Effects and Knowledge of Climate Change among Farmers in Southern Taraba, Nigeria

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Abstract

The study examined the effects and knowledge of climate change among farmers in Southern Taraba, Nigeria. Sampling techniques was done in stages which includes; purposive, accidental and simple random sampling were used in selecting 300 respondents. Data was collected using structured interviews from 300 farmers then analysed using descriptive statistics. Research findings reveal that most (89%) of the farming activities in study area was done by male. Major source of information on climate change in study area was throught radio (42.40%). The knowledge and perception of farmers on climate change phenomenon is substantially at rised in temperature (21.4%), increased in rainfall distribution and rising flooding (21.2%). The findings also reveal that major perceived effect of climate change on the crop production is low crop yield (22.49%). Farmers attribute frequent and severe of dry-spell, excessive precipitation, rivers drying up, change in timing and pattern of seasons as evidence of climate change in study area. Study concluded that despite its advantages in some cases, climate change seem to be exerting negative effects on crop production by intensifying vagaries of weather and climate change events in study area which leads to poor agricultural production in study region. It's recommend that there should be a public awareness compaign by the government using weather forecast on early warning information and provision of training on adaptive measures to farmers in study area.

Key words: *Climate Change, Knowledge, Information, Effect, Farmers.*

Introduction

Climate change is undoubtedly one of the greatest environmental, social and economic threats facing our planet today (Agawam & Pastiche, 2011). Climate change, which is attributable to the natural climate cycle and human activities, has adversely affected agricultural productivity in Africa (Ziervogel *et. al.*, 2006). That is why the phenomena attract more attention from the media, academics, politicians and businesses as evidence of its scale and seriousness mount on agricultural production. In fact, over the past two decades, a multitude of studies have analyzed the possible effects of climate change on a range of natural and social systems (Klein, 2004). Moreover, ecologically fragile areas are more prone to stresses created by climate change, it is more so for marginalized communities who are dependent upon nature-based resources (Nath & Behera, 2011). Recent evidence and projections indicate that the changes are accelerating and will lead to wide-ranging shift in climate variables (Madu, 2012).

According to Warrick and Barrow (1991), climate change is a long term shift in the climatic pattern of a specific location, region or planet measured by changes in features associated with average weather components such as temperature, wind and precipitation. The climate is said to have changed when the patterns and sequence of occurrence of weather events have shifted significantly from what they used to be over a period of time (Food and Agricultural Organization [FAO], 2008). As the planet warms, rainfall shift and extreme events such as droughts, floods and forest fires become more frequent (Zoellick, 2009) which results in poor and unpredictable yields thereby making farmers more vulnerable particularly in Africa (United Nations Framework Convention on Climate Change [UNFCCC], 2007). As the people of Africa strogle to overcome poverty and advance economic growth, this phenomenon threatens to deepen vulnerabilities, erode hard-won gains and seriously undermine prospects for development (German Advisory Council on Global Change [GACGC], 2004; Zoellick, 2009). There is need for concerted efforts toward tackling this menace particularly in Nigeria as the most populous country in Africa and 7th in the world with over 200 million people out of which 57% resides in rural areas (Population Reference Bureau [PRB], 2011; Madu, 2012). Recently, persistent droughts, flooding, off-season rain and dry spells have disrupted crop growing seasons in many Nigeria's agro-ecological zones (Medugu, 2009). Records have shown that Nigeria has experienced marked rainfall declines prior to the year 2012 which had an intensive spells of rainfall that brought about the worst flooding ever recorded in the history of Nigeria (Society for Water and Sanitation [NEWSAN], 2013). No part of Nigeria is safe from climate change as Nigeria's climate security vulnerability lies predominantly along the coastal states of the south and northern frontline states as a result of a combination of high physical exposure as well as low household and community resilience (NEWSAN, 2013).

The challenge posed by climate change on agriculture in southern Taraba region range from pronounced seasonality of rainfall (which confines cultivation to short periods of five to six months) to severe and recurrent dry spells (which disrupt the usual pattern of seasonal water availability). Most of the dry spells are characterized by false onset of rainfall, pronounced breaks during rainy season and early cessation of rainfall leading to drastic alterations

in seasonal rainfall distribution as in the case of all other northern states of Nigeria (Adefolalu, 1986; Anyadike, 1993; Aondover *et. al*., 1998; Ekpoh, 1999; Dai *et. al*., 2004; Anyanwole, 2007). These are very important climatic limitations placed on crop production in study region because it makes the correct timing of farm operations (which is crucial for obtaining optimum yields) difficult. The study region is a river basin area with river Benue passing through Ibi local government area as the major river, the river Donga in Donga local government area with many tributaries and streams as catchments that provides vast flood plains locally known as *Fadama* land (Wet land) where agricultural activities is done. These rivers are associated with repeated flash floods during rainy season without alarm which often destroyed farmland, cultivated crops and declining yields that cause failure to farm income, associated problems of food shortage, malnutrition and general impoverishment of local inhabitants (Derrick, 1974; Mortimore, 1989; Ekpoh, 1999; Mortimore & Adams, 2001).

