

Farmers' Perception of Climate Change in Central Agricultural Zone of Borno State, Nigeria.

Mustapha*, S.B; Sanda, A.H. and Shehu, H.

Department of Agricultural Extension Services, University of Maiduguri, Maiduguri, Nigeria

*E-mail: shettimabulama@yahoo.com *Mobile phone: +234(0)7060573884

Abstract

The study analysed farmer's perception of climate change in Central Agricultural Zone of Borno State, Nigeria. Data were collected from 160 respondents in the study area. Descriptive and inferential statistics (multiple regression analysis) were used. The result showed that all the variables except sex and marital status were significant at either 1% or 5% level of significance and positively signed. The study concluded that respondents in the study area perceived climate changes which were greatly influenced by their socio economic characteristics. Lack of current knowledge and information on climate, lack of credit facilities and poor extension services on climate change adaptation were identified to be the major constraints of adaptation to climate change in the study area. The study recommended that efforts should be made in improving the knowledge and skills of extension service personnel about climate change and adaptation management strategies and making the extension services more accessible to farmers.

Key words: Farmers' Perception, Climate Change, Agricultural Zone, Borno State.

1.0 INTRODUCTION

1.1 Background to the Study

Climate change refers to any change in climate overtime, either due to natural variability or as a result of human activity (IPCC, 2007; Fusel, 2007). The changes occur due to variation in different climatic parameters such as cloud cover, precipitation, temperature and increase in Green House Gases (GHG's) emission through human activities. Adverse impacts of climate change in Nigeria and other developing nations include frequent drought, increased rural-urban migration, increased biodiversity loss, depletion of wild and other natural resource base, changes in vegetation types, increased health risk and the spread of infectious diseases and changing livelihood systems (Abaje and Giwa, 2007; Hassan and Nhemachena, 2008).

The magnitude of impact varies greatly by region, climate change is expected to have a significant impact on agricultural productivity and shifting crop patterns. In this context, the impact of climate change on agriculture is an issue of great concern and significance to the lives and livelihoods of millions of poor people in Nigeria who depend on agriculture for food and livelihoods (Deressa and Hassan, 2009; Gwary, 2010). The impact of climate change on agriculture could result in problems with food security and might threaten the livelihood activities upon which much of the population depends.

As the understanding on global climate and its change is pre-requisite to take an appropriate initiatives to combat climate change. Adaptation to climate change requires that farmers first notice that the climate has changed, farmers then need to identify potentially useful adaptations and implement them. Adaptation refers to all the responses to climate change that may be used to reduce vulnerability (Deressa *et al*, 2008; Jones, 2010). This realization investigated to undertake a study to determine the ability of farmers to perceive climate change in the central agricultural zone of Borno state.

1.2 Statement of the problem

To enhance policy towards tackling the challenges that climate change poses to farmers, it is important to have knowledge of farmers' perception on climate change and factors affecting their perception of climate change. The Central Agricultural Zone of Borno State which lies in the Sudano-Sahelian region of Nigeria is one of the major food production areas of the country. To continue high food production in this region, farmers would have to adapt to climate change. There is however, little knowledge whether farmers perceived climate change in the study area. Hence, the study sought to explore farmer's perception of climate change and investigate the factors affecting the perception of the changing climate among farmers in the study area.

1.3 Objectives of the study

The main objective of the study was to examine respondent's perception of climate change in Central Agricultural Zone of Borno State, Nigeria. The specific objectives of the study were to:

- (i) identify the socio-economic characteristics of the respondents;
- (ii) determine respondent's perception on the effects of climate change in the study area;
- (iii) investigate the influence of socio economic factors on respondents' perception of climate change in the study area, and
- (iv) identify the constraints of adaptation to the perceived climate change by respondents in the study area.

2.0 METHODOLOGY

The study was conducted in central agricultural zone of Borno State, Nigeria. Borno central agricultural zone of Borno State is made up of eight local government areas comprising Maiduguri Metropolis, Jere, Konduga, Mafa, Dikwa, Ngala, Kala Balge and Bama. Primary data were collected by means of structured interview schedules among respondents. The secondary information was obtained from publications including journals and other relevant publications. The study used both descriptive and inferential statistics to analyze the data. For the descriptive statistics; frequency distributions and percentages were used. While, For the inferential statistics; multiple regression analysis was used. The equation was explicitly expressed as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, e) \text{----- (i)}$$

Y = Farmers' perception on climate change

F = Functional notation

X₁ = Age of farmers (years)

X₂ = Educational level (yr)

X₃ = Gender (1 = Male, 0 = otherwise)

X₄ = Farm size (Hectares)

X₅ = Farming experience (years)

e = Error term.

