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Farmers Perception And Impact Of Climate Change On Farmers And Farming Activities In Kwara State, Nigeria

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Abstract
*The study examined farmers' perception on changes in climate variables in eight LGA of Kwara State**.** Eight local government areas in Kwara State were purposively selected due to their vulnerability to climate change effects (These are North, Central and South district). Proportionate sampling was employed to select the eight villages from various senatorial districts in the state. A total of two thousand (2000) questionnaires were administered and one thousand four hundred and ninety three (1,493) returned. Descriptive statistics was used to analyze socio-economic characteristics of the farmers. ANOVA was used to test the significant differences between climatic variables in twenty years. The results indicated that majority of the respondents (67.9%) agreed that rain normally starts by April-May and that the month of August had the highest amount of rainfall, and 2010 recorded the highest amount of rain in ten years from 2000-2010. It was evident from the results that the highest dry spell was recorded in 2011. 56.1% of the respondents perceived that August was the period of lowest temperature (31.97^{0}C) and 20.6% reported that the year 2008 had the highest temperature (36.91^{0}c) in ten years from 2000-2010. Farmers were aware of the increased change in the climatic indices. It was recommended that farmers need to be sensitized on the importance of afforestation programme to mitigate climate change.*

Keywords: *Perception, Climate Change, Climate Variables, Kwara State*

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I. Introduction

Climate change is a change in the statistical distribution of weather including its averages, over a long period of time for a particular place within a specific time in a year. It ranges from ten to several hundred years (NOAA, 2007; Cramer *et al*., 2001). This usually refers to changes in the climatic variables such as temperature, rainfall, wind, and humidity. Climate change is a transience part of the earth natural environment; it emanates from synergies between the atmosphere, ocean, and land, as well as changes in the amount of solar radiation reaching the earth. Certain gases, such as carbon dioxide (CO_2) and water vapor (H_2O), trap heat in the atmosphere causing a greenhouse effect.

Human activities such as the burning of fossil fuels, like oil, coal, and natural gas is adding CO_2 to the atmosphere thereby inducing a change in climate. IPCC, (2007) and Cox, P. M. *et al*., (2000) reported, that most of the observed increase in the globally averaged temperature is likely caused by the observed increase in human activities. This phenomenon is generally known as "global warming".

Local People's perception of the Causes of Climate Change

Perception is the knowledge or understanding of a particular concept or word. It could further be explained as awareness, attitude, and approach to handling information (English Thesaurus 2018). All over the world, climate changes have presented a tremendous danger to people's lives and properties. Climate change has caused loss, damage, injuries, and death to many natural ecosystems since 1900, Climate change has claimed the lives of thousands of flora and fauna globally. In Nigeria, the sacking and migration of communities in search of farmland, grazing land, water and a conducive place for settlement, resulting in wars, communal clash could be attributed to climate change. In Nigeria, flooding in various parts have forced thousands of people to leave their homes, destroyed businesses, polluted water resources and increased the risk of diseases (Nwaubani, 1991; Edward-Adebiyi, 1997; Daily Sketch, 1997). Excessive droughts, in the Sokoto plains, has forced hundreds of thousands to migrate from their homes and villages while many are rendered homeless and properties worth millions of Naira have been destroyed (Bello, 2013). Extreme rise in temperature caused human activities could lead to heavy downpour, a rise in sea level melting of glacier ice and expansion of the ocean, thereby causing salt water to submerge coastal lands (Smith, 1996).

Studies have reported that local dwellers are aware of the hazards associated with climate change and have tried to proffer solutions to the problem (Abams, 1995; Folorunsho and Awosika 2001). These include selective felling of trees on farmlands during cultivation, preservation of grooves, the local people ensures that the land is held sacred both in cultivation and other uses (Action Aid, 2006; News release, 2007, *www.defra.gov.uk*).

The Effects of Climate Change

There are several effects of climate change on rural ordinary people all over the world. Far-reaching researches are being carried out all over to determine the extent to which climate change is occurring around the world. Potential impacts most studied by researchers in sub-Saharan Africa include drought, increased temperatures, dust storm, flood, reduced crop production and hazardous health effect of greenhouse gases emission.

The developed countries are responsible for most of the causes of this phenomenon that affects the developing countries of the world. For example, according to Jayaram *et a*l., (2010), Africa has about 25% of the world's arable land but contributes only 10% to the global agricultural output. The increased frequency, intensity and magnitude of drought and floods have adversely impacted on food and water security, water quality, energy and sustainable livelihoods of rural communities in the study area (AAI, 2006).

People have perceived changes in rainfall and temperature patterns over the years on pieces of evidence of climate change, the area south of the Sahara are worst hit. Mendelsohn *et. al*. (2006) found that farmers' perception of climate change as affected by an increase in temperature; reduced intensity and distribution of rainfall in many African countries has improved.

Adger *et. al*., (2007) perception on climate change showed that a significant number of farmers believe that temperature has already increased and that rainfall pattern has declined for African countries leading to a low yield of agricultural crops, less vegetation for livestock and water for irrigation. (Namara, *et. al*. 2010) mentioned that agricultural water management could be a relief for reducing poverty in the world. Agricultural water management and policies have played vital roles in increasing crop yield across Africa (FAO 2012). Valipour (2012) working in North Africa mentioned the status of irrigation and rain-fed agriculture in the world and summarized the advantage and disadvantages of irrigation system. Over forty-six percent of cultivated areas across the world are not suitable for rain fed agriculture because of climate changes and other meteorological conditions. The report of Burney *et. al*. (2013) favored investment in agricultural water management for green revolution in Africa. Frank *et. al*. (2008) suggested increased attention to monitoring and evaluation of capacity development and a closer link to emerging work on water governance. Wheater and Evans (2009) studied the relationship between land use, water management, and future flood risk. Their studies mentioned that apart from irrigation issue, water-related implications of climate change for future land use remain relatively unexplored. To conserve usable water resources, land uses which increase evapotranspiration or rapid runoff should be discouraged, rivers and groundwater resources could be used to counter irrigation and ameliorate the problems of climate change (Stokes and Howden 2012). Tilman *et. al* (2012) suggested the use of incentives and policies for ensuring the sustainability of agriculture and ecosystem services would be crucial to meet the demands of improving yields without compromising environmental integrity.

