

PERCEPTION OF CLIMATE CHANGE ON CROP PRODUCTION IN TARABA STATE, NIGERIA

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ABSTRACT

Agriculture is the main source of food, industrial raw materials in Nigeria. It is predominantly a rain fed system and hence vulnerable to climate changes. This current study was aimed at examining the effects of climate change on crop production in Taraba state, specifically the study examined the various climatic changes in the area and assessed the various food crops grown in the area. One hundred and eighty (180) respondents were randomly selected from the three geo-political zones of the state (Northern, Central and Southern Zones) from twelve (12) randomly selected wards within these zones; out of which 15 farming households were also randomly picked as the sample for the study. The findings perceived that majority of the respondents (76.1%) admits that reduction in crop yield is the major effects of climate change on crop production while 15.5% admits that climate change results to destruction of farmland by flood and wind, 4.4% admits that it reduces food quality of some crops. Recommendations made were: farmer's needs to adapt to measures suitable for food crop production during these climatic change periods as such to improve individual and national food security and government need to put in place extension agents as well as resources in order to curtail the adverse effects of climate change so as to improve agricultural production in but rural and urban places.

Keyword; Climate change, Crop production, Agro-ecological zones, Taraba

INTRODUCTION

Climate change refers to any change in climate overtime, which may be due to natural variability or as a result of human activity (Okoro, Agwu and Anugwa, 2018), it is also referred to any variation in climate over time, whether due to natural variability or as a result of human activities. Climate change and agriculture are inter-related processes, both of which take place on a global scale. The main climate elements in agriculture are temperature, moisture, sunlight, wind and evaporation (Funmilola *et al.*, 2016). Warming of the climate system is unequivocal as is now evident through increases in global average air and ocean temperatures, widespread melting of snow and ice and rising sea level consequently leads to increased rainfall and increased rainfall would lead to frequent flood and drought

resulting in variability in crop yields in different ecological systems. Climate change in the form of higher temperatures, reduced rainfall and increased rainfall variability, reduces crop yields, reduces net farm revenues and threatens food security in low income based economies including African countries (Achiike and Anthony, 2014).

Agriculture is the main source of food, industrial raw materials in Nigeria. It is predominantly a rain fed system and hence vulnerable to climate changes (Ibrahim *et al.*, 2010). Climate change and variability is a major threat to food security in many parts of the country which are largely dependent on rain fed and labour intensive agricultural production. Crop production is one of the most vulnerable systems and heavily hit by climate change in Nigeria and more particularly

in the Northern part of the country where the presence and prevalence of drought is mostly felt, crops are mostly flooded by flood, extensive dependence on rainfed farming coupled with high poverty level, the crop grown could not sustain the needs of the increasing population of people in the region. Agriculture is one of the most unique instruments of growth, development and poverty reduction if properly harnessed. It also contributes greatly to the development of the economy of nation, the livelihood of the citizens and other services which it is now been threatened by climate change. FAO, (2007), stated that, climate change is marked with increased intensity and frequency of storms, drought and flooding, altered hydrological cycles and precipitation variance which have implications on future food availability (Dahiru and Tanko, 2018).

Climate change is seen as the periodic modification of Earth's climate brought about as a result of changes in the atmosphere as well as interactions between the atmosphere and various other geologic, chemical, biological, and geographic factors within the Earth system; is one of the life-threatening environmental phenomena that affect economic development and sustainability worldwide. The natural climate cycle and human activities have contributed to an increase in the accumulation of heat-trapping "greenhouse" gases in the atmosphere, causing temperature increase globally (global warming) (Djomo *et al.*, 2020 more vulnerable to climate change than other sectors (Ajetomobi and Abiodun, 2010). Decline in crop). Climate change is a threat to agricultural development since its production activities are generally p yield and food crop production due to reduction in rainfall and relative humidity, and increase in temperature has been observed in recent times in Nigeria. Like other developing countries, the challenge of climate change and global warming is enormous in Nigeria leading to widespread poverty (Sofoluwe *et al.*, 2011). Adaptation strategy is identified as one of the policy options to reduce the negative impact of climate change (Sofoluwe *et al.*, 2011). Adaptation to climate change refers to adjustment in natural or human system in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities.