Aim of Study

The study aimed to examine current effects and knowledge of climate change among farmers in study region. Specifically, the study seeks to;

i. Identify perceived effects of climate change on crop production in study area.
ii. Identify various sources of information on climate change among farmers in study region.
iii. Assess the perception of farmer's knowledge on climate change in the region.

Specific Research Questions

1. What are perceiving effects of climatic impacts on crop production in study region?
2. What are the available sources of information on climate change issues in study region?
3. What is the knowledge and perception of farmers on climate change issues in the region?

Brief Description of Study Area

Location and Areal Extent: Taraba state is located between latitude 6°25'N to 9°30'N and longitude 9°30'E to 11°45'E with tropical continental climate with a land area of 60,291km^2 as second largest in Nigeria in terms landmass with population of over 2.3 million people according to 2006 population census and growth rate of 3.1% per annum. The state is located on eastern border land of Nigeria bordered with Cameroon Republics, Nassarawa, Plateau States, Bauchi, Gombe states and Adamawa State.

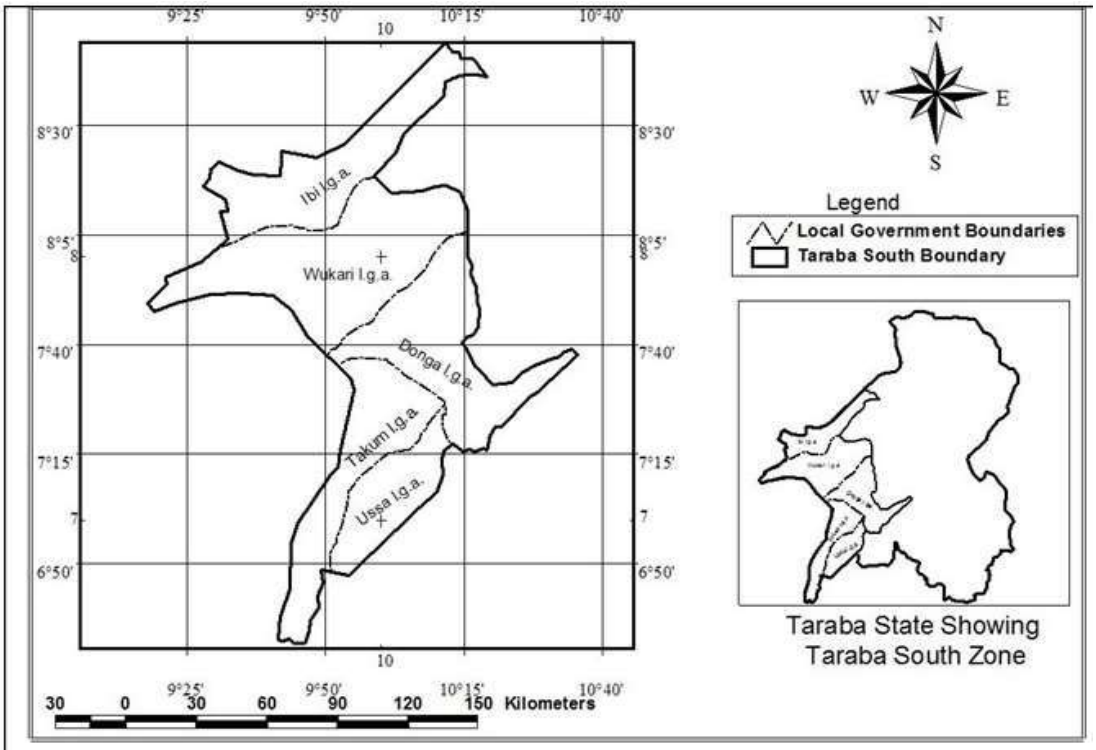


Figure 1: Taraba South Zone

Source: Cartor. Unit Geo. Dept. B.U.K. 2013

Southern Taraba consists of five local government areas namely; Wukari, Donga, Takum, Ussa and Ibi local government area. The region lies largely within the tropical area with vegetation of low forest in southern part and grassland in northern part. River Benue, Donga, and Ibi are the rivers in the region.