A close look at historical weather record of Maiduguri (1986-1996) showed that rural people though not literate have good knowledge of the changes in the climatic variables (Mendelsohn *et. al*.2005). The mean atmospheric temperature of the area has been on the increase since 1986 with low humidity. They also observed that the little rainfall received has been associated with flooding. Darkoh (1998) also reported climate change and variability in the Sahel region, and on the causes of desertification in the dry land of Africa. A similar observation had been reported by (Kandji *et.al.*, 2006) on the climate change variability in the Sahel region, and on the causes of desertification in dry land of Africa respectively. These observations also corroborate scientific studies in general (IPCC, 2007). Thus climate change is already visible in the study area. While many factors continue to influence climate, human activities like overgrazing, coupled with bush burning and other forms of degradation of natural vegetation have become a dominant force (Darkoh, 1998.)

Climate has changed over the past century, leading to biotic changes (Walther *et al*. 2002). Mean global temperature has increased approximately 0.6°C since 1900, (IPCC 2001). Biological responses to the warming already underway include species range shifts and changes in abundance and phenology (Parmesan and Yohe 2003)

Objectives of the Study

1. To evaluate long-term climate data (twenty years) of the area in order to determine variation in climate of the area over the years.
2. To understand farmers perception and experience of climate change

3. To identify the impact and adaptive measures being taken to maintain farmers' farming and livelihood in the area.

II. Material And Method

Study Area

Kwara State is situated between longitudes 8° and 10° north latitudes and 3° and 6° east longitudes, with Niger State in the north, Kogi State in the east, Oyo, Ekiti, and Osun States in the south and an international boundary with the Republic of Benin in the west. The major ethnic groups residing in Kwara State are the Yoruba, Nupe, Bariba, and Fulani. There are sixteen (16) LGAs in the state which include Asa, Baruten, Edu, Ekiti, lfelodun, llorin East, llorin West, llorin South, Irepodun, Kaiama, Moro, Offa, Oyun, Isin, Oke-Ero and Patigi. Farming is the major occupation of the people. This study was carried out in eight (8) local government areas in the state, Baruten, Edu, Ifelodun, Ilorin West, Irepodun, Kaiama, Moro and Patigi.

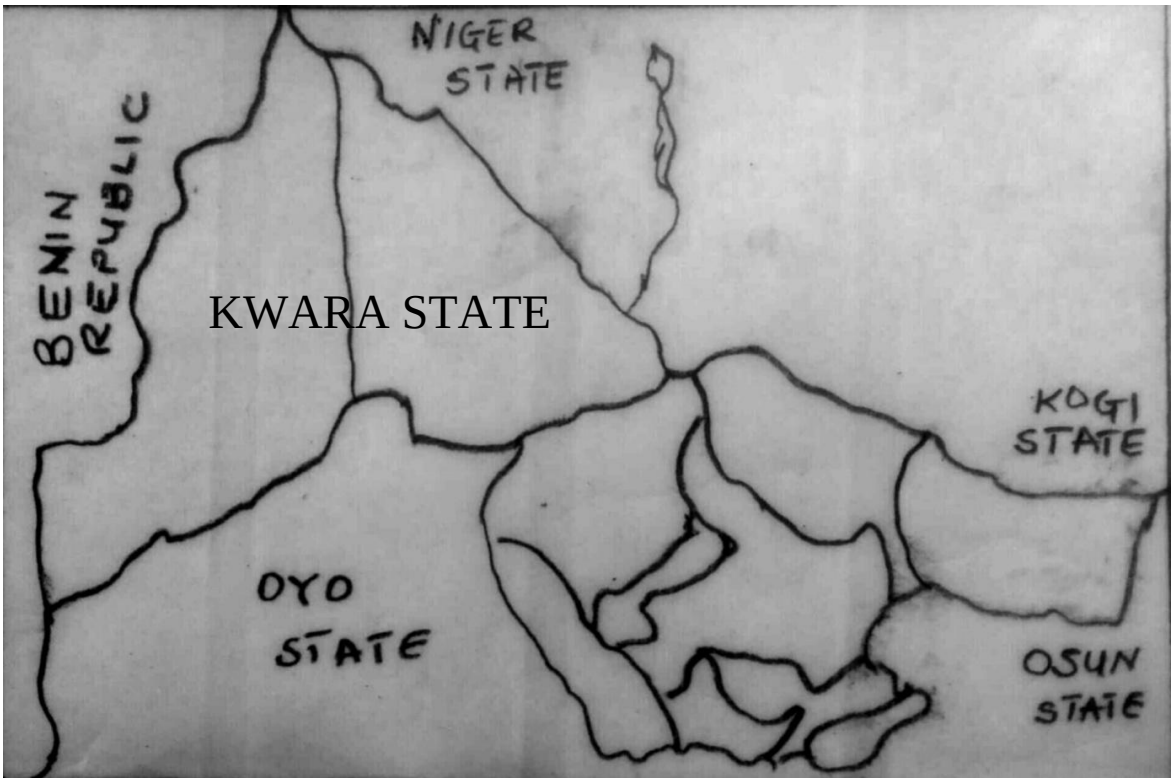


Figure 1: Kwara State, Nigeria

Data collection

The study purposively considered eight local government areas. These are areas with rural farmers whose means of livelihood depends on the use of natural resources such as land and the direct impact of the effects of climate change are felt on their means of livelihood. The socio-economic activities of the people are controlled by issues like environmental degradation, resources depletion, shrinkage of water sources, desertification, flooding etc. Climate variables such as temperature, rainfall, humidity, levels of sunshine are of daily concern to these rural communities. Kwara north contribution to climate change due to human contribution is negligible; however, these rural populations share greatly in the brunt of the impact of climate change from the major cities in the state and Nigeria. The number of villages and households in each local government are not the same, therefore thirty percent of the villages and settlements in each local Government were proportionately selected. A total of 2,000 questionnaires would be administered.

III. Data analysis

Primary and secondary data were collected. Primary data was collected using Structured and open-ended questionnaires on the socio-economic characteristics of the farmers, level of farmer's perception on climate change, Qualitative information such as farmers' experiences regarding climate change and adaptation measures taken on their farmland were collected from interviews and interpreted. Secondary data on rainfall, temperature, humidity; solar radiation and sunshine hours were obtained from NIMET Oshodi, Lagos. The data collected were subjected to descriptive statistical analysis (frequency and percentages) to analyze

socioeconomic characteristics of the farmers; Descriptive statistic was also used to measure the perception and awareness of the farmers. ANOVA was used to test the significant difference between climate variables over 20 years. Graph Pad Prism 6.0 Statistical package was used for the analysis.

