

FARMERS' PERCEIVED IMPACT OF CLIMATE CHANGE ON AGRICULTURAL ACTIVITIES IN OTUKPO LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA

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ABSTRACT

The study was undertaken to ascertain farmers' perceived impact of climate change on agricultural activities in Otukpo local government area of Benue State, Nigeria. Data were collected from 60 respondents using interview schedule. Multistage random sampling technique was used to select the farmers. Data were analyzed using percentage and mean statistic. Farmers were aware of the phenomena related to climate change such as rise in both day and night temperature (M= 1.83) and increased variability in rainfall (M= 1.78). The major perceived impacts of climate change on agricultural activities were decrease in agricultural production (M=2.63) and decrease in area for cultivation as a result of erosion (M=2.58). The adaptation methods used to cushion the impact of climate change in the area were planting of cover crops like melon and groundnut (95.0%), practicing of crop rotation (93.3%) and early harvesting of crops (93.3%). The paper recommended that farmers' adaptation capacities to climate change need to be urgently strengthened by extension agents' visitation to disseminate more recent information on climate change.

Key words: Impact, Climate change, Agricultural activities, Farmers, Benue state, Nigeria

INTRODUCTION

Climate change is one of the most serious environmental threats facing mankind worldwide. It affects agriculture in several ways, including its direct impact on food production (Enete and Amusa, 2010). The main human activity that is most likely to have a large impact on climate is the burning of "fossil fuel" such as coal, oil and gas and these fuels contained carbon. Burning them produces carbon dioxide gas (African Institute of Applied Economics (AIAE), 2009). In addition, deforestation and agricultural activities such as slash and burn, over grazing, continuous cropping practice were important potential factors in climate change.

The impacts of climate change are more pronounced in sub Saharan Africa because agricultural productivity greatly depends on precipitation and natural conditions of the environment. This situation is precipitated by the fact that the changes in climate are taking place in an environment characterized by extreme poverty.

(Urama and Ozor, 2011). Countries like Nigeria are likely to suffer the most because of their geographical location, low income and low institutional capacity as well as their greater reliance on climate sensitive renewable natural resource sector like agriculture (AIAE, 2009).

There is sufficient evidence that the world has been witnessing long term changes in climate patterns and variability with rapid acceleration in recent decades. According to Uguru, Baiyeri and Aba (2011), climate of the derived savannah ecology of Nigeria is changing. Six out of the seven warmest years since 1971 occurred between 2005 and 2010, and most of the years in the last decade (2001 – 2010) recorded above average temperatures, confirming a temperature rise in the derived savannah belt. There is also a paradigm shift in rainfall pattern (commencement, cessation, distribution and amount) in the last few decades, and also a considerable drop in relative humidity in the last decade.

Based on the foregoing, the broad objective of

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the study was to assess the farmers' perception on the impact of climate change on agricultural activities in Otukpo local government area of Benue state, Nigeria. Specifically, the study sought to: ascertain the farmers awareness of the evidence of climate change; assess the farmers perception on the impact of climate change on agriculture activities; and identify adaptation measure used in cushioning the impact of climate change.

METHODOLOGY

The study was conducted in Otukpo Local Government Area (LGA) of Benue State, Nigeria. All farmers in the LGA constituted the population for the study. Multistage sampling technique was used in selecting respondents. In the first stage, four communities were randomly selected which included: Adoka, Otukpo, Ugboju and Akpa. In the second stage, three villages from each of the four town communities were randomly selected. A list of 10 farmers involved actively in agricultural activities was collected from each of the selected villages through the help of the village head. From the list, 5 farmers were randomly selected using simple random technique from each of the sampled villages. A total of 60 farmers constituted the sample size for the study. Data for the study was gathered through structure interview schedule.

