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ANALYSIS OF CLIMATE CHANGE AWARENESS AND ADAPTATION STRATEGIES AMONG MAIZE FARMERS IN GIREI LOCAL GOVERNMENT AREA

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Abstract

This research was designed to examine the level of climate change awareness among Maize farmers in Girei LGA. Both primary and secondary data were used in this research, primary data were obtained from questionnaire, interview and observation. All the questions in the questionnaire were related to climate change awareness, adaptation and mitigation among maize farmers while other related information was obtained through interview and observation. A total of 200 registered maize farmers were sampled for the studies and only 191 questionnaires were recovered and subjected to statistical analysis using SPSS package. Simple frequency and percentages were used for interpretation of the data. Result on climate change awareness revealed that, majority of the farmers who accounted for 75.9% of the total farmers in the area were aware of climate change and 55% of the total farmers experience climate change through increase in temperature, in addition, majority of the maize farmers (40.8%) believed that Drought was the major climatic hazard experience in the study area. Result on adaptation measure to climate change among maize farmers revealed that, most of the farmers (42.4%) adjust planting date as the method used in adopting climate change in the area while 23.0% switch to cultivation of other crop. Result on the limiting factors to the adaptation method on the other hand showed that most of the farmers (74.3%) agreed that they encountered problem in implementing the desired adaptation strategies most especially in aspect of Agricultural technology and finance required to carry out farming process. They also admitted that, agricultural input such as high yield varieties; pesticide and herbicide are other constraint to maize farmers in their farming operation. There is a need for Government and NGO assistance in terms of agricultural input and extension services which will help to improve crop yield. In addition, cultivation of highly improve variety will reduce the risk of poor maize yield.

Key words: Climate change, awareness, adaptation, Maize farmers and Gerei

Introduction

Climate change is defined by different people with different view, according to Liu and Penner, (2002); Free and Angel, (2002); Amman *et al*, (2003); and Hegerl *et al*, (2007) it is the statistical evidence of changes in the mean and or variability of climatic properties that persist for an extended period of a decade or longer. It was also explained by IPCC (2017) as any change in climatic system over time, whether natural variability or because of human activities. They further explained it as a Current global concern resulted from human activities, specifically from the release of carbon dioxide and other greenhouse gases to the atmosphere. Climate change is one of the major challenges

affecting the world today. It affects almost all aspect of the world ranging from water resources, food security, hydropower and human health (Magadza., 2000). Agriculture is one of the major sectors affected by climate and there is no aspect of Agriculture that is not affected by climate. For example, Adebayo (2010) reported that, climate affect agriculture cultivation in many ways; land preparations, selection of crops, crop growing and harvesting. It was also documented by IPCC, (2007) that, many farmers record low yield of crop because of low rainfall, increase in temperature, change in relative humidity and solar radiation. In addition, FAO (2009) documented that, this effect of climate change on Agriculture activities varies from one region to another.

In Nigeria, evidence of climate change in the country are indicated by increasing surface air temperature, increasing heat waves which enhance disease vectors, communicable diseases epidemics, increased evaporation that lead to drying up of streams and river, loss of forest vegetation which promote soil degradation and desertification, as well as change in seasonal patterns of climate variables leading to reduction in agricultural productivity (NEST, 2003 and NEST, 2008). Similarly, in Adamawa State, evidence from the climatic record showed a delayed in onset date of rains, reduction in length of rainy season and increase in maximum temperature (Adebayo,2011). All these impact are revealed on different aspect of agriculture and crop types, for example, A research conducted on the impact of climate change on maize yield, on the maize growing regions (Northeast) of Nigeria, showed that temperature increase during the growing period of maize have impacting consequences on the yield. The yield shows high percentage decline of 10.8%. whereas the analysis on the findings indicated that when all the weather variables impacted on the yield, yield would be low due to impact of the weather change (Buba *et al.* 2017). Since evidence was revealed on effect of climate on maize, there is therefore a need to examine the level of the climate awareness among the maize farmers, their method of adaptation and constraint to the adaptation. This assertion, therefore inform the need to conduct the research on the effect of climate change on maize farming in Girei LGA.

