Challenges of Climate Change and Food Crop Production in Danbatta Local Government Area of Kano State

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Abstract

The study examined farmers' challenges on climate change and food crop production in Danbatta Local Government Area of Kano State. The study used stratified random sampling technique. Two hundred and fifty (250) copies of the questionnaire were administered on the respondents, out of which only 220 copies were retrieved and used for the analysis. The data were analyzed using descriptive statistics. The study findings revealed that farming is the major economic activity or occupation of the respondents in the study area (45%). The farming system in the area include crop farming, mostly grain crops (production of crops alone and mixed farming) and shifting cultivation. The findings further revealed that the local farmers in the study area plant early maturing crop as the main adaptive practice for climate change impact (16.3%). The findings also revealed that lack of adequate information on climate change (19.5%) and lack of farm ownerships (19.5%) are the major challenges to crop production in the study area. Based on the findings, the study recommended that government should create a conducive policy that will enhance adaptive capacity of the farmers, given the high degree of uncertainty about how climate change may affect farmers, and rural people in dry land area, the policy intervention in the state should focus primarily on addressing the underlying causes of vulnerability of the people and the limited adaptive capacity of the farmers, including their high dependence on natural resources, persistent poverty, inadequate education and alternative employment opportunities.

Keywords: Climate change, Crop production, Danbatta, Kano state and Rural Farmers.

Introduction

Climate change is a global environmental challenge that has potential of causing profound changes, particularly on plants in developing countries like Nigeria. Human beings all over the world are faced with the problem of depletion of natural resource (Abbas & Aminu, 2013). Agriculture is among the factors affecting the environment in satisfying human needs, while "climate is the primary determinant of agricultural productivity" (Apata, Samuel & Adeola, 2009). The rate and magnitude of changes in climate characteristics determines agronomic and economic impacts from climate change (Babagana, 2009). Climate change is a threat to

agriculture and even to non-agricultural socio-economic development aspects. Agricultural production activities are generally more vulnerable to climate change than other sectors (Agrawal & Perrin, 2009). Over the years, climate change has become an increasingly high-profile issue both from the social and economic viewpoints. It is not only the scientists and environmentalists who are concerned about climate change, government, politicians, and the general publics are also taking interest in climate change.

Climate change is probably the most complex and challenging problem facing the world today. Currently, intriguing questions include questions on weather uncertainty, persistent climate abnormalities, rampant environmental degradation, and eminent food insecurity. Some of these complexities are exacerbated by increased human population and demand for more land for agricultural production, urban expansion, and industrialization, which have resulted in destruction of the vegetation cover and subsequently rampant environmental degradation. The demand for food, fuel wood and forest products by locals expand this problem and the results are devastating effects that include climate change, droughts, floods and subsequently food insecurity (Agrawal & Perrin, 2009). Local farmers as used here describe rural producers who farm using mainly family labour and for whom the farm provides the principal source of income. Local farmers grow most of Nigerian grains and significant quantities of potatoes, beans, sorghum, vegetables, tree fruits etc. However, these farmers are faced with the challenges of increasing production while preserving natural resources. Meeting these challenges is vital to sustained livelihoods and reduction of poverty, especially within the fragile dryland and semi-arid area of Nigeria (Apata *et al*, 2009).

Crop production is one of the most vulnerable systems heavily hutted 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. If agriculture is properly harnessed, it can bring about growth and development by reducing poverty. It can also contribute greatly to the development of the economy of the nation and the livelihood of the citizens and other services; but it is now been threatened by climate change. Food and Agriculture Organization of the United Nations (2010) 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. These are what are being experienced in the Northern part of Nigeria.

One of the present major development problems facing Nigeria is persistent and increasing food insecurity linked to poverty. Almost 57 million or more Nigerians live below the poverty line, the majority of which live in the rural areas, with more than 70% of them relying on rain-fed subsistence or crude farming to survive (Okali, 2007; Ogungbile *et al*, 1998; Adefolalu, 1998). Evidence shows that continued climate change episodes may exacerbate the poverty level, leaving many local farmers, mainly the subsistence or small holders, trapped in a cycle of poverty and vulnerability to climate change.

