problem of climate change not only in Nigeria but all over the world (PDF,1996).

The forest should be protected through conservation of the existing forest to avoid emissions associated with forest degradation and reforestation, manage forest with high carbon uptake potential and develop adaptive management techniques (Aluko, 2008).

Human induced climate change could bring about losses in biological diversity and in goods and services that ecosystem produce to the society (IPCC, 2001).

According to Strahler (1998) outlining the following as causes of desertification in dry areas of northern Nigeria:

1. Low rainfall in the area which reduce the rate of vegetation growth.
2. Bush burning, clearing of trees and shrubs by grains farmers.
3. Overgrazing by dynamic cattle herders.
4. Cutting down of trees as a source of fuel for cooking.
5. Fast growth in population, which lead to establishments.

According to inter-governmental panel on climate change (2007) state that, in Africa by 2020 “between 75 and 250 million people are projected to be exposes to an increase of water stress due to climate change”.

Orlando (2000) said that “for effective advocacy on development issues NGO’s need to undertake research analysis, information, dialogues, media campaigns, seminars and awareness in policy arena”.

Rahman (2001) said that “Bangladesh scientist involve in the IPCC succeeded in incorporating indigenous and local literature in the global scientific review processes and also worked to ensure equity and fairness issues in the climate change debate.



## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Study Areas**

The study was conducted in Dandume which is a local government in Kastina State, Nigeria. Its headquarters are in the town of Dandume in the west of the area and it covers a land area of 422km<sup>2</sup>, it lies between latitude 11<sup>0</sup> 27<sup>1</sup> 3<sup>11</sup>N and longitude 7<sup>0</sup> 07<sup>1</sup> 37<sup>11</sup>E. It has a population of 145,839 (NPC, 2006).

##### **3.1.1 Climate**

The study area has two distinct seasons (Dry and Wet seasons). During wet season rainfall begins in late May to September, while the cold season known as Harmattan last from December to February. The temperature rising up to 38°C between March to May and reaches an average of 45°C in January. The average rainfall in the area is 600mm per annum (Rabiu, 2007).

##### **3.1.2 Vegetation**

The vegetation cover of the study area was characterized as Sudan savannah type. Natural grass covers is noticeable only during the rainy season,

while nature of the trees covers and other crops species have been permanently altered (Dan Abu, 2006).

The common species in the study area include: *Azadirachta indica*, *Adansonia digitata*, *Parkia biglobosa*, *Mangifera indica*, *Khaya senegalensis*, *Ziziphus spina Christi*, *Sidium gujaba*, and other thorny species of both economics and medicinal values (Dan Abu, 2006).

### **3.2 Sampling Procedure**

Stratified random sampling was used to select the three (3) areas in the LGA where the study will be conducted. The LGA was divided into three (3) areas (western, central and eastern zones). Each district was considered as a stratum which will be randomly selected from each stratum and fifty (50) respondents selected randomly from each village in the LGA.

### **3.3 Data Collection**

Structured questionnaire was used to collect primary data from farmers. The questionnaires were administered by direct contact with respondents. The interview schedule was used as instrument to assess the impact of climate change

on their livelihood. In addition, information on farmer's awareness of changes in climatic condition would obtain and asked whether they have notice changes in long-term temperature and rainfall pattern.

### **3.4 Data Analysis**

The data was analyzed by using descriptive statistics (frequency, percentage, distribution, and bar charts).

## **CHAPTER FOUR**

### **4.0 RESULTS**

#### **4.1 Socio-Economic Characteristic of Respondents**

The result in fig 1 indicated that, the male respondents accounted for about 80% while the female respondents accounted for about 20% in the study area. The result also showed that 55.67% of the respondents in the study area fall within the middle age bracket of 21 to 40 years, while 27.34% of the respondents were within the age range of 41 to 50 years and 16% were 51 to 60 years of age.

The result also showed that, 17% of the respondents had secondary school education while 34% had primary education. Respondents with tertiary education accounted for about 6% and those with non-formal education with 43% which constitutes the largest number of the respondents. Farming is the major occupation which subsistence farmers carried the majority with 40% of the respondents while 31.33% were commercial farmers. About (18%) of the respondents were civil servants while (10%) were traders. Farmers had farm size ranging from less than 3 hectares with 53.33%, 23.33% having 3 to 5 hectares, 13.33% having 5 to 10 hectares and 10% had 10 and above hectares.