In both developing and developed countries, extreme weather events and climatic anomalies have serious implications for agriculture, affecting crop yields and disease patterns. For instance, when drought is followed by intense rain, it may increase the potential for flooding, thereby creating conditions that favor fungal infestations of leaves, roots, and tuber crops. Such sequential extremes, along with changing timing of seasons, may also decouple long-evolved relationships among species (e.g., predator/prey); these relationships are essential for controlling pests and pathogens, as well as plant pollinators (Joshua *et al.*, 2015). Climate change is a growing threat to the agriculture sectors. The negative effects on agricultural production and livelihoods of farmers, foresters and fisher folk are already being felt in many places, more especially under the area under study; they will only get worse overtime. Unless climate change is addressed, agricultural productivity will decline with serious implications for food security. Millions of low-income people will be at risk of hunger and poverty. The agriculture sectors also contribute to climate change due to their emissions of greenhouse gases. Taraba state is an agrarian state with over 75 percent of its inhabitant dependent on agriculture as their main source of livelihood. This makes them most prone to the effects of climate change and variability (Oruonye and Adebayo, 2015). One of the adverse effects of climate change is global warming that has led to a rise in global temperature due to the generation and accumulation of greenhouse gases. Crops growth is influenced by heat due to the balance between photosynthesis and respiration. High temperatures affect many aspects of plant physiology and growth, which in turn may have a direct or indirect effect on crop yield (Djomo *et al.*, 2020). The Earth's temperature is rising as a result of increased atmospheric concentrations of greenhouse gases. If Green House Gas (GHG) emissions continue increasing at a high rate (essentially business-as-usual), climate models predict that global warming could increase 4.7-8.6° F above 2005-2025 levels by the end of the century. As the Earth warms, currently wet regions are expected to receive more rainfall, and currently dry regions receive less, although there will be exceptions and there is considerable uncertainty on how and how much climate change will

affect specific locations. Nigeria and indeed Northern Nigeria is not an exception (Dahiru and Tanko, 2018). This paper is therefore poised to examine the effects of climate change on crop production in Taraba State, Nigeria. Specifically, the study examines the major crops grown by farmers in the study area, identifies the various climatic changes in the area and examine crop farmer's assessment of climatic condition in the last 5 – 10 years in Taraba State.

METHODOLOGY

Study Area

Taraba State is located at the North eastern part of Nigeria. It lies between 6°25' and 9°30' North and between longitude 9°30' and 11°45' East of the Greenwich Meridian. The State shares boundaries with Bauchi and Gombe States in the North, Adamawa State in the east and Cameroon Republic in the south. The State is bounded along its western side by Plateau, Nassarawa and Benue States. The State has a land area of 54,428km², with a population of about 2,300,736 people according to the 2006 census. Taraba has 16 Local Government Areas with Jalingo as the State capital. The major occupation of the people of Taraba State is Agriculture. Cash crops produced in the State include coffee, tea, groundnuts and cotton. Crops such as maize, rice, sorghum, millet, cassava, and yam are also produced in commercial quantity.

Sampling Procedure

Multi-staged purposive sampling technique was employed in this study. In the first stage six (6) local governments areas, two (2) from each of the zones in Taraba state. Namely Jalingo and Zing from the North, Gassol and Bali from the Central Zone, Ibi and Takum from the southern zone respectively. In the second stage, purposive sampling was also used to select two wards from each of the LGAs. The selected wards were Majidadi and Kona in Jalingo, Zing A and Monkin in Zing LGA, Yerima and Tutare in Gassol, Bali A and Maihula in Bali LGA, and Wanu and Dampar in Ibi LGA, Dutse and Tikari in Takum LGA. Random sampling was used in the third stage to select Fifteen (15) farming households in each ward, making a total of 180 households. The

target households selected in these wards were predominantly rice, yam, groundnut, maize and cowpea farmers in all the selected local government areas, as these are the major food crops grown in the region, which has mostly been affected by climate change.