Climate: Taraba state has a wet and dry climate. The wet season lasts from April to October with mean annual rainfall varies between 1058mm in the north to over 1300mm in the South. The wettest months are August and September with dry season lasting from November to March. Mean annual temperature is about 28°C with maximum temperatures varying between 30°C to 39.4°C and minimum temperatures range between 15°C to 23°C.

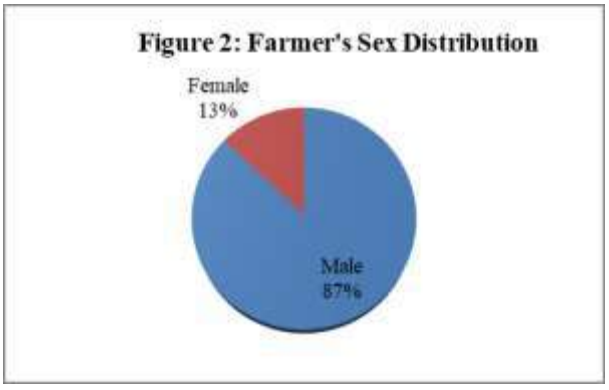
Vegetation: Rainfall distribution and topography are the most important factors influencing vegetation pattern in Taraba State. The vegetation is classified into three; northern guinea, mountain grassland and forest vegetation. Most of the lowland area is made up of ferruginous tropical soils which developed on crystalline acid rocks and sandy parent materials.

Agriculture: The major occupation of the people of Taraba South Senatorial zone is agriculture. Cash crops produced in the region include groundnuts, cotton, maize, rice, sorghum, millet, cassava, and yam are produced in commercial quantity. In addition, cattle, sheep and goats are reared in large numbers especially on the Benue and Taraba valleys. Similarly, the people undertake other livestock production activities like poultry production, rabbit breeding and pig farming in fairly large scale. Communities living around river Benue, river Taraba and river Donga engage in fishing activities all year round.

Material and Method

For proper investigation and analysis however, study was conducted in stages which include: field work and statistical analysis. The afore-mentioned issues are reflection of the research objectives mention earlier. During the field survey, recurrent visits to study farmland were made and collection of primary data commenced through group and individual interviews as well as interview questions were administered to those who can read and understand the questions among the farmers, field observation were recorded in the field which include the snapshot of photographs of the physically affected area in the region.

Stages of sampling technique was adopted for data collection from farmers involved for study; The first stage is purposive sampling that involves the selection of all the five local government areas in study region namely; Wukari, Donga, Ibi, Takum and Ussa local government area. The second stage is purposive sampling method where by two (2) most cultivated wards were selected out of the total wards found in each local government area (5) were namely; Akate and Asibity wards in Donga local government area, Bantaje and Tsukundi wards in Wukari local government area, Dafar and Jibu wards in Ibi local government area, Chanchangi and Kashimbila wards in Takum local government area and Lisan and Kwanbo wards in Ussa local government area which gave a total of ten (10) wards. The third stage is accidental or available sampling for selection of 300 farmers all.



Source: Field survey, (2015)

Formal interview technique with open ended questions was adapted in acquiring demographic variables, sources of information, knowledge and the perceived effect of climate change on crop production among farmers in study area in their respective farmlands. Thirty (30) farmers were interviewed each ward and two wards per local government making a total of sixty (60) farmers per local government area.

Descriptive statistical analyses were used appropriate such as frequency, percentage, mean were run and presented in pie chart and tables using statistical package for social science (SPSS) application package.

RESULT AND DISCUSSION

Socio-demographic variable of Respondents

The results of the analysed data of study reveals (figure 2) most (87%) of farming activities in study area were conducted by males with little engagement female.

Analysis of age of respondents indicated majority (47%) of the farmers were between 31 to 40 years and mean age of the respondents was 38 years which is within active age for agricultural production (Table 1). About 42.33% of farmers had 21 to 30 years of farming experience while the mean years of farming experience is within 25 years which implies management skills improved with experience. 74.67% had primary, secondary and tertiary education and formal education enables farmers to obtain useful information from bulletins,

agricultural newsletter and other sources. Results (Table 1) also reveals 42.67% have 1 to 5 hectares of farm size and average farm size in study area is estimated to be 7 hectares of land as low farm size compounded use of hand tools which made cultivation of large scale production difficult in study area.

Mean annual income (₦134, 666) of farmer's falls between ₦101, 000 to ₦150, 000 annual income ranges in the region (table1). Agbamu (2006) reported it was not always easy to determine the level of income of Nigerian farmers because some of them did not keep records while others were skeptical on disclosing their income. He was of the view that the higher the income level of a farmer the less he or she would be disposed to fear of taking risk in respect of adopting a given technology.