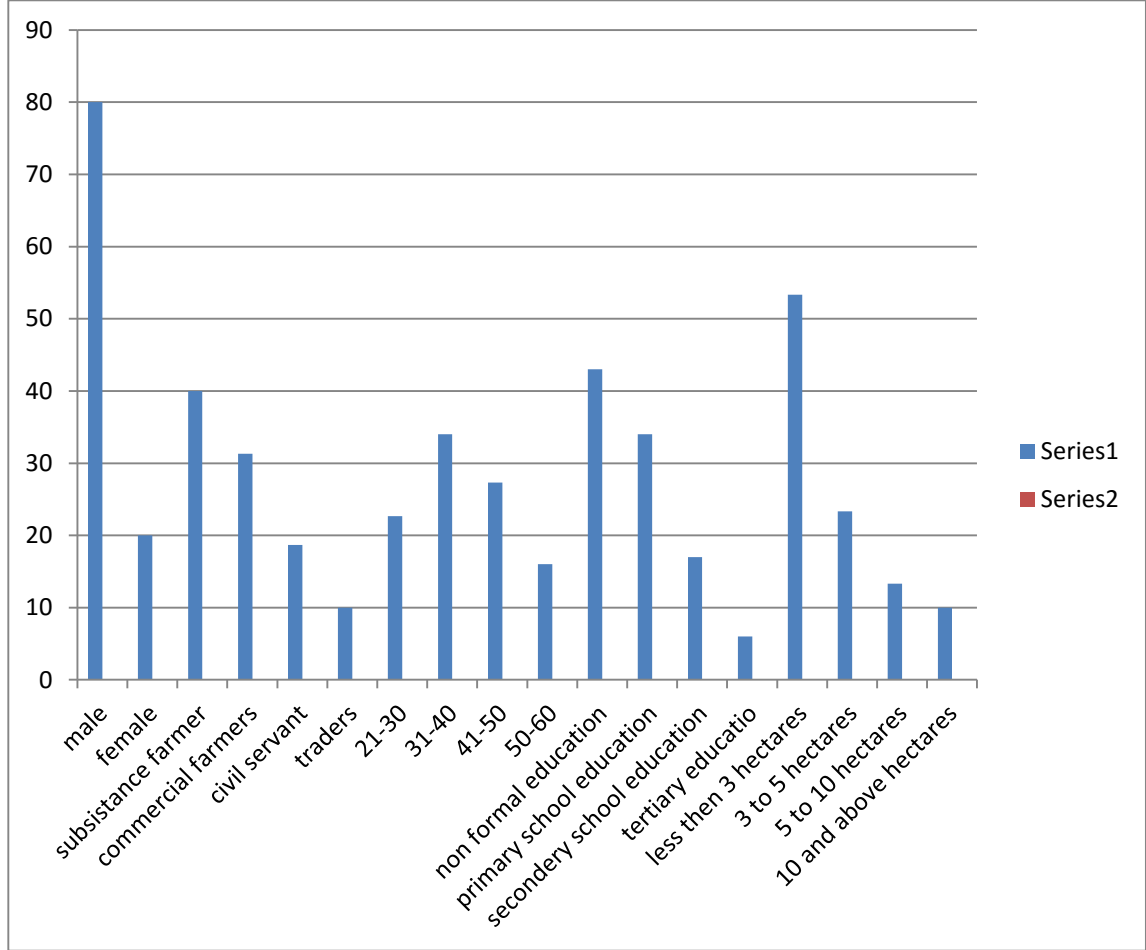


Fig 1: Socio –Economic Characteristic of the Respondents

## 4.2 Farmers' Perception on Temperature Pattern

About 50.67% of the respondents agreed that the temperature has increased while 26.67% of the respondents were of the view that there was decrease in temperature, and 16.67% of the respondents were in the view that, there was fluctuation while 6.66% of the respondents were in the view of normal temperature within the area. About 53% of the respondents perceived that, the temperature was too hot; while 33.33% agreed that, the temperature was too cold and 13.34% agreed that, the temperature was normal.