Climate variations affects local farmers in the study area on a daily basis and they respond differently to its damages depending on their adaptive capacity. Among such damages are the loss of crops due to intense droughts and prolonged dry spells, flood and the emergence of new plants and livestock diseases. Traditional farmers of the fragile Danbatta Local Government Area of Kano State suffer greater impacts from the emerging climate change related problems, such as increasing rainfall variability, extreme temperatures (extreme hot days), shorter growing seasons, high solar radiation, greater moisture stress, new pest, and diseases etc. This calls for adaptation strategies to offset negative impacts of climate change and food crop production in the study area.

Description of Study Areas

The study area is Dambatta Local Government Area (LGA) of Kano State, Northwest Nigeria and has its headquarters in Dambatta town. It is one of the 44 Local Government Areas of the state. It has an area of 732 Km^2. Dambatta LGA shares borders with the Minyibir and the Makoda LGAs and with Jigawa state. Danbatta LGA comprises several towns and villages which include Fogolawa, Barebari, Danya, Hazo, Kwasauri, Rade, Tabo and Zago. The population of the area is estimated at 174,955 inhabitants with the dominant tribes in the area being Hausa and Fulani. Hausa and Fufulde languages are extensively spoken in the area while Islam is the commonly practiced religion in the area.

The study area experiences two major seasons which are dry and rainy seasons. The average temperature of the area is put at 33ºC. The study area lies geographically between latitude 12º 14'N to 12º 36'N and longitude 8º29'E to 8º49'E.