IV. Results and Discussion

Socio-economic Characteristics of the Respondents

Table 1abelow showed that majority of the respondents in five LGAs (Edu, Moro, Barutin, Ifelodun and Patigi) surveyed were male with Patigi having the highest (89.9% male) and (10.1% female). The figures in three LGAs Irepodun, Kaiama and Ilorin south are relatively close in male, female ratios with Ilorin South recording (54.2% males) and (45.8% females). Respondents within the age range of 19-28 years showed the highest percentage of people engaged in farming (Irepodun 45.8% and Patigi 45.5%). Ages < 18years and 49 > recorded the lowest number of respondents (Ilorin south and Patigi 3.4% respectively). A total of 971 (68.2%) of respondents engaged in farming in all the LGAs are male. This indicated that male dominates agricultural workforce in the study area. Majority of the respondents sampled 812 (51.1%) practice Islam with animist background. It was observed that the population of seven out the eight local governments sample was dominated by Muslims, only Irepoodun LGA showed a result with a higher Christian population 135 (75%) compared with 45 (25%) Islam. This agrees with Adedoyin *et. al*. (2005) who reported that males dominated the agricultural workforce in Nigeria. The high proportion of male to the female workforce in agriculture may be attributed to the socio-cultural belief of the rural dwellers who believe that farming is an occupation exclusively reserved for the male gender and useful for homemaking. It could also be due to the fact that land ownership and inheritance in a typical Nigerian socio-cultural set up is exclusively for the male child. The female gender, therefore, finds it difficult to acquire land on a substantial quantity which could be used for farming. Religion and its beliefs also play crucial roles in the livelihoods of the study area and is a factor that limits females from inheriting large portions of land which could be used for agriculture. For instance, males who are mostly household heads, have more access to land and participate more in outdoor activities than females.

Table 1a: Socio-economic Characteristics of the Respondents (BIODATA)

	Gender		Age					Religion	
	Male	**Female**	**< 18**	**19-28**	**29-38**	**39-48**	**49 >**	**Christianity**	**Islam**
Edu (195)	165 (84.6)	30 (15.4)	20 (10.3)	34 (17.4)	92 (47.2)	25 (12.8)	20 (10.3)	65 (33.3)	130 (66.7)
Irepodun (180)	160(88.9)	20 (11.1)	19 (10 6)	36 (20)	61 (33.9)	29 (16.1)	31 (17.2)	135 (75)	45 (25)
Moro (185)	161 (87)	24 (13)	18 (9.7)	35 (18.9)	85 (45.9)	22 (11.9)	20 (10.8)	45 (24.3)	140 (75.7)
Barutin (190)	170 (89.5)	20 (10.5)	25 (13.2)	30 (15.8)	99 (52.1)	21 (11.1)	14 (7.3)	41 (21.6)	149 (78.4)
Ifelodun (183)	168 (91.8)	15 (8.2)	20 (10.9)	31 (16.9)	36 (19.7)	50 (27.3)	45 (24.6)	101 (55.2)	82 (44.8)
Kaiama (191)	170 (89.0)	21 (11.0)	27 (14.1)	35 (18.3)	94 (49.2)	26 (13.6)	15 (7.9)	47 (24.6)	144 (75.4)
Patigi (190)	165 (86.8)	25 (13.2)	25 (13.2)	35 (18.4)	83 (43.7)	28 (14.7)	18 (9.5)	90 (47.4)	100 (52.6)
Ilorin South (179)	169 (94.4)	10(5.6)	16 (8.9)	36 (20.1)	59 (33.0)	40 (22.3)	10 (5.6)	101 (56.4)	78 (43.6)
Total (1493)	**1328 (88.9)**	**165 (11.1)**	**170 (11.4)**	**272 (18.2)**	**609 (40.8)**	**241 (16.1)**	**173 (11.6)**	**625 (41.8)**	**868 (59.1)**

Table 1b: Socio-economic Characteristics of the Respondents

LGAs / Number of Respondents	Marital Status				Family size			Educational Status				
	Single	**Married**	**Divorced**	**Widow**	**1-5**	**6-10**	**11-15**	**Not Educ.**	**Attend 1^0**	**2^0 Drop out**	**Comp 2^0**	**Tertiary**
Edu (195)	40 (20.5)	144 (73.8)	20 (10.3)	10 (5.1)	88 (45.1)	61 (31.3)	45 (23.1)	52 (26.7)	24 (12.3)	20 (10.3)	36 (18.5)	63 (32.3)
Irepodun (180)	74 (41.1)	82 (45.5)	23 (12.8)	11 (6.1)	115 (63.8)	61 (33.7)	19 (10.5)	32 (17.7)	18 (10.0)	15 (8.4)	38 (21.1)	91 (50.6)
Moro (185)	70 (37.8)	80 (43.2)	23 (12.4)	12 (6.5)	111 (60.0)	56 (30.3)	19 (10.2)	25 (18.6)	20 (12.9)	15 (8.1)	52 (28.1)	73 (39.5)
Barutin (190)	45 (23.7)	117 (61.6)	18 (9.5)	10 (5.1)	100 (52.6)	51 (26.8)	39 (20.5)	90 (47.4)	30 (15.8)	20 (10.5)	30 (15.8)	40 (21.1)
Ifelodun (183)	100 (54.6)	72 (39.3)	8 (4.4)	3 (1.8)	105 (57.4)	59 (32.2)	19 (10.4)	26 (14.2)	16 (8.7)	15 (8.2)	38 (20.8)	88 (48.1)
Kaiama (191)	46 (24.1)	121 (63.4)	14 (7.3)	10 (5.2)	80 (41.9)	64 (33.5)	47 (24.6)	83 (43.5)	27 (14.1)	18 (9.4)	28 (14.7)	35 (18.3)
Patigi (191)	38 (20.0)	129 (67.9)	15 (7.9)	8 (4.2)	62 (32.6)	77 (40.5)	51 (26.8)	45 (23.7)	25 (13.2)	20 (10.5)	35 (18.4)	65 (34.2)
Ilorin South (179)	111 (62.0)	56 (31.3)	7 (3.9)	8 (4.5)	89 (49.7)	80 (44.7)	10 (5.6)	9 (5.0)	35 (19.6)	3 (1.7)	51 (28.5)	81 (45.3)
Total (1493)	**524 (35.1)**	**801 (53.7)**	**128 (8.6)**	**72 (4.8)**	**750 (50.2)**	**509 (34.1)**	**249 (16.7)**	**362 (24.2)**	**195 (13.1)**	**126 (8.4)**	**308 (20.6)**	**536 (35.9)**