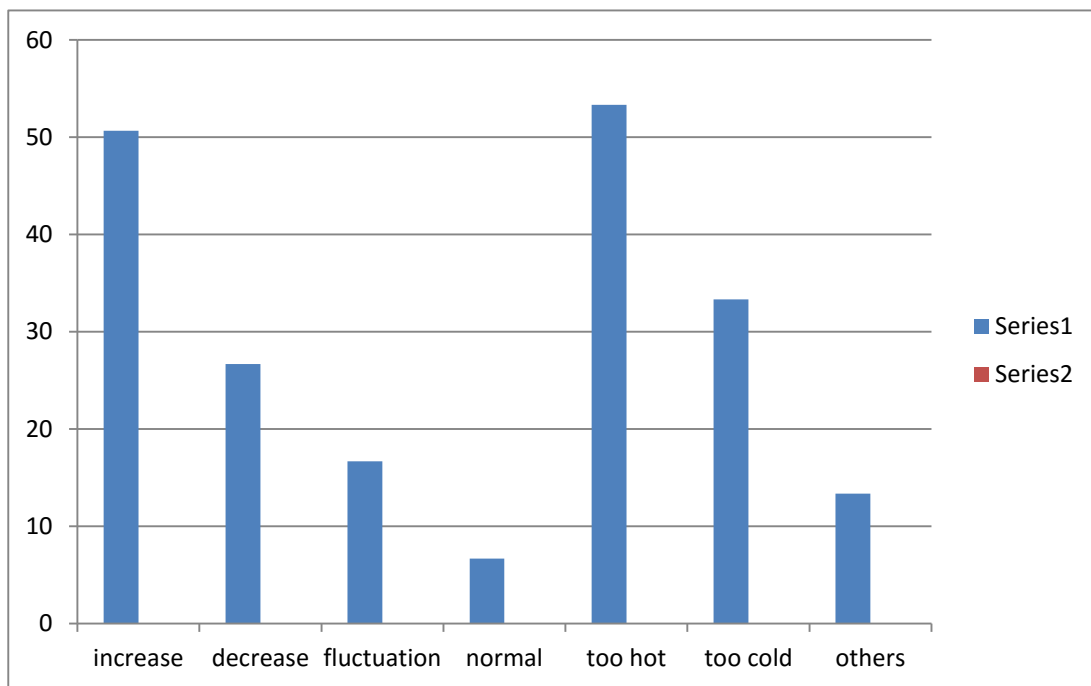


Fig 2. Farmers' Perception on Temperature Pattern.

### 4.3 Farmers' Perception on Rainfall Pattern

The result fig 3 indicated that about 57.33% of the respondents agreed that, the rainfall has increased while 20% of the respondent believed that, the rainfall has decreased and 22.67% of the respondent said that, the rainfall was normal. About 64% of the respondents believed that the rainfall was heavy while 12.67% of the respondents pointed of erratic rainfall and 23.33% indicated fluctuation rainfall.