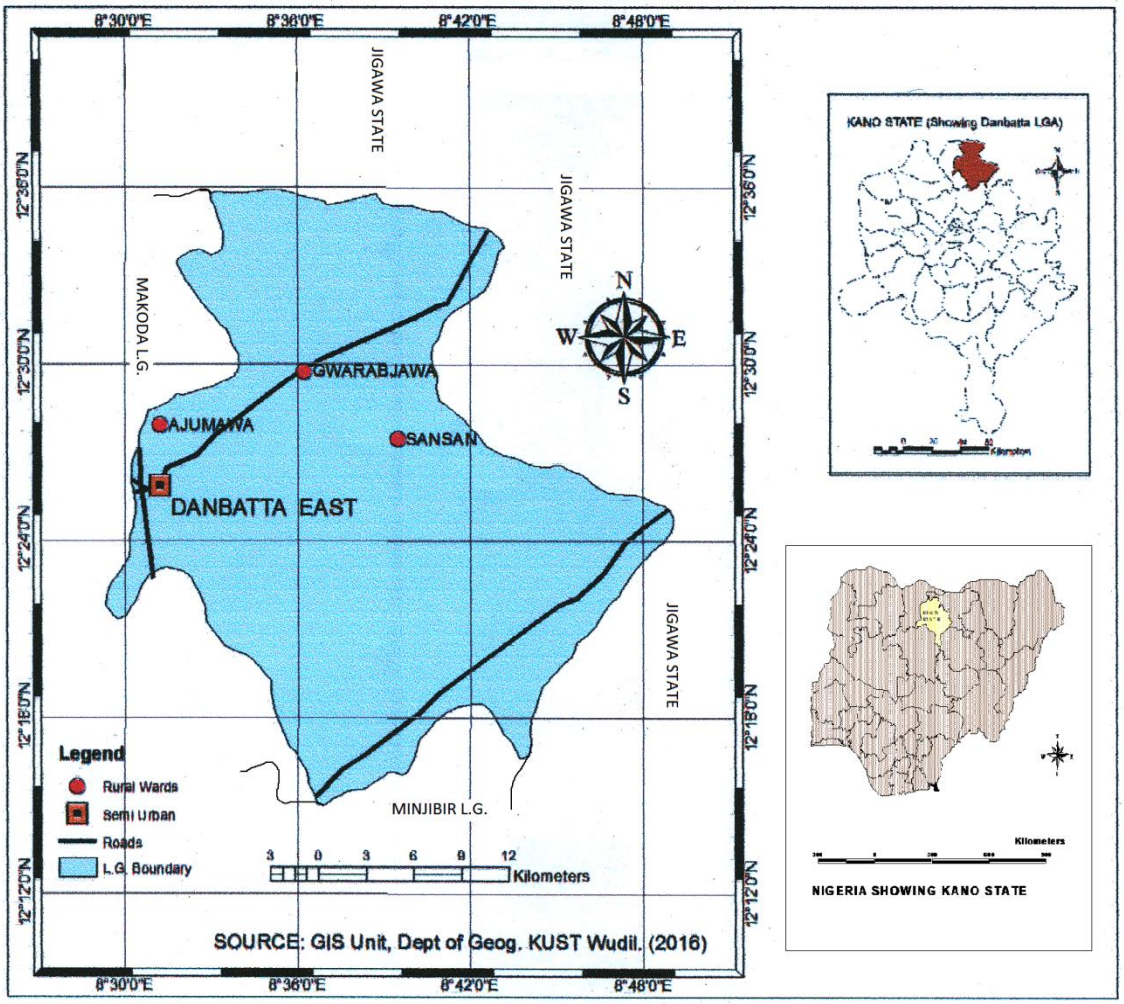

Figure 1: Map of the Study Area

Crop cultivation is a key economic activity in the area with a number of crops such as millet, onions, sorghum, and groundnut grown in the area. Other important economic activities in the area include hunting, pottery, textile making and leather works. Trade is also an important economic activity in the area with the LGA hosting several markets

Materials and Methods

This study used stratified random sampling techniques in the selection of the study areas and communities for questionnaire administration. In the first place, the study purposively selected Dambatta LGA as representative to three (3) Agricultural Development Projects (ADP) headquarters, as semi-urban area due to its farming infrastructures and influence of these farming areas to environmental degradation. In the second phase, one semi-urban area was

chosen and four (4) wards out of ten (10) wards, were systematically chosen as representatives in order to minimize as much as possible urban influence and minimize sampling bias. Variables such as farmers' population, farmers' farm size and distance from urban influence were considered primarily in choosing sampling points. The selection of rural wards was done by using systematic sampling which involves picking the second after arranging them numerically. The same principles were applied in selecting the villages under the LGA chosen for questionnaire administration. Three wards (3) were sampled from rural areas. Overall, a total of 250 questionnaires were used to elicit information on the effect of climate change and adaptation of mitigation practices by respondents in the study area as presented in Table 1:

Table: 1 Sample Size Selection

S/n	Wards Selected	Areas Designated	Respondents (%) n=250
	Dambatta East	Semi-urban	100
	Ajumawa	Rural	50
	Gwarabjawa	Rural	50
	San-san	Rural	50
Total	250		

Source: Field survey, 2016.

A total of two hundred and fifty (250) copies of the questionnaire were administered on the respondents. Out of the total questionnaires, only 220 were retrieved and coded for analysis. Accordingly, data were analyzed using Statistical Package Software for social Sciences (SPSS), descriptive statistical tools such as percentages (%), frequency (f).

Result of the Findings

Socio-Economic Characteristics of the Respondents

The socio-economic characteristics of the respondents in the selected wards were identified to have an understanding of their social and economic strength to cope with impacts of the changing climate on the study area. The socio-economic status of the respondents also expanded the scope to view their roles in responding to climatic disaster.

Occupational Pattern

Farming is the major economic activity or occupation of the respondents in the study area. According to figure 1, farming is the major economic activity for majority of the respondents throughout the study area. The status of primary occupation of the respondents varies largely although livestock keeping is the second major economic activity, most livestock keepers are also farmers, as very few of them keeps livestock alone. Petty traders ranked third (11%) followed by clergy work/Islamic scholars (8%). Other minor economic activity included

hawking of water and selling of crop stocks and firewood were observed by women in particular and young men.