One thousand four hundred and ninety three (74.7%) of questionnaires sent out was administered and returned successfully. From the results obtained, there were more males involved in farming than females in the LGAs surveyed. Results from all the LGAs showed that most of the respondents interviewed are still in their prime age (29-38) years except in Ifelodun LGA. Young people are rarely engaged in farming as the statistics showed that less than 33% of the respondents are within the age range of 18-28 years. This could probably be due to the fact that most of them are still in their formative years in education or they did not see any economic future in farming (Table 1a). Majority of the respondents 801 (53.7%) in the LGAs were married, 524 (35.1%) single while 72 (4.8%) were widows. Traditional customs in most rural communities in Nigeria denies widows access to farmlands and properties when their husbands die, and women are often disinherited by parents when they marry. This could be responsible for the low number of widows involved in farming. The result showed that 750 (50.2%) of the respondents had family sizes in the range of 1-5, 509 (34.1%) in the range of 6-10, while 362 (24.2%) in the range of 11 children and above per household. It was observed that 362 (24.2%) of the respondents in the study area had had no education, 195 (13.4%) had primary education, 126 (8.4%) are secondary school dropouts, 308 (20.6%) completed secondary school, and 536 (35.9%) had tertiary education. This indicates that majority of the respondents have family responsibilities to cater for which affects their farming activities. The percentage of families with 1-5 members was higher compared with families with 6-10 and 11-15 members (Table 1b) above. This result is contrary to earlier submissions by researchers that rural dwellers dependent on family size (a large number of children) as labour for farming activities. It was observed that the percentage of uneducated respondents and respondents with a large number of family are the same, it could therefore be argued that illiteracy is one of the factors responsible for uncontrolled birth. It can also be deduced that education and type of agriculture practiced in these communities have an effect on family size since the number of respondents with tertiary education was highest 536 (35.9%) and majority of the respondents practice animal rearing only, therefore large number of children are not needed to work the land. There are equally a high number of commercial farmers in the area, mechanized equipment and improved tools are gradually replacing the use of human labour on the farms.

The study showed that 221 (14.8%) of the farmers engage in crop production, 793 (53.1%) practice mixed farming system of agriculture, 395 (26.5%) engage in animal production while 73 (4.9%) engage in fish farming. Most of the farmers 917 (61.4%) were engaged in subsistence farming while 566 (37.9%) practice commercial agriculture. Farm size varied from 1 to 20 hectares, with about 758 (50.8%) having between 1 and 5 hectares, while the rest 735 (49.2%) had between 6 and 20 hectares (Table 1c) above. Farming on small holdings for family sustainance still predominates in these communities.

Table 1d below shows that maize is the predominant crop growing the rural people in this region while sheep and goats are the major animals reared within the communities by herders and their settlements. A large number of respondents sampled 425 (28.5%) keep sheep and goats. The main stapple crop grown in these area is maize which represent 11.5% of the crops in the sampled area. Fisheries which is practiced by only 4.9% of the population sampled an upcoming agricultural practice noticed mainly among few who have the priviledge of education and some training in fish rearing techniques.

Table 1c: Farming System, Scale and Size of the Respondents in the LGAs

	Farming system Practiced				**Farm Size**				**Farming Scale**	
	Crop only	Mixed Farming	Animal only	Fish Farming	<2	3-5	6-10	11-15	Subs	Comm
Edu (195)	8 (4.1)	130 (66.7)	47 (24.1)	10 (5.1)	35 (17.9)	57 (29.2)	50 (25.6)	53 (27.2)	146 (74.9)	39 (20.1)
Irepodun (180)	72 (40.0)	64 (35.)6	40 (22.2)	4 (2.2)	56 (31.1)	47 (26.1)	50 (27.8)	27 (15.0)	30 (16.7)	150 (83.3)
Moro (185)	15 (8.1)	118 (63.8)	44 (23.8)	8 (4.3)	45 (24.3)	48 (25.9)	45 (24.3)	47 (25.4)	136 (73.5)	49 (26. 5)
Barutin (190)	15 (7.9)	120 (63.2)	52 (27.4)	3 (1.6)	32 (16.8)	52 (27.4)	58 (30. 5)	48 (25.3)	140 (73.7)	50 (26.3)
Ifelodun (183)	68 (37.2)	71 (38.8)	40 (21.9)	4 (2.2)	52 (28.4)	45 (24.6)	48 (26.2)	38 (20.8)	90 (49.2)	93 (50.8)
Kaiama (191)	6 (8.4)	115 (60.1)	55 (28.8)	5 (2.6)	30 (15.7)	63 (33.0)	48 (25.1)	50 (26.2)	143 (74.9)	48 (25.1)
Patigi (190)	5 (2.6)	118 (62.1)	51 (26.8)	16 (8.4)	36 (18.9)	50 (26.3)	48 (25.3)	56 (29.5)	143 (75.3)	47 (24.7)
Ilorin South (179)	32 (17.9)	57 (31.8)	66 (36.9)	23 (12.8)	56 (31.3)	54 (30.2)	51 (28.5)	18 (10.1)	89 (49.7)	90 (50.3)
Total (1493)	**221 (14.8)**	**793 (53.1)**	**395 (26.5)**	**73 (4.9)**	**342 (22.9)**	**416 (27.9)**	**398 (26.7)**	**337 (22.6)**	**917 (61.4)**	**566 (37.9)**

Table 1d: Sumary of crops and animals produced in each LGA										
	Crop Produced					Animals Reared				
	Maize	Yam	Cassava	G nut	Rice	Cattle.	Piggery	Poultry	Fish	Goat/Sheep
Edu (195)	8 (4.1)	9 (4.6)	15 (7.7)	35 (17.9)	11 (5.6)	14 (7.2)	2 (1.0)	32 (16.4)	10 (5.1)	59 (30.3)
Irepodun (180)	24 (13.3)	20 (11.1)	30 (16.7)	13 (7.2)	7 (3.8)	6 (3.3)	12 (6.7)	10 (5.6)	4 (2.2)	44 (24.4)
Moro (185)	23 (12.4)	7 (3.8)	19 (10.3)	13 (7.0)	4 (2.2)	19 (10.3)	11 (5.9)	18 (9.7)	8 (4.3)	63 (34.1)
Barutin (190)	29 (15.3)	48 (25.3)	10 (5.3)	13 (6.8)	2 (1.1)	20 (10.5)	3 (1.6)	4 (2.1)	3 (1.6)	55 (28.9)
Ifelodun (183)	25 (13.7)	10 (5.5)	25 (13.7)	12 (6.6)	2 (1.1)	14 (7.7)	18 (9.8)	24 (13.1)	4(2.2)	49 (26.8)
Kaiama (191)	31 (16.2)	40 (20.9)	10 (5.2)	13 (6.8)	2 (1.0)	22 (11.5)	3 (1.6)	10 (5.2)	5(2.6)	55 (28.8)
Patigi (190)	14 (7.4)	9 (4.7)	19 (10.0)	29 (15.3)	23 (12.1)	9 (4.7)	8 (4.2)	10 (5.3)	16 (8.4)	53 (27.9)
Ilorin South (179)	18 (10.1)	4 (2.2)	7 (3.9)	5 (2.8)	2 (1.1)	22 (12.3)	17 (9.5)	24 (13.4)	23 (12.8)	47 (26.3)
Total (1493)	**172 (11.5)**	**147 (9.8)**	**135 (9.0)**	**133 (8.9)**	**53 (3.5)**	**126 (8.4)**	**74 (5.0)**	**132 (8.8)**	**73 (4.9)**	**425 (28.5)**