Four different objectives were design to achieve this aim;

i. Examine the level of climate change awareness among maize farmers in Girei LGA
ii. Examine the adaptation method used by maize farmers in Girei LGA
iii. Examine the constraint of the adaptation method used by maize farmers.

Study Area and Method

Girel local government area is situated between latitude 12 11`51``N to 12 41` 49``N and 12 1` 23``E to 12 33` 8``E and covers a total land area of 1848km^2 (See figure 1). The study area is found within the tropical climate and has a mean monthly sunshine hours of about 220 from January to April, this decrease to mean value of 207 hours between May to September due to cloudiness, The mean sunshine hour increase again to about 255 from the period between October and December, temperatures gradual increase from January to April due to increase receipt of solar radiation. The temperature is usually experienced before the harmattan dust come around December, the study area annual rainfall of 919mm (Adebayo, 1999).

The dominant soil types found in the study area Cambisol, Luvissol and Regosols which are located in different part of the area. Cambisol is the most widely sprayed soil type and are deeply poor drained with medium tenure and have sandy loamy, silt loamy or

loamy sand surface horizon and lower horizon are usually sandy Luvissols they are moderately acid, and are shallow to moderately deep and well drained. They have gravel to loamy sandy surface horizontal and lower horizons are usually sandy. Regosols; they are coarse textured soils with moderate to low organic content. They are general dark to grey, grayish brown in color with PH of 6.4. Regosols are general loosely extensively drained and intensively leached (Ray, 1999). Both primary and secondary data were used in this research, primary data were obtained from questionnaire, interview and observation while secondary data (climatic Data) were collected from Modibbo Adama University of Technology (MAUTECH), Yola Metrological station. All the questions in questionnaire were related to effect of maize farming while other related information where obtained through interview and observation. Total numbers of maize farmers on the other hand were collected from Maize farmers Association, Yola Branch.