3.0 RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of Respondents

The socio-economic characteristics of respondents were studied. These include sex, age, and occupation, farming experience, farm size, family size and educational level, as presented in Tables 1. The revealed that the respondents' age ranges from 20 -40years above with most (31.1%) in the range of 31-35 years and the least for over 40 years (10%). This was an indication of the fact that most of these farmers were in their active and productive years who could easily perceive about climate change. This was contrary to the findings of Ishaya and

Abaje (2008) reported that only 11.5% of the respondents fall between 31-40years, while the remaining 81% fall between 41-65years of age.

Table 1 also showed that majority of the respondents (73%) was males while only 27.0% were females. This indicates that farming activities was common among men which could be as a result of the strenuous efforts required in carrying out the activities on the farm. This agrees with Ishaya and Abaje (2008) who reported that out of those studied, 66% were males, while only 34% were females. Table 1 further shows that 21.3% of the respondents were in farming for less than five years, 31.3% representing most of the respondents had 6-10years in farming activities, while only 26.3% confirmed to be in farming for more than 16 years. This was an indication that farming activities has been one of the economic activities in the study area. It could also be implied that the respondents in the study area had a reasonable years of farming experience and knows much about their environment in perceiving the changing climate.

Table 1 revealed that most (45.1%) of the respondents had informal education, 18.6% and 16.5% went to primary and secondary schools respectively while only 20% of those studied had tertiary education. This means that the level of education among farmers in the study area is low which could affect their perception of climate

change in the study area. The level of education attained by farmers determines their ability to perceive, interpret and correctly determine actions that would possibly enhance their performance in farming activities (Manyatsi et al, 2010). The finding accords with that of Dhaka (2010) and Gbetibou(2009) who reported that the level of education attained by an individual goes along way in shaping his personality, attitude to life and adoption of improved practices or adverse conditions as the case may be.

Family size ranged from 1-12 and above persons per household (Table1). The result revealed that 28.8% of the respondents had 7-9 persons per household, 11.3% had 10-12 persons, while only 15% of the respondents claimed to have less than 3 persons per household. This shows that there might be enough labour from the household to manage farming activities resulting from change in climate condition and the implication of this could be improved perception of climate change.

Moreover, Table 1 revealed that majority (58.8%) of the respondents cultivated less than one hectare (<1ha) of land, 30% cultivates 1-2ha while only 2.5% cultivate more than 5ha annually. The difference in scale of production may be due to the financial background of the farmers, goal of production and economics of scale. It could be implied that due to their small scale nature, the respondents might a hindered perception to climate change in the study area.

3.2 Respondents Perception on the Effects of Climate Change in the Study Area

Table 2 showed that most of the respondents (36.3%) strongly agreed that climate change led to crop/livestock infestation and diseases while 26.3% strongly disagreed with the assertion. This implies that their perception on adaptation strategies could be based on strategies that address crop/livestock infestation and diseases. The result also shows that most of the farmers 33.8% reported that climate change s responsible for the increased food costs while only 18.8% strongly disagreed. The implication could be that their perceived strategies could be directed towards improved productivity of food in the study area. Table 2 further revealed that most of the respondents 33.8% disagreed to the ascertainment that climate change led to rural-urban migration while 17.5% of the respondents strongly held to the view that climate change led to rural – urban migration.

According to 61.3% of the respondents, climate change was perceived to be the cause of draught while 21.3% of the respondents disagreed with the assertion. This agrees with the findings of Ishaya and Abaje (2008) who reported that 84% of the respondents testified that climate change is a critical environmental issue that needs immediate attention. The result of their findings further revealed that 85.5% of the farmers affirm that climate change has led to various forms of drought, thereby reducing the quality and quantity of crops produced which were very significant factors that increase cost of food crops. This implies that their perceived strategies could be improved water management and irrigation system.