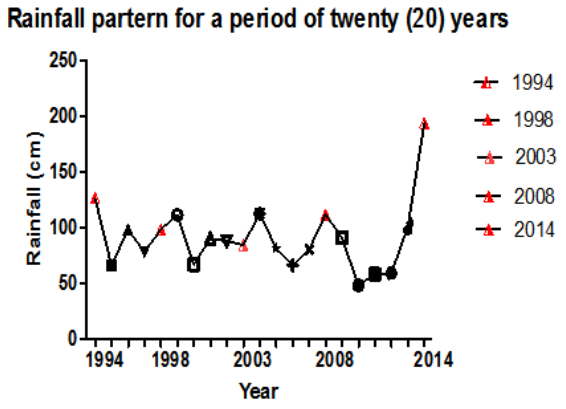


Figure 2a

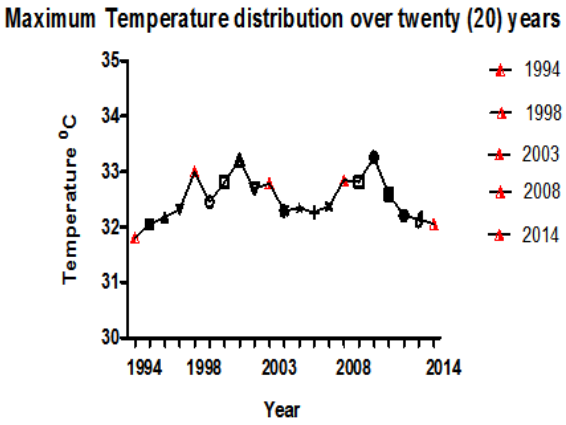


Figure 2b

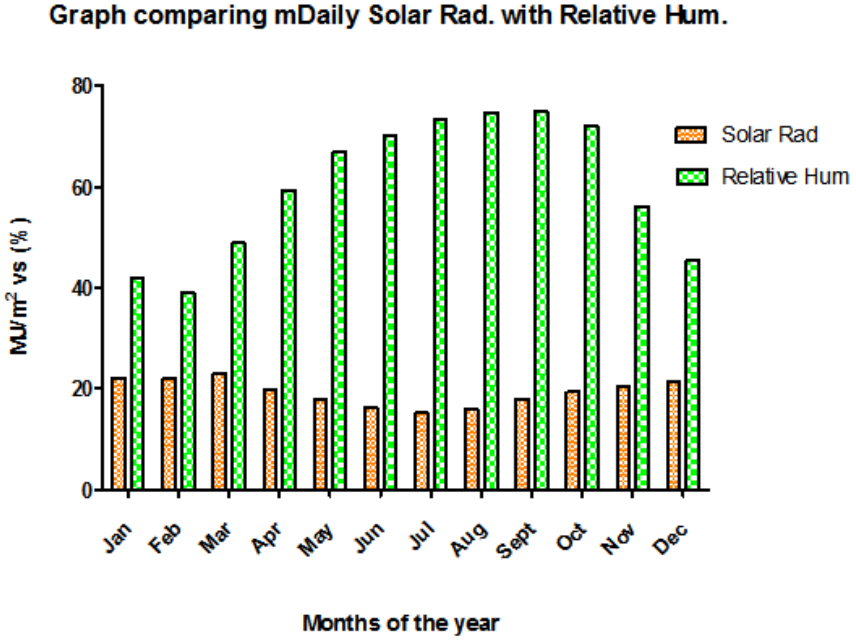


Figure 3

The rainfall and maximum daytime temperature pattern of the study area for a period of twenty (20) years were obtained and analyzed (Figures. 2a and 2b). The result shows that rainfall in the study areas was high in the years 1999, 2003, 2007 and 2014 with the incidence of flooding noticed in several areas. This agrees with the report of Adeoye *et.al*., (2009) who working on climate change and the menace of flooding in Nigerian cities noticed hazardous floods in Niger, Bayelsa Delta and Kaiama in 2011. It was observed that mean daytime temperatures in the years mentioned above were lower compared with the years preceding or after them. The years with high mean daytime temperatures according to this survey were 1998, 2001 and 2010; it was equally observed that rainfalls within these years were low. The result shows that there is an inverse relationship between the mean daytime solar radiation and relative humidity in the study area (Fig. 3). It was also gathered from the questionnaires administered that there were incidents of floods in some of the communities in these years.