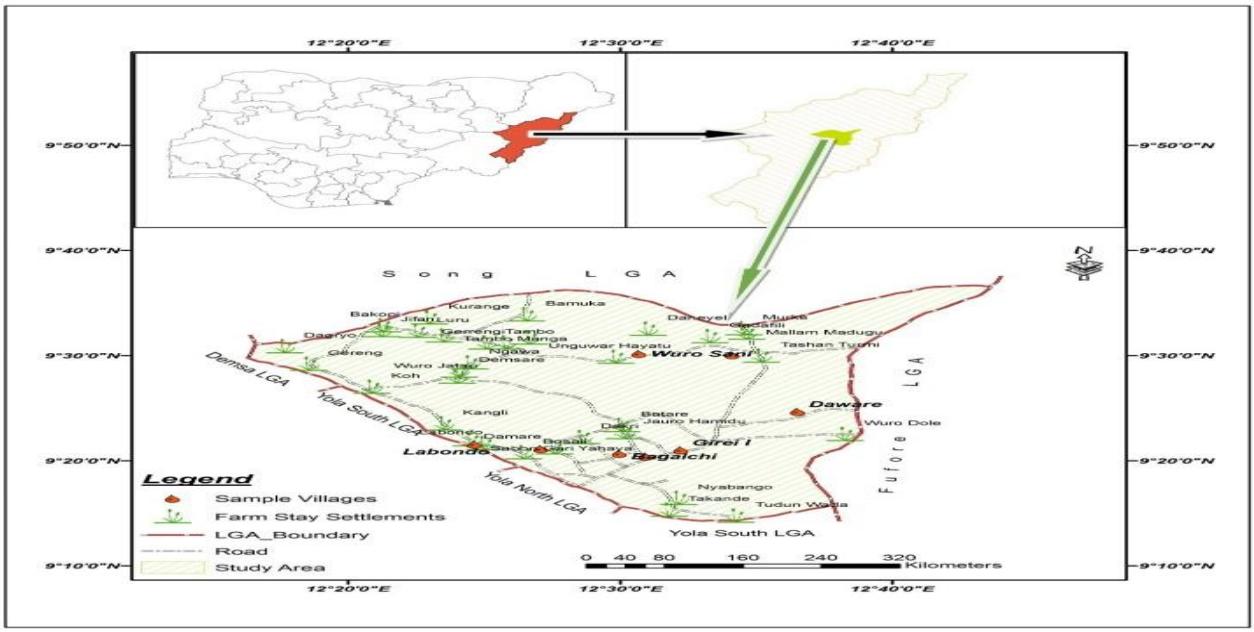

Figure 1: Map of the Study Area

In order to achieve effective survey coverage, it is paramount to involve an appropriate sampling technique as the leading instrument for the successful completion of a research work. In regards to this, proportional formula for allocating questionnaires was adopted using the Cochran`s (1977) proportional techniques formula:-

$$n = \frac{N}{1 + N[e]^2}$$

Where n= sample size

N= total population of maize farmers

$(e)^2$ = the level of precision

(e) = 5% [0.05]

Using the equation above, the total number of questionnaires used was computed as follows;

The total number of registered maize farmers in Girel is 400, therefore; $\frac{400}{1+400(0.05)^2} = 200$.

The total number of questionnaire administered to the respondents are two hundred (200) questionnaires out of which only one hundred and ninety one (191) were adequately retrieved from the respondent and were subjected to analysis.

Table 1: Computation of sample questionnaire Sample Questionnaire Administered to Various Locations

Wards	Computation of sample questionnaire to various location	No. of sample questionnaire
Jabbilamba	No. of maize farmers in Jabbilamba X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{64}{400} X\ 200 = 32.0$
M/Daware	No. of maize farmers in M/Daware X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{50}{400} X\ 200 = 25$
Wurosunu	No. of maize farmers Wurosunu X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{62}{400} X\ 200 = 31$
Labondo	No. of maize farmers in Labondo X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{40}{400} X\ 200 = 20.0$
Damare	No. of maize farmers in Damare X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{48}{400} X\ 200 = 24.0$
Sangere Futy	No. of maize farmers in Sangere futy X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{44}{400} X\ 200 = 22.0$
Girel 1	No. of maize farmers in Girel 1 X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{50}{400}$ X 200 = 25
Bagalchi	No. of maize farmers in Girel 2 X Total Questionnaire / Total No.of maize farmers in Girel	$\frac{42}{400} X\ 200 = 21$

Source: Field Survey, 2019.

All the data collected were subjected to different statistical analysis. Climatic data were analyzed using bar chart and trend analysis while all questions from the questionnaire were analyzed using simple frequency in SPSS.

Results and Discussion

In other to examine the level of climate change awareness among farmers, several questions were address. These includes; awareness of climate change among maize farmers, how they experience climate change in their maize farms, their experience on rainfall variability, onset date of rain and the major climatic hazard they experience.

Result on climate change awareness as presented in Table 1 revealed that, majority of the farmers (75.9%) of the total farmers in the area are aware of climate change and 55% experience climate change due to increase in temperature, which clearly implies that most of the maize farmers in the study area experience climate change through temperature increase. This is similar with the observation of Buba *et al.* (2017) documented that, temperature increase during the growing period of maize in maize growing region of Northeastern Nigeria has impacting consequences on yield of Maize. Maize farmers in the area also acknowledged that, changes in onset date of rain which now start late than normal is a sign of climate change in the area and the total rainfall amount is sufficient for maize growth and yield. This is not surprising because maize crop required moderate rainfall amount for it growth and yield, unlike other crops like rice that required sufficient rainfall amount for it growth and yield. In addition, maize farmers in the area agreed that rainfall in the area start late than usual this affects the normal Onset date of rain. This result agreed with the view of Adebayo, (2011) who documented that, in Adamawa State, evidence from the climatic record showed a delayed in onset date of rains, reduction in length of rainy season and increase in maximum temperature. Finally, majority of the maize farmers (40.8%) believed that Drought is the climatic hazard experience in the study area, while 31.4% acknowledge that desertification was the common environmental problem influencing farming activities in the area.