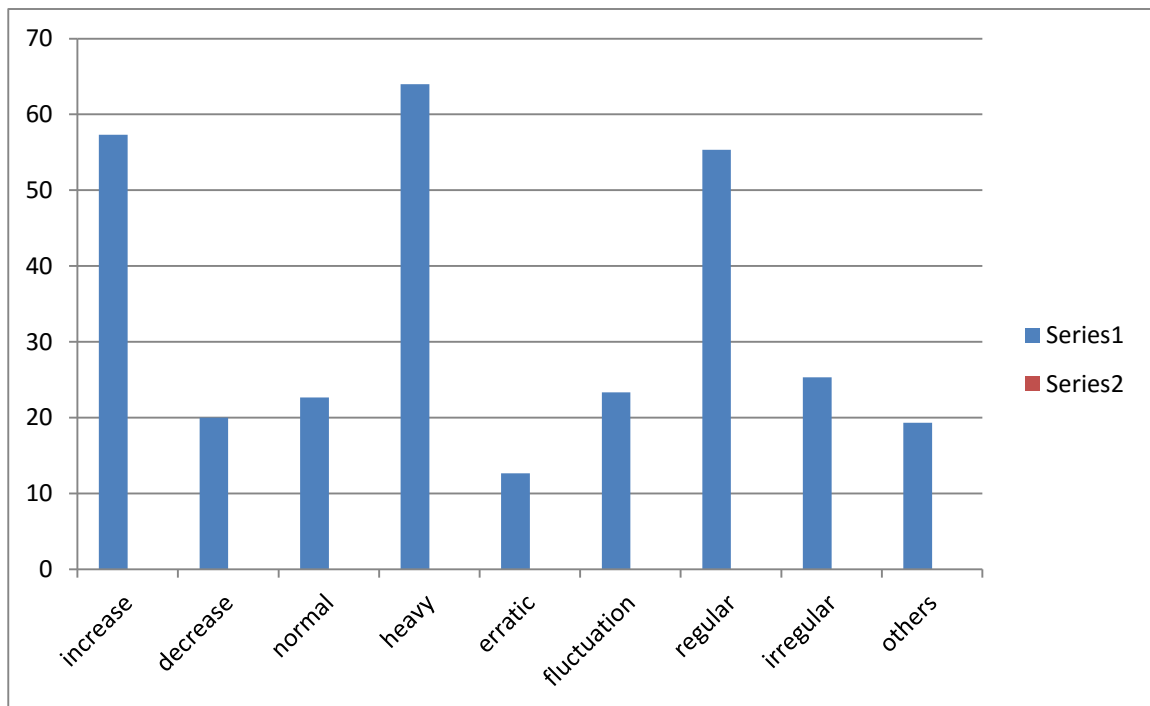


Fig. 3: Farmers' Perception of Rainfall Pattern

#### **4.4 Farmer's Perception on Change in Crop Production**

The result in fig 4 indicated that, about 1.333% of the respondents were not sure, while 60.67% of the respondents were using different crops as observed through the research. About 33.33% of the respondents believed that, there was no change while 34.67% were of the view on change in planting and harvesting.

Moreover, 43.33% of the respondents were involve in change in crop production of crop while 8.67% of the respondents were involved in planting of trees in crop production. About 28% of respondents agreed that, there was increase in crop production while 20% of the respondents opined that, there was decreased in crop production. However, 28% of respondents believed that, there was no change in crop production.

50% of respondents believed that, there was great impact of climate change on the farming activities while 20% were believed in political influenced.