Table 1eHuman activities affecting Climate change in sampled areas

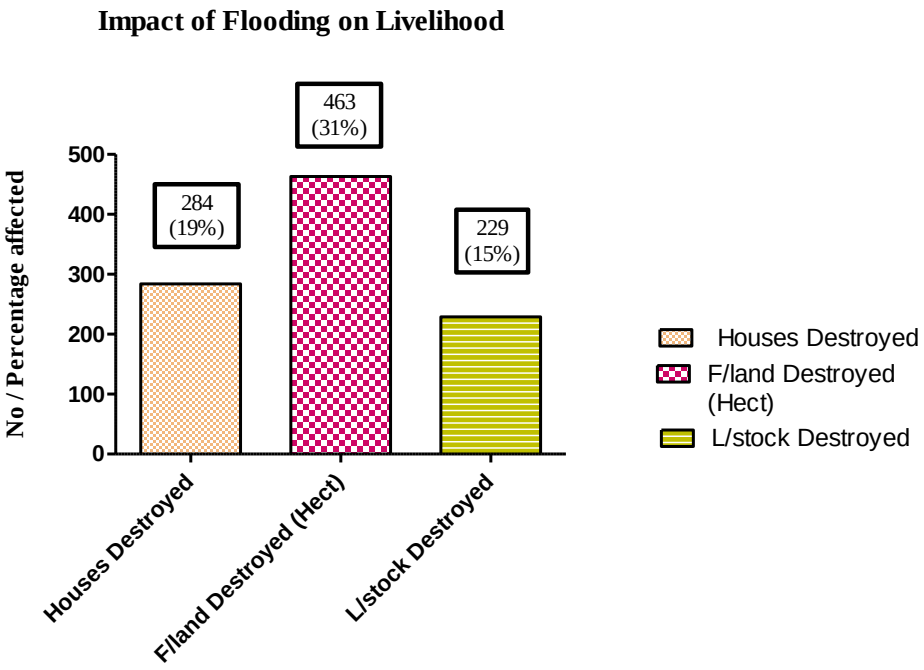
	Human Activities					Vegetation Type			Other Activities		
	Charcoal	Building	Farmland	Industries	Livestock	Woody Perennials	Shrubs	Grassland	Pest	Diseases	Bush burning
Edu (195)	35 (21.1)	31 (18.7)	70 (42.2)	10 (6.0)	20 (12.0)	20 (12.0)	40 (24.1)	105 (63.9)	113 (68.1)	33 (19.9)	20 (12.0)
Irepodun (180)	74 (44.6)	28 (16.9)	53 (31.9)	11 (6.1)	11 (6.6)	24 (14.5)	54 (32.5)	88 (53.0)	79 (47.6)	57 (34.3)	30 (18.1)
Moro (185)	31 (44.3)	61 (32.8)	16 (22.9)	-	23 (32.9)	11 (15.7)	20 (28.6)	39 (55.7)	16 (22.9)	9 (12.9)	45 (64.3)
Barutin (190)	90 (54.2)	13 (7.8)	43 (25.9)	-	10 (6.0)	11 (6.6)	110 (66.3)	45 (27.1)	8 (11.4)	16 (22.9)	45 (65.7)
Ifelodun (183)	36 (21.6)	71 (42.5)	35 (21.0)	5 (3.0)	20 (12.0)	42 (25.1)	50 (29.9)	75 (44.9)	71 (42.5)	54 (32.3)	42 (25.1)
Kaiama (191)	58 (47.9)	27 (19.0)	19 (13.4)	2 (1.1)	15 (10.5)	35 (24.6)	23 (16.2)	84 (59.2)	10 (7.0)	13 (9.2)	119 (83.8)
Patigi (190)	85 (47.8)	52 (29.2)	23 (12.9)	2 (1.1)	16 (9.0)	9 (5.1)	100 (56.2)	69 (38.8)	110 (61.8)	47 (26.4)	11 (6.2)
Ilorin South (179)	90 (50.3)	62 35.0)	8 (4.5)	15 (8.4)	2 (1.1)	46 (25.0)	54 (36.5)	77 (43.5)	55 (31.1)	77 (43.5)	45 (25.4)
Total 1493	**499 (27.4)**	**345 (23.1)**	**267 (17.9)**	**45 (3.1)**	**117 (7.8)**	**198 (13.3)**	**451 (30.2)**	**582 (39.0)**	**462 (30.9)**	**306 (20.5)**	**357 (23.9)**

Impact of Human activities on Vegetation and Livelihood of the Sampled areas

Result from table 1e above showed that human activities are agents of climate change and impact negatively on the livelihood of the sampled areas. Logging for charcoal and building is very high contributing to over 50% loss of vegetation. Land clearing for farmland and livestock grazing take up 384 (25.7%). Clearing for industry is very low indicating that these communities are predominantly rural or neglected by government presence. Human activities due to climate change contributed to decline in soil fertility, water cycle in the communities has been affected by climate change, high temperature have led to surface evapotranspiration from plants and land surface. This agreed with UNFCC report 2007 which stated that the removal of part of the forest or vegetation cover in a given region results in much moisture loss. This could lead to drier weather, as it could be inferred from the result of the respondent about forty percent of the vegetation in this area is turning to grassland. This invariably has led to reduction in the productivity of both the tree and agricultural crops. At extreme dryness a lot of trees and other plants will die leaving the soil open and vulnerable to the desiccating effects of sun and soil erosion which collectively reduce the nutrients content of the soil. Trees serve as carbon sink because they utilize CO_2 in the physiological process of photosynthesis, carbon compounds like carbohydrates are synthesized through the process but when the trees died and decayed or are cut and burnt the carbon contents are released either into the soil or atmosphere and the process continues but is broken when the trees are adversely affected by climatic variables. Laurence (1999) reported that when forests are cleared, the carbon is released as CO_2, it leads to an increase in the atmospheric CO_2 concentration. CO_2 is the major contributor to the greenhouse effect. According to IPCC (2001), the effects of climate change can reduce agricultural production, worsen food security, increase flooding and drought spreading diseases and increased risk of conflicts over scarce land and water resources.

Impact of Flooding on Livelihood

Figure 1:showed that 284 (19.0%) housing units belonging to some of the respondents or their neighbours have been destroyed due to the effect of heavy flooding, 463 hectares approximately (31.0%) of the respondents interviewed reported loss of farmlands to flooding, while 229 (15.3%) pointed out that their livestock were affected by flood. This indicates that flooding is rampant in the sampled areas and its effect is a menace to both man and his livelihood. It was reported by Darkoh (1998) that valuable properties including houses, agricultural products, and livestock were lost due to flooding. According to Yakubu and Yakubu (2008) change in climate as a result of increasing temperature has brought about increasing water bodies in Sokoto state (flood). Annual flood are commonly experienced along the Sokoto Rima river, and farmlands and houses are submerged, this also lead to tree and agricultural crop failure.



Effect of Drought on Livelihood of the communities

30.6% of the respondents reported that the increased insect attacks are the major effects of drought on farm products (figure 2) this could be attributable to the dry condition that favours rapid development of some insects (e. g caterpillar). 15.7% of the respondents believed that destruction of fauna and flora was aggravated by drought, while only 27.9% of the respondents agreed that low productivity of farmlands was caused by drought. This indicates that increased insect attack brings destruction on productivity and economic livelihood. This agrees with NIMET report (2001) which observed in Borno state (Maiduguri) from 1960-1999 that drought threatened agricultural and forestland areas of Nigeria. The persistent droughts have often times resulted in famine in the northern Nigeria, for instance during the drought of 1972-1973, about 300,000 animals died and farm yields dropped by 60%.