Table 2: Climate Change Awareness

Question	Response	Frequency (%)
Are You aware of Climate Change?	Yes	75.9
	No	24.1
How do you Experience Climate Change in your maize farm?	Increase in Temperature	55.0
	Decrease in Temperature	4.7
	Change in Time	16.2
	Change in Frequency of Drought	12.6
	No Change in Temperature	0
	Change in Precipitation	11.5
	Others	0
Experiencing increase in Rainfall amount During Rainy Season	Yes	67
	No	33
Do changes in Onset Date of Rain caused Climate Change?	Yes	76.4
	No	23.6
Do the rain start late than normal?	Yes	66
	No	34
Do planting date changes because of change in Onset date of Rain?	Yes	74.3
	No	25.7
Does planting date change Maize Yield?	Yes	56
	No	44
Does precipitation amount sufficient for maize yield?	Yes	59.7
	No	40.3
Which of the following climatic hazard is notice in your farm?	Drought	40.8
	Desertification	31.4
	Shortage of Rainfall	13.4
	Temperature decrease	6.8
	Flooding	8.9
	Land Degradation	12.0

Source: Field Survey, 2019

Result on adaptation measure to climate change among maize farmers was presented in Table 2, the result revealed that, most of the farmers (42.4%) adjust planting date as the method used in adopting climate change in the area while 23.0% switch to cultivation of other crops whenever they experience climatic change in their maize farms. In addition, they also presented that, adjusting planting date and switching to cultivation of other crops is preferable because it has low cost of practice and easy to implement. This is not surprising because most of the farmers in the area when interviewed on their reason for selecting the adaptation, they responded that, they cannot be able to afford the technical method of adaptation because of high cost. In addition, the farmers are more familiar with the local method of adjusting planting date and applying animal dumps in case of infertility of soil.

Table 3: Adaptation Measures to climate change among maize farmers

Questions	Responds	Frequency
What is the actual adaptation measure you applied in your farm?	Adjust planting Date	42.4
	Switching to other crops	23.0
	Irrigation Supplementation	8.4
	Using improved crop variety	7.3
	Application of fertilizer and pesticide	12.6
	Zero Tillage	1.0
	Mixed Cropping	5.2
	Others	
What inform your decision in selecting adaptation strategies practiced?	Unexpected return (Yield)	29.8
	Low cost of Adaptation	41.4
	Ease of practice	9.9
	Suitability to climatic condition	18.3
	Others	0.5

Source: Field Survey, 2019

Result on the limiting factors to the adaptation method was presented in Table 3 where most of the farmers (74.3%) agreed that they encountered problem in implementing the desired adaptation strategies most especially in aspect of Agricultural technology and finance required to carry out the farming process. They also admitted that, agricultural input such as high yield varieties; pesticide and herbicide are other constraint to maize farmers in their farming operation.

Table 4: Constraint to climate change adaptation among maize farmers

Question	Response	Frequency
Do you encounter problem in selecting and implementing adaptation strategies?	Yes	74.3
	No	25.7
If yes, Indicate the limitation	Lack of Appropriate Technology	23.0
	Necessary input constraint	13.6
	Financial Constraint	22.5
	Labor constraint	11.5
	Land constraint	7.3
	Lack of information	6.8
	Lack of capital	8.4
	No access to water	6.3
	Others	0.5
What do you think Government should do to reduce the impact of climate change?	Education and awareness	31.4
	Legislation	8.9
	Early warning system	20.9
	Provide relative measures	26.2
	Provide credit facilities	12.6

Source: Field Survey, 2019

Conclusion

Following the finding of this study, it was concluded that, increase in temperature was the major indicator of climate change to the farmers, and it was also acknowledged that, changes in onset date of rain now start late than normal is another sign of climate change in the Area. In addition, it was observed that, Drought and desertification were the major climatic hazard experience in the study area. It was also concluded that, adjusting planting date and cultivation of alternative crops are the adaptation methods used by farmers to reduce the impact of climate change on maize farming in the area. In addition, Agricultural technology and finance required to carry out the farming operation are the major constraint to maize farming in the Area. Similarly, agricultural inputs such as high yield varieties, pesticide and herbicide are other constraint to maize farmers.

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