3.3 Influence of Socio Economic Factors of Respondents on Perception of Climate Change

Table 3 indicated that included explanatory variables explained 97% of adjusted variability observed in climate change perception amongst respondents while the remaining 3% could be as a result of residual error. The result showed that all the variables except sex and marital status were significant at either 1% or 5% level of significance and positively signed. The implication of this positive sign was that an increase in level of these variables would lead to an increase in the level of farmer's perception on climate change.

3.4 Constraints of Adaptation to Perceived Climate Change by Respondents

Table 4 reveals that most (46.3%) respondents argued that lack of current knowledge on adaptation measures has been the greater challenge while 5% confirmed that lack of irrigation water and inadequate finance/credit to acquire modern techniques has been the impediment to modern technology/innovation adoption 27.5% of the respondents held to the view that poor extension services on climate change has been responsible for the difficulty in innovation adoption, only 16.3% blamed lack of climate information to the reason for their predicament.

4.0 CONCLUSION AND RECOMMENDATIONS

The study concluded that the respondents in the study area perceived climate changes which were greatly influenced by their socio economic characteristics. Lack of current knowledge and information on climate, lack of credit facilities and poor extension services on climate change adaptation were identified to be the major constraints of adaptation to climate change in the study area.

Based on the findings of this study, the following recommendations were made:

- i. Government policies should ensure that terms for credit in the banks are flexible to enhance farmers' access to affordable credit, which will increase their ability and flexibility to change crop and soil management strategies in response to climate change.
- ii. Improving the knowledge and skills of extension service personnel about climate change and adapted management strategies and making the extension services more accessible to farmers appears to be the key component of a successful adaptation programme in the face of changing climate.
- iii. Farmers through the extension services should be educated on the effects of their various farm practices on climate change.
- iv. The respondents should be encouraged to form climate change adaptation cooperatives. The overall need is to setup serious environmental conservation among the farmers. This can only be possible by first and foremost educating the indigenous people on the significance of conservation of the natural environment.

REFERENCES

- Abaje, I.B. and Giwa, P.N.(2007). Urban flooding and environmental safety: a case study of Kafanchan in Kaduna State, Nigeria. A paper presented at the golden jubilee(50th anniversary) and 49th annual conference of the Association of Nigerian Geographers(ANG) at the university of Abuja,15th -19th October
- Deressa, T., Hassan, R. M., Alemu, T., Yesuf, M. and Ringler, C. (2008). Analyzing the Determinants of Farmers' choice of Adaptation Methods and Perceptions of Climate Change in the Nile Basin of Ethiopia. *International Food Policy Research Institute (IFPRI) Discussion Paper* 00798, Addis Abba, Ethiopia.
- Deressa, T. T. and Hassan, R. M. (2009). Economic Impact of Climate Change on Crop Production in Ethiopia: Evidence from cross-sectional measures. *Journal of African Economies*, 18,529-554.
- Dhaka, B. L; Chayal, K. and Poonia, M. K. (2010). Analysis of farmers' perception and adaptation strategies to climate change. *Libyan Agriculture Research Center Journal International*,6(3):166-173.
- FAO. 1997. Irrigation potential in Africa: a basin approach. Retrieved March 8, 2010 from <http://www.fao.org/docrip>
- Fusel, H. (2007). Vulnerability: A Generally Applicable Conceptual Framework for Climate Change Research. *Global Environmental Change*, 17(2): 155-167.
- Gbetibouo, G. A. (2009). Understanding Manyatsi,A.M.; Mhazo,N. and Masaririmbi,M.T. (2010): Climate variability and change as perceived by the rural communities in Swaziland. *Research Journal of Environmental Earth Sciences* 2 (3); 164 – 169,
- Gwary, D.M. (2010).Climate Change Adaptation and Mitigation Options for Improving Food Security in Nigeria. A lead paper presented at 6th National Conference on Organic Agriculture at University of Maiduguri,Nigeria,22-24 November.
- Hassan, R. and Nhemachena, C. (2008). Determinants of African Farmers' Strategies for Adapting to Climate Change: Multinomial Choice Analysis. *African Journal of Agriculture and Resource Economics*, Vol. 2(1): 83-104.
- IPCC(2007). Climate Change - Impacts, Adaptation and Vulnerability: *Contribution of Working Group JP II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge. UK, 976pp.
- Ishaya, S. and Abaje, I. B. (2008): Indigenous People's Perception on climate change in Jema'a Local Government Area of Kaduna State, Nigeria. *Journal of Geography and Regional Planning* Vol. 1(8) pp. 138 – 143

Jones, L. (2010). Overcoming Social Barriers to Adaptation. *Overseas Development Institute, (ODI) Background Note*, [www.odi.org.uk/50 years](http://www.odi.org.uk/50_years). Accessed January, 2011.