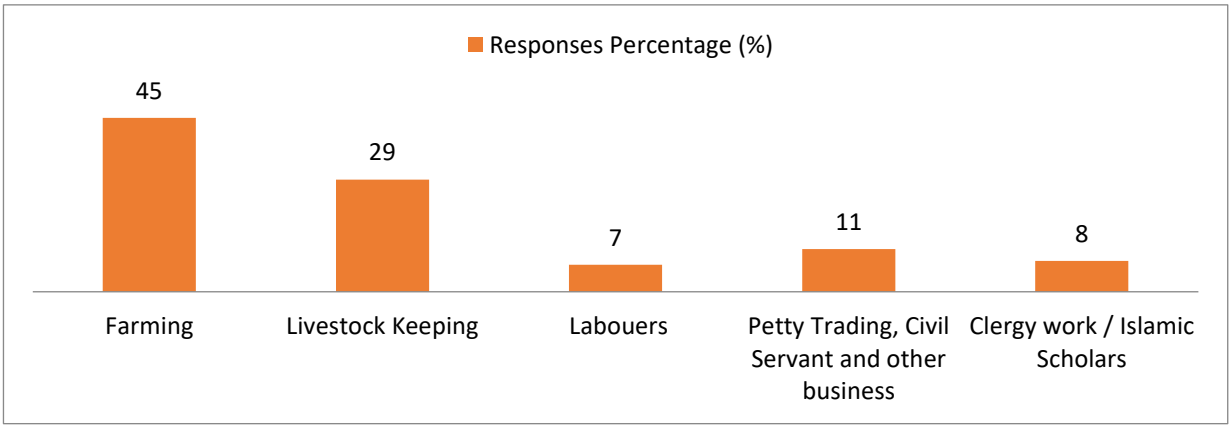

Fig: 1: Distribution of Respondents Primary Occupation

Source: Author's analysis, 2022

Farming System in the Study Area

Figure 2 presents the distribution of the farming system in the study area. This reflects the farming systems. The farming systems in the area include crop farming, mostly grain crops (i.e. production of crops alone, mixed farming; i.e. the keeping of livestock and crop farming) and shifting cultivation. Much of these activities are greatly on subsistence level with little mechanization.