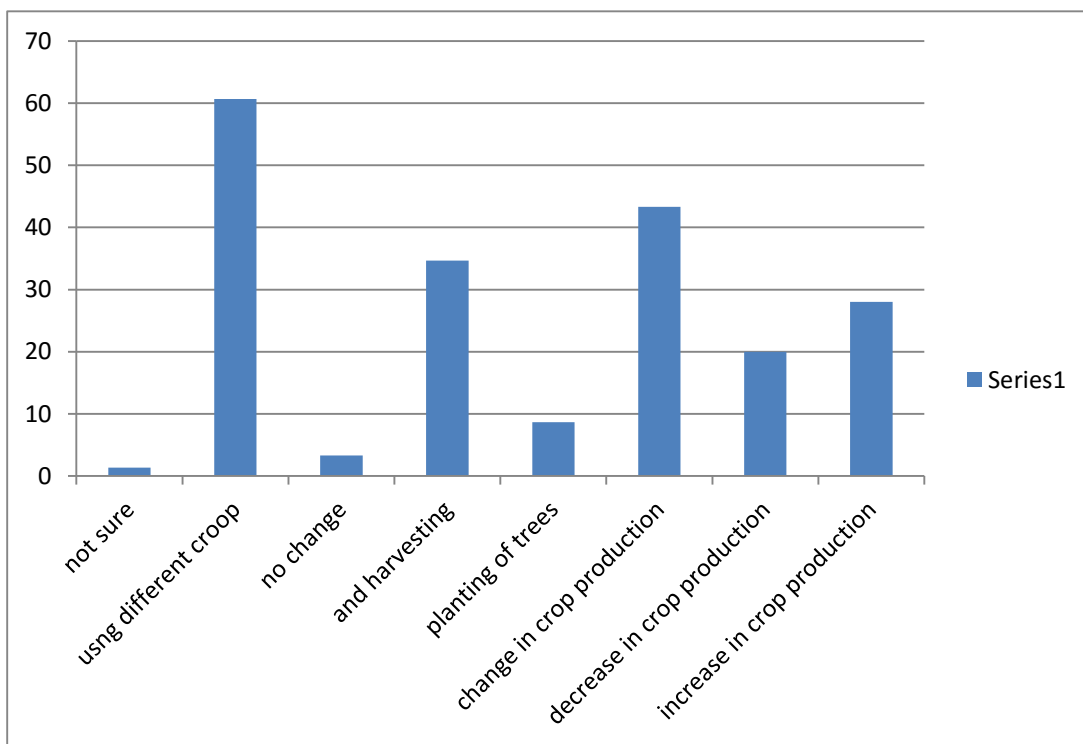


Fig. 4: Farmer's Perception on change in crop production

#### 4.5 Farmer's perception on the impact of Farming Activities

The result Fig 5 showed that, about 50% of the respondents agreed that, there were increased in insect pest outbreak. About 43.33% and 8.66% of the respondents considered that, it's no longer easy to predict the onset and cessation period of the changes, About 53.33% and 46.66% of the farmers said that, they

have been affected due to lack of input and some said that they have available input respectively. So also, 43% of the respondent said that, late sowing or planting affected their yields while other 4% observed that, early planting affected their yields.

Another impact on farmer was credit. About 46.66% of the respondent said,, they did not have credit while 5% of the respondent have gotten credit from the government

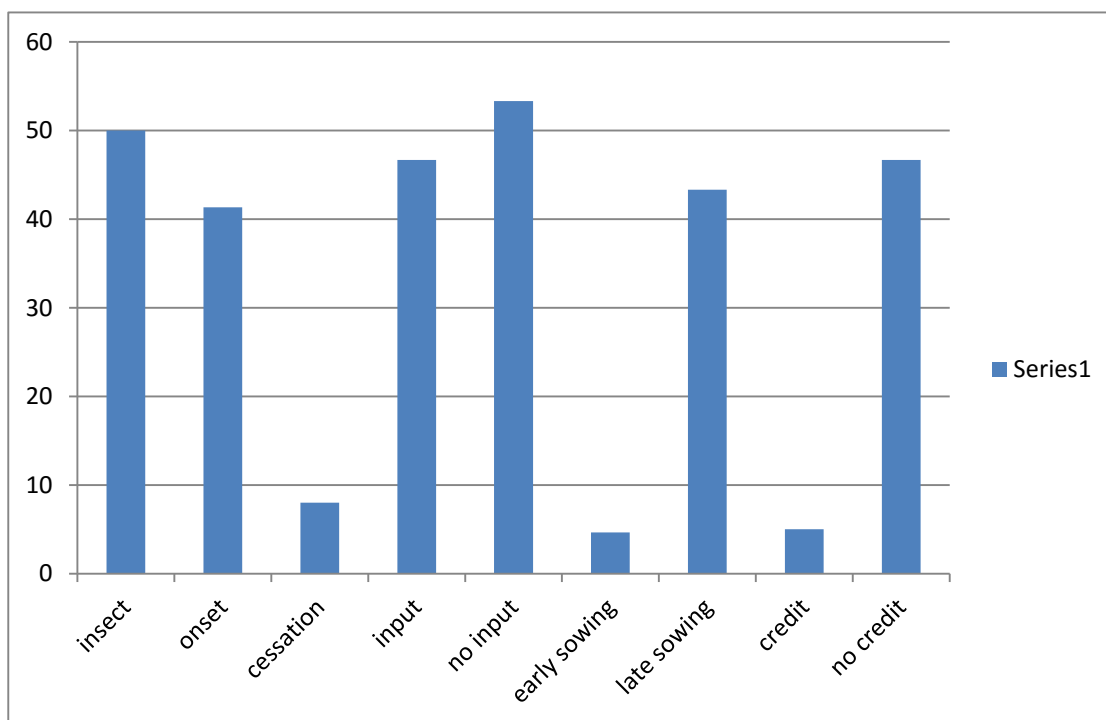


Fig 5 Farmer's perception on farming activities.

## **CHAPTER FIVE**

### **5.0 DISCUSSION**

#### **5.1 SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS**

Socio-Economic Characteristics combine different factors such as sex between male and female in which more males were involves in farming activities with 80% while 20% were female.

##### **Age of the Respondents**

Age is the factor that determines the year of an individual as young and old, age composition among individual especially family head has influence in decision making. Results shows that, 55.67 % of the respondents, range between (21 to 40 years) and 27.34% of respondent range between (41 to 50years) and 16% of the respondents were ranged between 51 to 60 years as the oldest among others, this is to said that age has negative effect on farming activities, because as the farmers grow older, they lack the strength and capacity to work for a long

period of time. According to Okoye (1999) where he made some research on the influence of age on the adaptation of farming system.