Manyatsi, A.M.; Mhazo, N. and Masaririmbi, M.T. (2010): Climate variability and change as perceived by the rural communities in Swaziland. *Research Journal of Environmental Earth Sciences 2 (3); 164 – 169*,

Table 1: Distribution of respondents by socio economic characteristics (n=160)

Variable	Frequency	Percentage (%)
Age(yrs)		
20 – 25	18	11.25
26 – 30	42	26.25
31 – 35	50	31.25
36 – 40	34	21.25
> 40	16	10.00
Sex		
Male	118	73.75
Female	42	26.25
Farming experience		
< 5	34	21.25
6 – 10	50	31.25
11 – 15	34	21.25
>16	42	26.25
Level of education		
Informal education	72	45.00
Primary education	30	18.75
Secondary education	26	16.25
Tertiary education	32	20.00
Family size		
< 3	24	15.00
4 – 6	36	22.50
7 – 9	46	28.75
10 – 12	18	11.25
> 13	36	22.50
Farm size		
< 1 hectare	94	58.75
1 – 2 hectares	48	30.00
3 – 4 hectares	14	8.75
> 5 hectares	4	2.50

Source; field survey, 2011

Table 2: Distribution of respondents by perceived effect of climate change(n=160)

Farmers' perception	Frequency	Percentage (%)
Increased crop/livestock pests and diseases		
Strongly agreed	58	36.25
Agreed	40	25.00
Disagree	20	12.50
Strongly disagreed	42	26.25
Increase in food costs		
Strongly agreed	58	36.25
Agreed	52	32.50
Disagreed	28	17.50
Strongly disagreed	22	13.75
Increased rural-urban migration		
Strongly agreed	16	10.00
Agreed	34	21.25
Disagreed	58	36.25
Strongly disagreed	52	32.50
Increased drought		
Strongly agreed	28	17.50
Agreed	34	21.25
Disagreed	98	61.25

Source; field survey, 2011

Table 3: Regression analysis on the influence of socio-economic characteristics of respondents on their perception of climate change

Variable	Coe-efficient	Standard error	t-value
Age	0.422	0.011	5.478**
Sex	0.001	0.013	0.063
Family size	0.042	0.027	1.540*
Marital status	0.033	0.013	0.212
Educational level	0.013	0.020	1.969*
Farm size	0.014	0.011	4.263**
Farming experience	0.007	0.014	3.477**
Constants	0.424	0.083	5.856**
R ²	0.971		5.107**
Adjusted R	0.976		

Source: field survey, 2011

Note: ** and * are significant level at 5 and 1% respectively

Table 4: Constraints of adaptation strategies to climate change among respondents

Constraints	Frequency	Percentage (%)
Lack of access to irrigation water	8	5.00
Lack of current knowledge on adaptation strategies	74	46.25
Poor access to climate information	26	16.25
Lack of credit facilities	8	5.00
Poor extension services on climate change adaptation	44	27.50
Total	160	100

Source: field survey, 2011

This academic article was published by The International Institute for Science, Technology and Education (IISTE). The IISTE is a pioneer in the Open Access Publishing service based in the U.S. and Europe. The aim of the institute is Accelerating Global Knowledge Sharing.

More information about the publisher can be found in the IISTE's homepage:

<http://www.iiste.org>

CALL FOR PAPERS

The IISTE is currently hosting more than 30 peer-reviewed academic journals and collaborating with academic institutions around the world. There's no deadline for submission. **Prospective authors of IISTE journals can find the submission instruction on the following page:** <http://www.iiste.org/Journals/>

The IISTE editorial team promises to review and publish all the qualified submissions in a **fast** manner. All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Printed version of the journals is also available upon request from readers and authors.

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