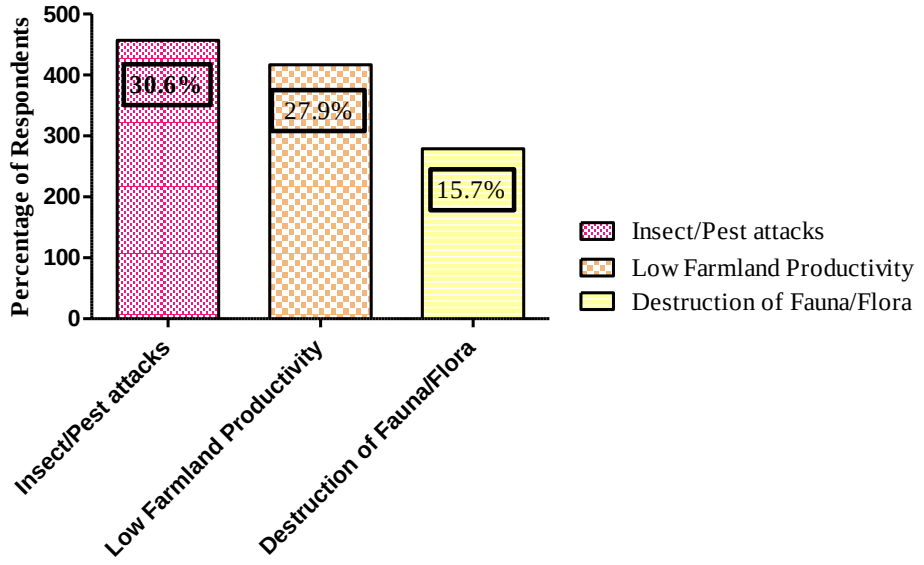


Figure 2: Effect of Drought on Livelihood

Threat of Climate Change

The result showed that 36.1% of the respondents believed that threat of climate change was more on health, the changes affect people's health as evidenced by widespread diseases such as malaria and high blood pressure. 16.4% of the respondenst showed that food supply/agriculture is more threatened by climate change, 11.3% believed that fuelwood availability is affected by climate change, while 4.0% and 34% of the respondents respectively repored that agrobusiness and biodiversity are also threatened by climate change in the study area (Figure 3). According to A.A.I (2006),difference in weather conditions in a day or over a year influence seasonal rainfall patterns and temperature levels. These changes often times lead to droughts and incessant rainfall, thereby affecting people's cropping patterns and agronomic calendars.

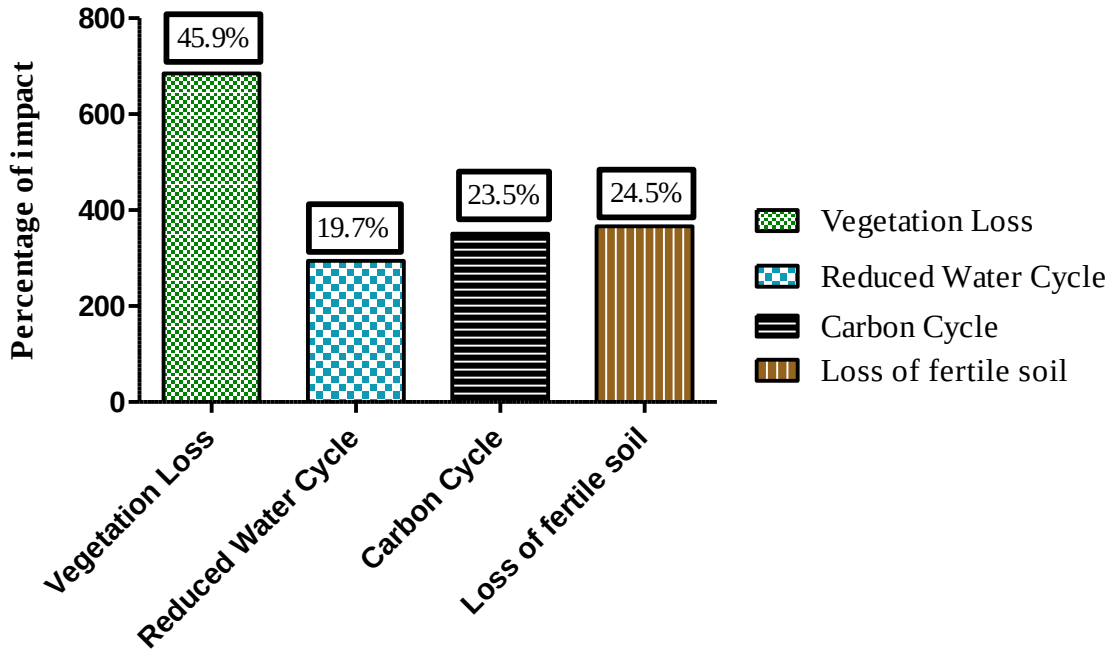


Figure 3: Effect of Climate change on Vegetation

Causes of climate change

The result showed that 40.8% of the respondents mentioned that deforestation is the major cause in the area (Figure 4). Another 25.1% thought that over population is the leading cause of climate change in their communities, 21% believed over grazing causes climate change, while only 12% of the respondents opined that poor management of soil is the major cause of climate change in their area. This implies that deforestation generally increases the rates of soil erosion by increasing the amount of run-off and reducing the protection of the soil through the litter fall. According to UNFCC (2007) deforestation has negative effects on the environment; the most drastic impact is the loss of habitat for millions of species. Seventy percent of the earth's land animals and plant live in the forest and many cannot survive deforestation that destroyed their homes.