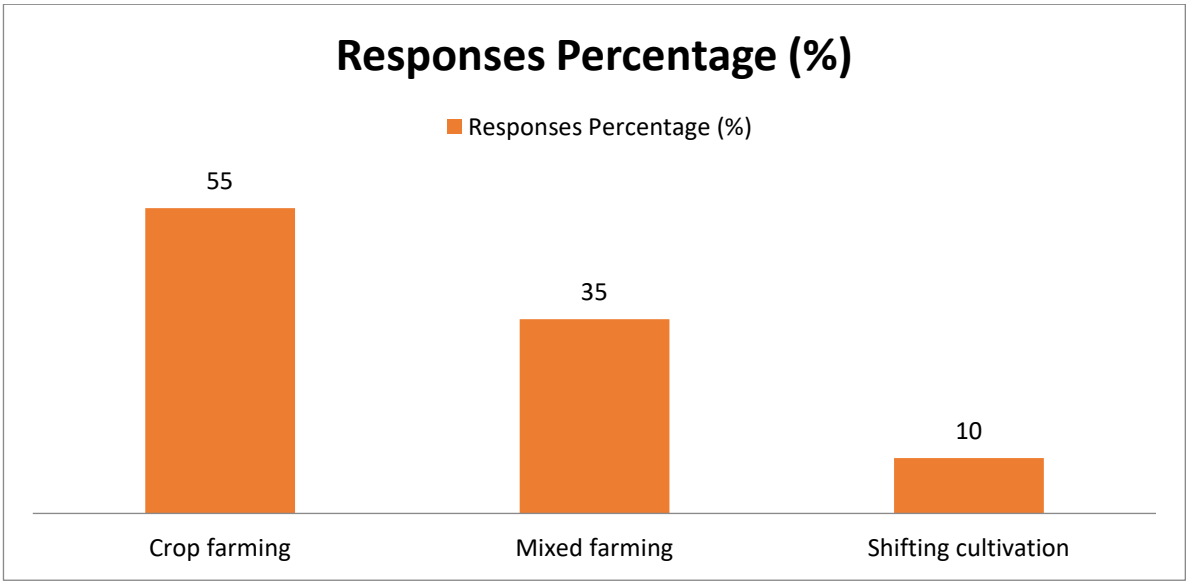

Fig: 2: Farming Systems by Percentage Proportion in the Study Area

Source: Author's analysis, 2022

Adaptive Coping Practice for Climate Change Impact by Farmers

The result of the study findings on the coping strategies by local farmers is presented in Table 2. The result revealed that 8.1% of the respondents claimed that they adopt cover cropping/mulching as their main adaptive coping strategies, 13.1% of the responded claimed that they adopt irrigation as their adaptive coping practice for climate change impact by farmers, 12.0% responded that planting of economic trees is the main adaptive coping practice for climate change impact by farmers, 16.0% of the respondents responded that erosion control (wind/water) is the main adaptive coping practice for climate change impact by farmers, 16.3% of the respondents responded that planting early maturing crop is the main adaptive coping practice for climate change impact by farmers, 12.7% of the respondents responded that planting exotic crop species and drought resistant varieties is the main adaptive coping practice for climate change impact by farmers and while 7.7% of the respondents claimed that adoption of mixed cropping is the main adaptive practice and lastly 1.4% claimed that other factors influence their farming practices. These findings revealed that majority of the respondents responded that planting early maturing crop is the main adaptive coping practice for climate change impact by farmers.

Table 2: Main Adaptive Coping Practice for Climate Change Impact by Farmers

Variable	Frequency	Percentage (%)
Cover cropping/Mulching	18	8.1
Practicing irrigation farming	29	13.1
Planting of economic trees	26	12.0
Erosion control (wind/water)	35	16.0
Planting early maturing crop	36	16.3
Planting exotic crop species	28	12.7
Planting drought resistant crops	28	12.7
Adoption of mixed farming	17	7.7
Other specify	3	1.4
Total	**220**	**100**

Source: Author's analysis, 2022

Challenges of Climate Change on Crop Production

The result in Table 3 revealed challenges of climate change on crop production by farmers in the study area based on their perception of climate change. From the findings, 19.5% reported lack of proper information on the phenomenon, another 19.5% claimed lack of farm

ownerships, 16.9% lack of improved seeds, 17.3% lack of modern techniques, 14.5% lack of access to water for irrigation and 12.3% lack of access to funds or credit.

Table 3: Challenges of Climate Change on Crop Production

Variables	Frequency	Percentages (%)
Lack of improved seeds	37	16.9
Lack information	43	19.5
Lack of access to water for irrigation	32	14.5
Lack of access to funds or credit	27	12.3
Modern techniques	38	17.3
Farm ownerships	43	19.5
Total	**220**	**100**

Source: Author's analysis, 2022

Conclusion

This study has examined the challenges of climate change and food crop production in Danbatta Local Government Area of Kano State. The findings of the study revealed that the major impact of climate change is felt among rural farmers, especially those living in the dry and fragile ecosystems of the state. Such impacts manifest in form of increased food insecurity, increased poverty levels, high disease level etc. Although the number of participated farmers is high, the result obtained by the study cannot be generalized beyond the sampled population (i.e., Danbata Local Government). The study reported that although, farming is the major economic activity and livestock keeping is the second major economic activity, most livestock keepers are also farmers, as very few of them keeps livestock alone. Much of these activities are carried out on subsistence level with little mechanization. The study also reported that planting early maturing crop and erosion control (wind/water) are the main adaptive coping practice for climate change impact by farmers in the study area. The study therefore concluded that lack of proper information on climate change and lack of farm ownerships are the major challenges of climate change on crop production in the study area.

Recommendations

Based on the findings of the study, the following recommendations are made;

- **i.** Increase dissemination of information on climate change in the area. Since adaptive capacity is partly determined by knowledge (including local knowledge) and the awareness of climate change risks, it will be crucial to raise local farmers level of awareness about potential climate related risks, as well as appropriate mechanism to address such risk. It will also be necessary to raise similar awareness within the local government.
- **ii.** Government should create a conducive policy that will enhance adaptive capacity of the farmers, given the high degree of uncertainty about how climate change may affect farmers, and rural people in dry land area, government policy intervention in the local government should focus primarily on addressing the underlying causes of vulnerability

of the people and the limited adaptive capacity of the farmers, including their high dependence on natural resources, persistent poverty, inadequate education and employment alternatives/opportunities. Such policy must be adapted to local content and integrated into broader long-term development plan at different scales. Strengthening local public and private institutions and raising awareness among them about climate related risk will be the key, since local institutions play a major role in supporting or hindering communities in their process of adapting to change.

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