### **Occupation**

Farming is the major occupation where 40% of the respondents were involved in subsistence farming while 31.33% were commercial farmers. About 18% and 10% of the respondents were civil servants and traders. This participation of farmers in farming activities or agricultural production is in line with the agreement of Sidibe (1996) findings who stated that, agricultural production alone can help to reduce the erosion and it becomes alternative source of food and income which reduce poverty level or enhance crop production.

### **Educational Background**

Education is the way of solving any human problems and promotes his life to better way.

Education is the most important in a man's life where 17%, 34% had secondary school education and primary school education while 43% of the respondents had non- formal education and 6% accounted with tertiary education.

## **5.2. FARMERS' PERCEPTION ON TEMPERATURE PATTERN**

Regarding the temperature, the study shows that, about 53% of the respondents agreed that, the temperature was too hot while 33.33% of the farmers believed that, the temperature were cold and other 13.34% of the respondents proved to normal temperature.

The degree of hotness or coldness of the temperature in the selected zones has contributed to their vulnerability to climate. This is an agreement with Adger *et. Al.*, (2003), findings that change will have greater negative impacts on poorer farmer households as they have the lowest capacity to adapt to changes in climate condition. The study was confirmed by Adger *et al.* (2003) who This is in agreement with IPCC (2007) that, the warm spells and heat waves increasing frequency over most land areas (very likely), these reduce yields in warmer regions due to heat stress, increased danger of biodiversity. The overall perception of the respondents on change in rainfall from this study was that, the weather was getting colder (33.33%) while 53% said it was hotter, and that there were pronounced changes in the timing of rains. The results did not agree with Mendelsohn *et al.* (2006). Finding that perception on climate change showed that a significant number of farmers believed that, temperature has already increased

and that rainfall had declined for element reported that, crop diversification conserve as insurance against rainfall variability as different crops are affected differently by climate events

### **5.3 FARMERS' PERCEPTION ON RAINFALL PATTERN**

Regarding rainfall It was observed that, there was increase in crop production as a result of increase in rainfall with 57.33% while 20% of the respondents said that, it was decrease and 22.67% believed that, the rainfall was normal. This ensured that critical crop growth stage do not coincide with harsh climate conditions in the season. Growing a number of different crops in the same plot or in different reduce the risks of complete crop failure as different crop are affected differently by climate events.

This study also agreed with Nhemachana and Hassan (2007), who found that; increase diversification through engaging in production activities that are more drought- tolerant and or resistance to temperature stresses as well as activities that make effective use and take full advantage of the prevailing water are importance and forms of insurance against rainfall variability.

This study confirmed with F.A.O (2008), finding that; warmer and fewer cold days and night warmers and more frequent hot days and night over most land areas. These increase yields in colder environments, decreased yield in warmer environments, increased insect outbreaks.

The impacts of climate change on biodiversity in the study areas were evident with increased growing season of crops, high soil moisture content, high growth rates of crop, and high yield from farm produce. This claim that all, these occurred as results of change in timing of rainfall. It is no longer easy to predict the onset and cessation period of rains. This claim was confirmed by the finding of Omotosho (1992) that; the prediction of onset and cessation dates determines the cultural practice of the farmer. Nevertheless, the respondents claimed they have no choice than to adopt. Also, this claim was confirmed by IPCC (2007) that; heavy precipitation at 60% events increasing in frequency in the areas which may result to damage to crops, soil erosion, in ability to cultivate land due to water logging of soils.

#### **5.4 FARMERS' PERCEPTION ON CHANGE IN CROP PRODUCTION**

With production regard to change in crop production where 33.33% of the respondents agreed his, there was no change while 43.33% were in the view that, there was change in crop production. However, 34.67% and 8.67% of the respondents believed that there was change in planting and harvesting and planting of trees in crop production. This further agreed with Klaus *et al.* (2007) that the rural people bear the burden of climate change. This is because they have less access to capital which makes it harder for them to adapt to climate change.