Sources of Data

Both primary and secondary data were used for this study. The primary data was gathered from households using well-structured questionnaires. Data were collected on the effects of climate change on crop production. The secondary data used for this study were obtained from published, unpublished materials and the annual mean time series data from Nigerian Meteorological Agency (NIMET) that included the following; temperature, and rainfall, and also annual yields of farmers were collected from the National Bureau of Statistics.

Analytical Techniques

Descriptive statistics was used to assess the effects of climate change on crop production in the study area. These included the use of line graphs.

RESULTS AND DISCUSSIONS

Major Crops Grown by Farmers in the Study Area

The below expressed that 18.3% of the respondents in the study area were found to be groundnut producers, 16.1% were maize farmers, 17.2% were rice farmers, 15.0% were sorghum producers, 10.6% were found to be cowpea farmers, 8.9% were cassava farmers while 13.9% were yam producers despite multiple responses from the respondents. This corroborates with the findings of Oruonye and Adebayo (2015) on assessment of the level of farmers awareness and adaptation to climate change in Northern Taraba State, Nigeria found that the most common crops cultivated in the study area include cereals, legumes and tubers such as Maize (26.6%), rice (21.9%), groundnut (13.3%) and yam (11.5%). These crops which form the staple food in the study area are susceptible to the impacts of climate change.

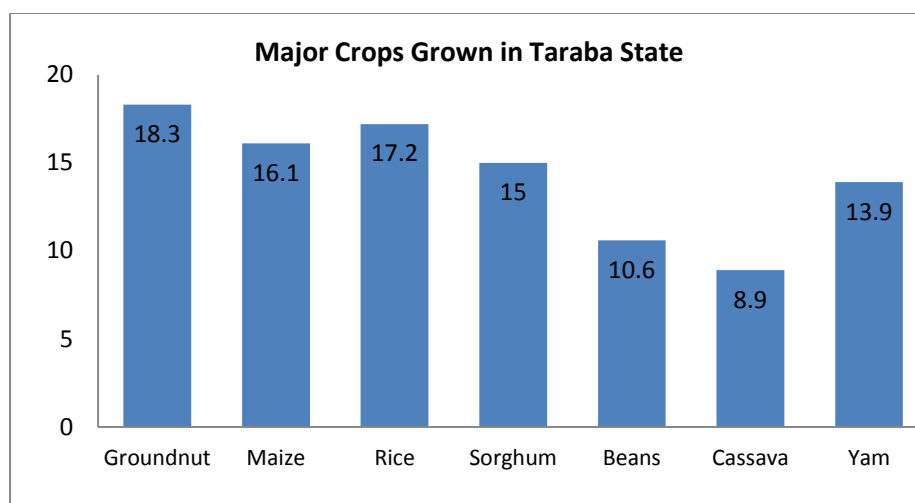


Figure1: Major Crops grown by Farmers in the study area

Source: Researcher's Survey, 2020

Various climatic changes

The line graph below shows that 23.3% of the respondents admit climate change is noticed when there is a shift in precipitation pattern (either increasing or decreasing), 22.2% admits that an increase or decrease in temperature pattern, 16.1% admits that there is

increase in flooding when the climate changes, 17.2% admitted that it degrades soil, 6.7% admitted that crop processing factories face scarcity of raw materials as a result of climate change, while 4.4% admitted that when the climate changes there is often availability of fertilizer and pesticides.