To ascertain farmers' awareness of the phenomenon relating to climate change, they were provided with some variable to tick from. To determine the perceived impact of climate change on agriculture, a list of known variables on possible impact of climate change was provided on a rating scale 1-4 to get the mean value of 1.5. Variables with mean score value ≥ 1.5 were regarded as the perceived impact of climate change while variables with a mean score of ≤ 1.5 were not regarded as possible impact of climate change on agricultural activities. To ascertain the adaptive measures adopted by farmers in cushioning the impact of climate change in agriculture, a list of possible adaptation strategies known through review of literature were made available to the respon-

dents to tick from to indicate the one they adopted in cushioning the impact of climate change. Data were analyzed using percentage and mean statistic. The statistical package for social sciences (SPSS) version 16 constituted the software used for the analysis.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The mean age of the farmers was 45.2 years (Table 1), indicating that they are still in their active age. Higher proportions of the respondents are male and had one form of formal education or the other. The mean years of farming experience was 11.5 years, indicating that they have been in farming for quite a long period of time. The mean household size was 7 persons, indicating large house hold size. The average farm size was 3.7 hectares. About 62% of the farmers sampled had been visited by extension agents to disseminate agriculture related information with an average visit of 2 times per year by extension contact. This was considered as very low for regular information dissemination and therefore calls for more extension visitation. The major crops grown were cassava, yam, beans and maize while goat, poultry and pig were the major livestock kept.

Farmers' Awareness About Phenomena Relating To Climate Change

Results in Table 2 show that farmers were aware of the various phenomena relating to climate change. These include rise in both day and night temperature ($M=1.88$). They have experienced the heat with rise in temperature over past years. This has also led to increase in drought. They are also aware of the reduction in agricultural activities as a result of variability of weather condition, hence reducing the agricultural activities. The rainfall over the year have not been consistent, it varies. Others phenomena relating to climate change include increase in pest attack and incidence of diseases. This implies that farmers are aware that there are changes in the climate.

Table 1: Distribution of respondents according to socio-economic characteristics (n = 60)

Variable	Percentage	Mean
Age (Years)		
≤ 30	20.0	45.2
31-40	31.7	
41-50	15.0	
51-60	15.0	
60 and above	18.3	
Sex		
Male	81.7	
Female	18.3	
Academic qualification		
No. formal education	11.7	
Primary school attempted	5.0	
Primary school completed	11.7	
Secondary school attempted	6.7	
Secondary school completed	33.3	
Tertiary institution	31.7	
Farming experience (years)		
≤ 5	38.3	11.5
6-10	25.0	
11-15	8.3	
16-20	10.0	
20 and above	18.4	
Household size		
≤ 5	31.7	7
6-10	55.0	
11-15	13.3	
Farm size		
≤ 2.0	33.3	3.7
2.1 – 4.0	35.0	
≥ 4.1	31.7	
Extension contact		
Yes	61.7	
No	38.3	
Type of crop grown*		
Yam	81.6	
Cassava	73.4	
Beans	53.3	
Maize	30.0	
Rice	5.1	
Types of livestock reared*		
Goat	81.7	
Poultry	63.3	
Pig	46.6	
Sheep	26.6	

*multiple responses

Perceived Impact of Climate Change on Agricultural Activities

Decrease in agricultural productivity due to soil erosion (M= 2.63) and loss of arable crop land as a result of flood (M= 2.58) were the major perceived impact of climate change on agricultural activities (Table 3). Others were hardening of seed bed as a result of temperature increase, increase in the cost of cultiva-

tion, decrease in agricultural yield, increase in weed growth, reduction in number of live-stock, increase in moisture loss due to exposed soil surface, increased in crop pests and disease infestation, decrease in quality of farm produce, decrease in income, delay ripening of some vegetation fruits, delay growths of crops, increased in mortality of livestock as a result of body heat, delaying the cropping season leading to scarcity of food, loose of medicinal plants, animal losing their habitants which may result to their death and increase in labour cost as a result of weed growth.