Table 1: Socio-economic characteristics of Farmers (n =300)

Variable (X)	Frequency	Percentage	Mean
Age Range (years)			
Below 21	9	3.00	
21 – 30	49	16.33	
31 – 40	141	47.00	38
41 – 50	67	22.33	
51 – 60	21	7.00	
Above 60	13	4.33	
Years of farming experience (years)			
1 – 10	11	3.67	
11 – 20	63	21.00	
21 – 30	127	42.33	25
31 – 40	81	27.00	
Above 40	18	6.00	
Level of education			
Religion	76	25.33	
Primary	131	43.67	
Secondary	84	28.00	
Tertiary	9	3.00	
Farm size (ha)			
1 – 5	128	42.67	
6 – 10	115	38.33	6.8
Above 10	57	19.00	
Annual income level (₦)			
Below N50000	12	4.00	
50000 - N100000	80	26.67	
101000 – 150000	91	30.33	₦134666
151000 – 200000	78	26.00	
above 200000	39	13.00	
Total	**300**	**100**	

Source: Field survey data, (2014)

Effects of Climate Change on Crop Production

Data in table 2 reveals that farmers perceived the following as a serious effect of climate change on agricultural production; low crops yield (22.49%), difficulty in predicting crop planting

period (18.05%) and quick loss of soil moisture (13.47%) were all recored by respondents.

Table 2: Responses on perceive effects of climate change (n = 300)

Perceived Effects of climate change	Frequency	Percentage
Drying and wilting of crop seedlings	53	7.59
Difficult in predicting crop planting period	126	18.05
Increase cost of production	64	9.17
Delay rainfall	82	11.75
Drying up of streams	17	2.44
Loss of soil moisture	94	13.47
Spread of crop pests and diseases	29	4.15
Insecticide and pesticide no longer effective	76	10.89
Low crop yield	157	22.49
Stunted growth	39	5.59

Multiple responses recorded.

Source: Field survey data, (2014)

Perception Level of Climate Change in Study Area

Table 3: Responses on climate change indicators (n = 300)

Indicator of climate change	Frequency	Percentage
High temperature	107	21.4
Low Rainfall	28	5.6
Dry-spell more frequent	11	2.2
High rainfall	115	23
Extreme cool temperature	8	1.6
Rain season now shorter	21	4.2
Rising floods	106	21.2
Excess sunshine	104	20.8

Multiple responses recorded. Source: Field survey data, (2014)

The result (table 3) reveals most (86.4%) of respondents perceived high level of temperature as a result of excess sun shine and high rainfall distribution in the area which in most cases result to unaware flash floods as major indicators of climate change in the region. According to IPCC (2007), many natural systems seem affected by increasing temperature; in tropical regions, high temperature is a constraint to crop production; it greatly influences not only the growth duration but also growth pattern and the productivity of crops; especially in developing countries that are

vulnerable to climate change with low adaptive capacity.

Sources of Information on Climate Change

Table 4 below reveals major sources of information on climate change to the local community in study area is through radio (42.40%) and information getting through their fellow farmers also account significant percentage (26.96%). This inferred radio as the most widely used source of information on climate change by respondents. According to Nhemachen and Hassan (2007) information through extension agents enhanced more the chances of adapting to climate change but my study area is not the case because of less intervention of government or non-governmental agricultural extension workers in farming activities.

Table 4: Responses on the sources of information on climate change (n = 300)

Sources	Frequency	Percentage
Radio	173	42.40
Television	20	4.90
Extension agents	15	3.68
Internet	20	4.90
Meteorological station	14	3.43
Fellows farmers	110	26.96
Cooperative societies	24	5.88
Religious bodies	17	4.17
Print media	15	3.68

Multiple responses recorded.

Source: Field survey data, (2014)

Conclusion

Southern Taraba has its shares of negative impacts of climate change despite its advantages in some cases. But these impacts are predicted to get worse with time necessitating more serious measures to be taken by the farmers themselves, the government, NGOs and other private sector organizations that may assist farmers.

The study communities have experienced increasingly early onset of rains that are not sustained, crops that are exposed to increasing temperatures causing farmers to plant and replant their crops within one cropping season. Extreme climatic events have also been on the increase, such as strong winds, floods, flash floods, frequent dry-spell among other extreme weather event which corroborate with predictions of IPCC (2001, 2007) and DFID (2009).

It can be concluded that despite its advantages in some cases, climate change seem to be exerting adverse effect on crop production by intensifying the vagaries of weather and climate change events as perceived by farmers which leads to the poor agricultural production in Taraba south region. Based on the above findings that study recommends; the establishment of climate change information centers by government particularly at local government level which will provide awareness

campaigns to members of public, weather forecast/early warning information services and provide training on how to adapt to climate change.

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