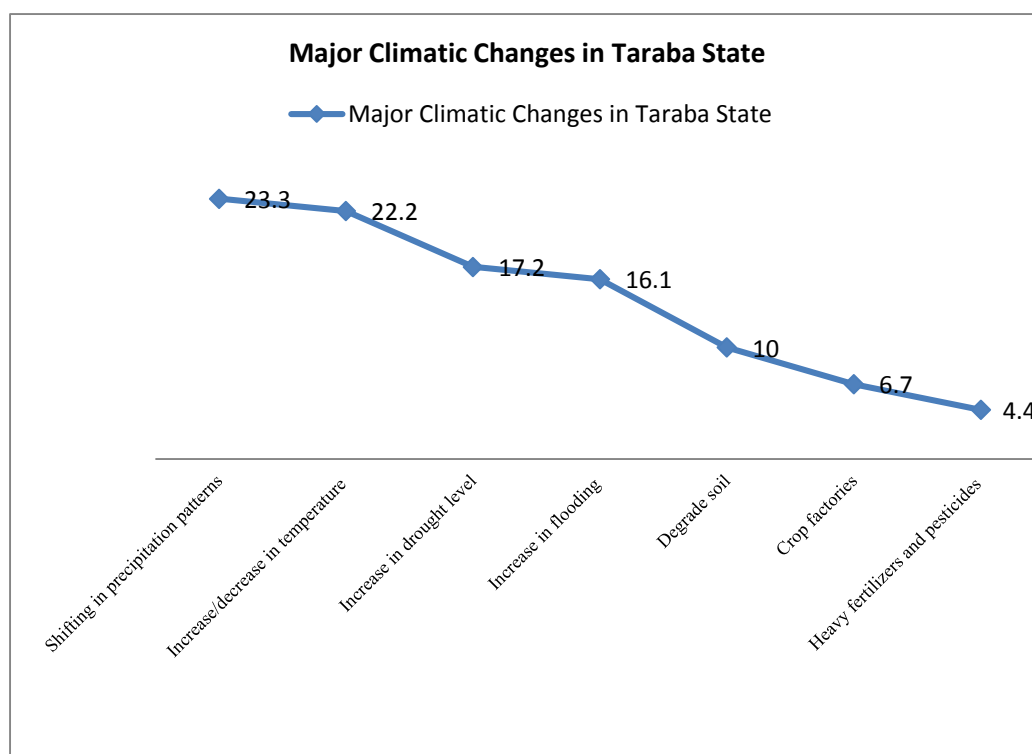


Figure 2: Major climatic changes
Source: Researcher's Survey, 2020

Effects of Climate Change on Crop Production in the Study

Based on the Table below 1; on the effects of climate change on crop production in Taraba state, the findings revealed that majority of the respondents (76.1%) admits that reduce in yield of crop is seen as the major effects of climate change on crops production. This corroborate the findings of Oruonye (2014) on an assessment of the level of awareness of

climate change and variability among rural farmers in Taraba state, Nigeria revealed that the farmers were asked how too much or excess rainfall affects them, their response ranges from destruction of farmlands by flood (79.1%) to submergence of houses by flood (10.5%). This corroborated the findings of Oruonye (2012) and Oruonye and Adebayo (2013) which shows an increasing cases of flood disaster in the study area with worse flood in 2005 and 2012 in which over 5000 farmlands were destroyed.

Table 1: Effects of climate change in Taraba State

Effects of climate change on crops	Response	Percentage
Reduces crop yield	137	76.1
Destruction of farmland by flood and wind	28	15.5
Disrupt food availability	4	2.2
Reduces access to food	3	1.7
Reduces food quality of some crops	8	4.4
Total	180	100

Source: Survey, 2020

SUMMARY AND CONCLUSION

This current study was aimed at examining the effects of climate change on crop production in Taraba state, specifically the study examined the various climatic changes in the area and accessed the various food crops grown in the area. One hundred and eighty (180) respondents were randomly selected from the three geo-political zones of the state (Northern, Central and Southern Zones) from twelve (12) randomly selected wards within these zones; out which 15 farming households were also randomly picked as the sample size for the study. The study showed that various climatic changes noticeable in Taraba state includes changes in precipitation pattern (either increasing or decreasing), increase or decrease in temperature pattern, increase in flooding degraded soil, crop factories faces scarcity of crops as a result of climate change and there is often availability of fertilizer and pesticides. The findings further showed that majority of the respondents (76.1%) admits that reduction in crop yield is the major effects of climate change on crop production while 15.5% admits that climate change results to destruction of farmland by flood and wind, 4.4% admits that it reduces food quality of some crops.

RECOMMENDATIONS

Recommendations based on the findings include;

- i. With the adverse effects of climate change on crop yield and food security in general, farmers need to adapt to measures suitable for food crop production during these climatic change periods as such to improve individual and national food security.
- ii. Government need to put in place extension agents as well as resources in order to curtail the adverse effects of climate change so as to improve agricultural production in both rural and urban places.

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