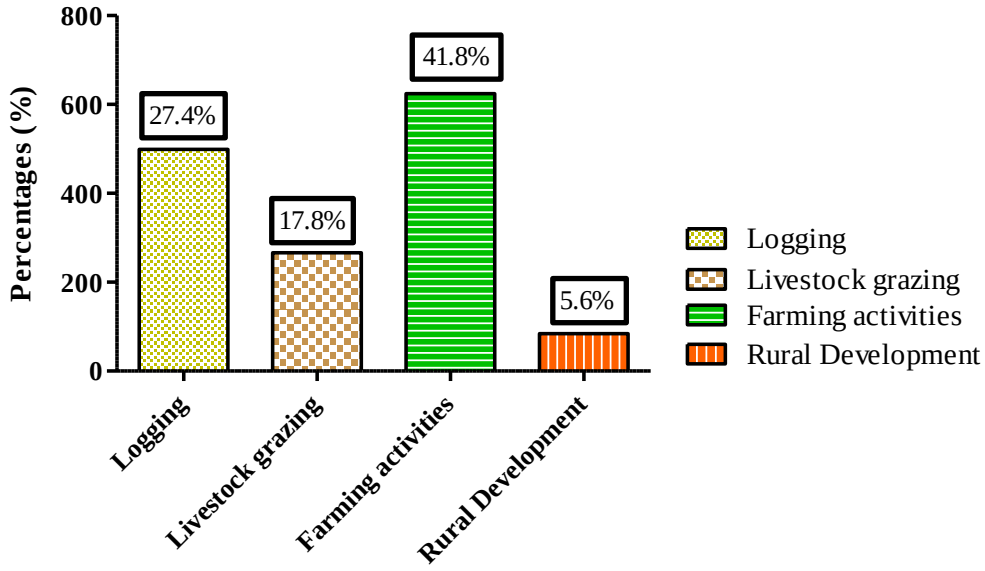


Figure 4: Impact of human activities on sampled area vegetation

Types of Pests Introduced

Climate change had led to various forms of crops infestations thereby reducing the quality and quantity of crops produced. As shown in Figure 5 below, 43.9% of the respondent opined that birds affect the production of crops, 18.2% of the respondent said weevils affect crop production right from the field to the store, 9.8% mentioned that nematode affect their farm produce, while 25.6.0% of the respondents showed that grasshopper affect crop production. According to Darkoh (1998) bird has more destroyed agricultural and forest resources. Quelea birds have added pressure on the already fragile ecosystem. According to one of the respondents, he had lost more than 100 bags of grain to invasion of quelea birds in the past five years.

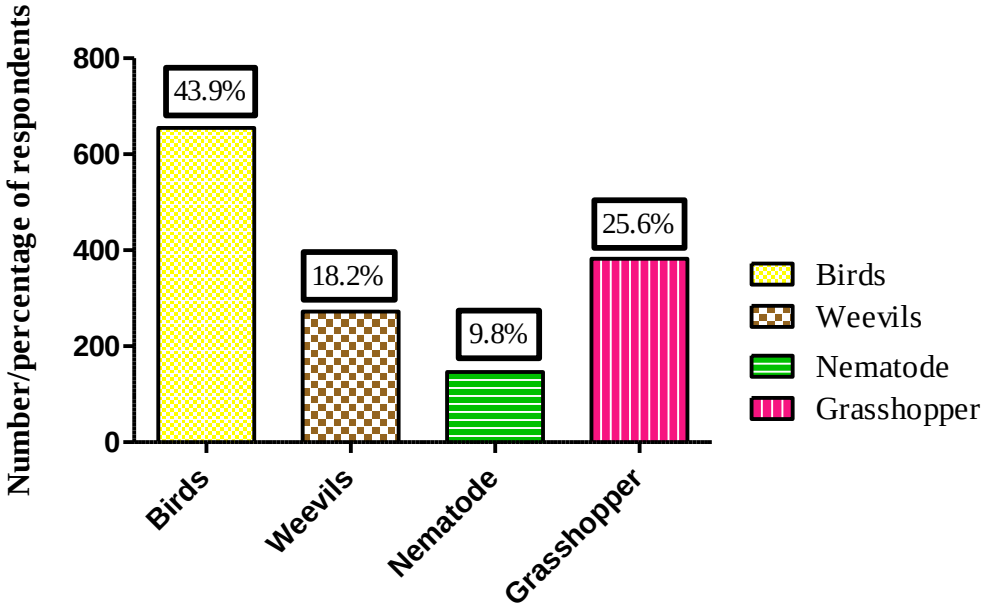


Figure 5: % Pest /types in sampled area

Labour

Most of the farmers (72.1%) spent ₦ 3000-200,000, 12.6% spent 201,000-400,000, 8.9% of the farmers spent 401,000-600,000 to carry out farming activities yearly (Table 3).This indicates that majority of the respondents spent little amount on labour to carryout their farming activities.This finding implied that the study area was dominated by small scale farmers as categorized by Reddy *etal*. (2004) who reported that majority of the farmers spent little amount to carryout farming activities due to small size of land and therefore labour is

grossly underutilised. The relatively small farm sizes could imply that the farms could be easily and properly managed without employing much labour.

Table 3: Showing labour cost and Crop produced

	1	2	3	4
Labour cost (N)	3000-200,000 (**72.1%**)	201,000-400,000 (**12.6%**)	401,000-600,000 (**8.9%**)	>600,000 (**6.4%**)
Yield (kg)	200-4,000 (**61.8%**)	4,001-8,000 (**13.2%**)	8,001-12,000 (**11.2%**)	12,000-23,000 (**13.8%**)

V. Conclusion and Recommendations

This study revealed that farmers are aware of some of the menace of climate change. Over fifty percent of respondents interviewed were able to identify climate change drivers such as an increase in daily temperature and rainfall pattern in their environment. Some of the farmers were also able to record the incidents of flooding and drought in their communities which correspond with records obtained from NIMET. Du, *et. al*., (2010) stated that nature (climate change drivers) are determinants of flooding. Felino (2007) reported that the factors that influence the occurrence of flooding are anthropogenic in nature and according to the World Meteorological Organization (2008); causal factors of floods include hydrological extremes and human factors. However, the understanding that these changes occur due to their neglect and the way they relate to their environment is what calls for questioning. For example, the practice of shifting cultivation, indiscriminate land clearing and bush burning both for cultivation, pest and disease infestation – prior to or during the two main tropical seasons, gathering of fuelwood, charcoal etc. Other interactions with the farmers revealed that some of them attribute this menace to local beliefs such as "punishment from the gods", thereby resorting the gods for a solution Daily Sketch (1989). This finding corroborates those of Olayinka *et. al*., (2015). Farmers need to adjust their cultivation and rearing systems as well as management practices to ensure that they make efficient use of the limited land and water resources; and rainfall for food production and other needs.

The result indicated significant impact of climate change on livelihood such that many people lost their lives due to flood, livestock were destroyed due to flood and livestock were destroyed due to harsh weather. The respondents also indicated that farm produce were invaded by birds (quelea), deforestation was the major cause of climate change, and why some agreed that over population was responsible.

The rural dwellers and farming communities need to be further sensitized on the adverse effect of destroying the natural environment for commercial activities and farming. The government should ensure affordable alternative sources of energy for domestic use to the communities to prevent the indiscriminate logging and clear felling of wood for charcoal and fuelwood, tree planting be encouraged and the World bank should assist the farmers as climate change is affecting their livelihood.

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