The resource limitation and poor infrastructure have limited the ability of most rural farmer take up productions measures in response to change in climatic conditions. This finding agreed the Kandlinker and Risbey (2000) who observed that, since most smallholder farmers are operating under resources limitations they, fail to meet transaction costs necessary to acquire production measures and at times farmers cannot make beneficial use of the land available information they might have.

It has been predicted by some researchers and bodies such as IPCC that during the next decades billions of people, particularly those in developing



countries, will face changes in rainfall pattern that will contribute to severe water shortages or flooding and rising or decline temperature that will cause shift in crop growing seasons. Increased intensity and frequency of storms, drought and flooding, altered hydrological circle and precipitation variance have implication for future food availability most especially in the developing world, which is already contending with chronic food problems, although the potential impacts on rain fed agriculture vice-versa irrigated system are still not well understood (FAO 2007).

## **5.5 FARMERS' PERCEPTION ON FARMING ACTIVITIES**

The impact of climate change on farming activities in the study areas were evident with increased growing of crops, high soil moisture content, high growth rates of crop, and high yield from farm produce.

This claim that all these occurred as results of changed in timing of rainfall. It is no longer easy to predict the onset with 43.3% and cessation with 8.66% of the respondent's period of rainfall while about 50% of respondents agreed that, there was increase in insect pest outbreak.

This claim was confirmed by the finding of Omotosho (1992) that, the prediction of onset and cessation dates determines the cultural practice of the farmer. Nevertheless the respondents claimed they have no choice than to adopt. Also this was confirm by IPPC(2007) that heavy precipitation at 60% event increase in frequency in the area which may result to damage to crops, soil erosion in ability to cultivate land due to water logging of soils. This claim was confirmed by the finding of Omotosho (1992) that; the prediction of onset and cessation dates determines the cultural practice of the farmer. Nevertheless, the respondents claimed they have no choice than to adopt. Also, this claim was confirmed by IPCC (2007) that; heavy precipitation at 60% events increasing in frequency in the areas which may result to damage to crops, soil erosion, in ability to cultivate land due to water logging of soils.

## **CHAPTER SIX**

### **6.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 SUMMARY**

The study perception of farmers on the impact of climate change on farming activities in Dandume Local Government Area of Katsina State was carried out in order to examine the rainfall and temperature pattern affecting crop production Over time. 150 questionnaires were administered and retrieved. The data were analyzed using descriptive statistic (percentage, Bar chart e.t.c).

57.33% of the respondents show that, there was increase in rainfall while 20% believed that, there was decrease in rainfall, however, 22.67% were on the view that, the rainfall was normal.

Regarding the temperature, the study shows that, about 53% of the respondents agreed that, the temperature was too hot while 3 3.33% of the farmers believed that, the temperature was cold and other 13.34% of the respondents proved to normal temperature.

The study observed that, there was increase in crop production as a result of high increase in rainfall as well as the increase in the degree of hotness or coldness of temperature.

The impacts of climate change on farming activities in the study areas were evident with increase growing season of crops, high rainfall, high growth rates of crops and high yield from farm produce.

## **6.2 CONCLUSION**

The study was based on perception and analysis of impacts of climate change on farming activities. Result on farmer perception indicated that, they understood change in climate as a result of change in temperature and rainfall.

The areas were getting colder and water or moisture with change timing of rains. The implication was that farmers need to adjust their management practices to ensure that; they make efficient use of the available rainfall and water resources for crop production and other needs. Impact or barriers to taking crop production options communities around the areas of study were identified as lack of credit and information concerning climate change forecasting rationing of inputs and lack of seed resources as important constraints. Addressing these issues can

significantly help the farmers to tailor their management practices to colder and conditions.

### **6.3 RECOMMENDATIONS**

Based on the results obtained from the research the following recommendations are made:

- Information about farmer's awareness on climate change and current late or early rainfall in hot or cold seasons would assist policy makers in the efforts to decrease or increase its vulnerability and adverse impacts.
- The government should assist these farmers' particularly those that are impacted by climate change in meeting costs of crop production to its adverse effects. And also should provide credit; lend input to farmers of the areas of study.
- Non-governmental organization (NGOs); should strengthen the capacity of rural dwellers or farmers that will promote the effect of climate change on farmer and educate the farmers of the areas of study.