Table 2: Distribution of respondents according to their awareness about phenomena relating to climate change

Phenomenon Related to Climate	Mean (M)	S.D
Rise in both day and night temperature	1.88*	0.415
Less agricultural activities	1.78*	0.524
Increased variability in rainfall	1.78*	0.454
Increase in pest attack and incidence of diseases	1.70*	0.591
Increase drought	1.70*	0.892

*aware of the phenomena relating to climate change

This finding corroborates the assertion of United State Department of Agriculture (USDA) (2007) who stated that climate change has both positive and negative effects on farming but there could be a more negative influence in the long run, which may lead to food scarcity if no immediate efforts are to confront these problems. Crop yields are affected by many factors associated with climate change which include: temperature, rainfall, extreme weather events, climate variability and even CO₂ concentration in the atmosphere which is predicted to cause global warming that will have a significant impact on crop production.

Adaptation Strategies Used in Cushioning the Impact of Climate Change

The adaptation methods used to cushion the effect of climate change as indicated in Table

4 were planting of cover crops like melon and groundnut, practicing of crop rotation and early harvesting of crops. Other adaptation methods used were early planting of crops, prompt weeding, mixed cropping, mulching to reduce water loss, use of improved animal species, increase in frequency of weeding to reduce pest and diseases, avoidance of bush burning, controlled grazing, planting of drought resistant crops and diversification of crop production. This implies that various methods are being used by farmers in adapting to climate change impact.

CONCLUSION AND RECOMMENDATIONS

Virtually all the respondents were aware that variables like extreme weather events and uncertainties in the onset of farming season have been on the increase for the past years in Nigeria. The perceived impact of climate change on agricultural activities was enormous. These include decrease in agricultural productivity and decrease in area for cultivation as a result of erosion and deforestation. Crop yields are affected by many factors associated

Table 3: Mean score of perceived impact of climate change on agricultural activities

Perceived impact of climate change in agriculture	Mean (M)	Standard deviation
Decrease in agricultural productivity due to soil erosion and flood	2.63*	0.610
Loss of arable crop land as a result of flood	2.58*	0.645
Hardening of seed bed as a result of temperature increase	2.57*	0.810
Increase in the cost of cultivation	2.53*	0.747
Decrease in agricultural yield	2.52*	0.854
Increase weed growth	2.52*	0.892
Reduction in the number of livestock	2.52*	0.748
Increase in moisture loss due to exposed soil surface	2.45*	0.910
Increased in crop pests and disease infestation	2.43*	0.871
Decrease in quality of farm produce	2.40*	0.766
Decrease in income	2.40*	0.848
Delay ripening of some vegetation fruits	2.37*	0.843
Delay growths of crops	2.35*	0.799
Increased in mortality of livestock as a result of body heat	2.35*	0.804
Delaying the cropping season leading to scarcity of food	2.30*	0.869
Lose of medical plants	2.13*	0.853
Animals losing their habitats which may result to death	1.82*	1.017
Increase in labour cost as a result of weed growth	1.52*	0.770

*perceived impact

Table 4: Adaptation methods used by the farmers in cushioning the effect of climate change on agriculture

Adaptive strategies	Yes (%)	No (%)
Plant of cover crops like melon, groundnut	95.0	5.0
Practicing crop rotation	93.3	6.7
Early or prompt harvesting of maturing crops to reduce the incidence of pest and diseases	93.3	6.7
Processing of crops to minimize post harvest losses	93.3	6.7
Early planting	91.7	8.3
Prompt weeding	91.7	8.3
Mixed cropping	91.7	8.3
Mulching to reduce water loss	88.3	11.7
Use of improve animal species	86.7	18.3
Increase in frequency of weeding to reduce incidence of pest	86.7	18.3
Avoidance of bush burning	86.7	18.3
Diversification of enterprise from agriculture to other enterprise	86.7	18.3
Controlled grazing	80.0	20.0
Planting of drought resistance variety	80.0	20.0
Afforestation/planting of trees	76.7	23.3
Fallowing	70.0	30.0
Planting across the slope (terracing)	61.7	30.3

with climate change which include increased temperature, rainfall, of which has resulted to flood. Although farmers were using different adaptation strategies in cushioning the effect of climate change like planting of cover crops, practicing of crop rotation and early harvesting of crops, it is however recommended that farmers' adaptation capacities to climate change need to be urgently strengthened by extension agents visitation to disseminate more recent information regarding climate change.

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