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- Non-governmental organization (NGOs); should strengthen the capacity of rural dwellers or farmers that will promote the effect of climate change on farmer and educate the farmers in the study areas on the needs to plant more trees.
- Knowledge: to help social groups and individuals farmers to gain a variety of experience in and acquire a basic understanding of the climate change policy issues and its impacts.
- Attitude: to help individuals and social groups of farmers acquire a set of values and feeling of concern for the environment and the motivation of actively participating in climate change activities.
- Skill: to help social groups and individuals acquire skills for identifying and lacking climate problem.

- Participation: to provide social groups and individuals with an opportunity to be actively at all levels in working towards climate change vulnerability reduction and mitigation.

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**APPENDIX**

**USMANU DANFODIYO UNIVERSITY SOKOTO**

**FACULTY OF AGRICULTURE**

**DEPARTMENT OF FORESTRY AND FISHERIES**

**RESEARCH INTERVIEW GUIDE**

**TOPIC: FARMER'S PERCEPTION ON THE IMPACT OF CLIMATE  
CHANGE ON FARMING ACTIVITIES IN DANDUME LOCAL  
GOVERNMENT AREA OF KASTINA STATE, NIGERIA.**

I am a final year student of the above named institution and department. I hereby solicit for your cooperation by responding to all question asked. Thank you!

Solution A: Demographic Information

1. Gender ..... Male ( ) Female ( )
2. Marital Status..... Married ( ) Single ( ) Divorce ( )
3. Village .....
4. Occupation.....
5. Age.....

Section B: Technical Information

1. Have you observe any change in the pattern of temperature

Yes ( ) No ( )

2. If yes, what is the change in pattern

(a) Increase ( ) (b) Decrease ( ) (c) fluctuation ( ) (d) Normal ( )

3. What change in temperature have you observed in the area?

(a) Increase ( ) (1b) Decrease ( ) (c) fluctuation ( ) (d) Normal ( )

4. What is the rate of temperature change?

(a) Regular ( ) (b) Irregular ( ) (c) fluctuation ( ) (d) Normal ( )

(e) Others (specify.....)

5. What is the intensity of heat you observed?

(a) Too hot ( ) (b) Too Cold ( ) (c) Normal ( ) (d) others

(specify.....)

6. What is the rate of rainfall pattern?  
 (a) Heavy ( ) (b) Erratic ( ) (c) Normal ( ) (d) others  
 (specify.....)
7. What pattern of change in wind have you observed?  
 (a) Heavy ( ) (b) High ( ) (c) Normal ( ) (d) others  
 (specify.....)
8. What direction and time does wind move in this area?  
 (a) East ( ) (b) West ( ) (c) South ( ) (d) North  
 (e) Others (specify  
 .....)
9. What is the intensity of solar radiation in this area?  
 (a) Heavy ( ) (b) High ( ) (c) Normal ( ) (d) others  
 (specify.....)
10. What is the percentage of humidity in this area?  
 (a) High ( ) (b) low ( ) (c) fluctuation ( ) (d) others  
 (specify.....)

11. What is your farming system?

- (a) Subsistence farming ( ) (b) commercial farming ( ) (C) Agro forestry farming ( ) (d) Tungya system ( ) (e) others (specify.....)

12. What is the size of your farm land?

- (a) Less than 3 hectares ( ) (b) 3 to 6hectares ( ) (c) 7 to 9 hectares ( ) (d) 10 hectares and above ( ) (e) others (specify.....)

13. What are the types of crop and animal do you produce?

- (a) Food crop (b) cash crop  
(c) Legumes crop (d) others (specify.....)

14. What change in crops production have you observed?

- (a) Increase ( ) (b) Decrease ( ) (c) fluctuation ( ) (d) others (specify)

15. What is your output of last year farm product?

- (a) 20 to 40 bags (b) 40 to 60 bags (c) 60 to 100bags (d) 100 bags and above.

16. How can you differentiate between the output of last and this year farm produce?

- (a) Improved ( ) (b) Not Improved ( ) (c) standstill ( ) (d) others (specify.....)

17. Have you observe any change in terms of quality and quantity of your yield or product ion Yes ( ) No ( )

18. If yes, what are the changes that affect the quality and quantity of your yield or production?

19. Which major impact do you think may be related to climate change on your production?

(a) Financial ( ) (b) Social ( ) (c) Chemical ( ) (d) Physical ( )

(e) Ecological ( ) (f) Biological ( ) (g) Political ( )