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**Awareness of Climate Change and its Dangers among Local Farmers of Katsina State, Nigeria**

**\*<sup>1</sup>A. Galadima and <sup>2</sup>S. I. Moyi, <sup>1</sup>A. M. Lawal**

<sup>\*1</sup>Centre for Research, Federal University, PMB 1001, Gusau, Nigeria

<sup>2</sup>Department of Biological Sciences, Federal University Gusau, PMB 1001, Gusau, Nigeria

**Corresponding Author's Email & Phone No.:** [ahmadgldm@yahoo.com](mailto:ahmadgldm@yahoo.com); +2348064412388

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**ABSTRACT**

Campaign for climate change awareness, mitigation and adaptation is inevitably a global strategy for consideration. Therefore, investigations on the level of farmers' commitment in this direction will be very helpful in terms of policy design and implementation. This study therefore targeted farmers in Katsina state as respondents. Five hundred (i.e.500) farmers across five (5) local government areas of the study state (i.e. Katsina state) were targeted and interacted with for the purpose of this investigation by administering pre-designed and eco-evaluated questionnaires. The results showed that most of the farmers have poor prior knowledge of the situation. However, those with good knowledge of climate change are applying fundamental adaptation and mitigation strategies to elevate their agricultural outputs. We are recommending an intensified government campaign towards situation awareness and effective policy design.

**Keywords:** Climate change; awareness; handling; farmers; policies.

**1.0 INTRODUCTION**

Since more than one century now the exploitation and utilization of fossil fuels has become a major source of energy for applications at the industrial and household scales. Certainly, the fossil fuels (including petroleum, natural gas and coal) will continue to play an important role in at least the next five decades to come. However, the emission of gaseous environmental pollutants like methane, carbon (IV) oxide and NO<sub>x</sub> has seriously contributed to environmental degradation over the years (Ehhalt et al., 2001; Herzog et al., 2000; Mitchell et al., 1995; Robertson et al., 2000; Searchinger et al., 2008). Specifically, climate change and global warming are believed to have originated via this mechanism. Certainly, the climate of the universe had been changing over very long period of time due to associated variations in global temperature.

The more challenging factor that called for concern is the current rapid rate of global warming. The release of the greenhouse gases identified herein continue to grow alarmingly and these gases are the major culprits in causing the climate change. Unfortunately, the dangers of climate change go beyond the culprit countries and has become a global

phenomenon. Some of the effects of climate change identified so far include serious reduction in the productivity of fertile agricultural land, occurrence of heatwaves, ocean warming and acidification and rise in sea level (Fraser et al., 2011; Gössling and Upham, 2009; Mbow et al., 2014; Mozell and Thach, 2014). All of these problems will certainly have negative consequences on human and animal lives.

One major concern here is that the developing countries like Nigeria and others in Sub-saharan Africa are expected to suffer more from the climate change consequences (Bryan et al., 2009; Collier et al., 2008; De Wit and Stankiewicz, 2006; Jones and Thornton, 2003; O'Reilly et al., 2003; Thompson et al., 2002). Spread of diseases and reduction in agricultural land productivity thereby elevating hunger threats due to poor rainfall have already been felt in this region.

Addressing the climate change situation is a collective effort for all the citizens. This way, several inconsistencies could be handled. Firstly, millions of people experiencing climate-based risks and extreme poverty would be complimented. Secondly, people near the seas could be protected from rise dangers.

Thirdly, addressing the climate change also go a long way in reducing the stress of poor accessibility to portable water supply and eliminate the over spread of heat-borne diseases.

Now while the government and NGOs contribute in this perspective, the local farmers shall be made to understand the challenges of climate change and strategies for addressing them. This will guide policy makers in coming up with appropriate implementation and assessment plans (Becken, 2007; Change, 2014; Matisoff, 2008; Shwom et al., 2010; Tol, 2001). Within the range of this scope, the study investigated the understanding of climate change and its consequences among randomly selected farmers in Katsina state of north-western Nigeria.

## 2.0 RESEARCH METHOD

### 2.1 Selected Study Area Description

Katsina is among the seven states that constituted the north-western region of Nigeria. The state was established in 1987 has a boundary with Republic of Niger to the northern part. In addition to its border with Zamfara state by the western side, Katsina shares boundaries with Kano and Kaduna states to the

East and South, respectively (see Figure 1). An estimate of over 70% of the more than six million inhabitants of the state are local farmers engaged mainly in food crops production and the area composed largely of vegetation made-up of scrubs and savannah (especially in the southern axis). Agricultural crops cultivated in this part of northern Nigeria include groundnut and cotton for commercial purposes whereas millet, guinea corn and maize are cultivated for household feeding and proving animal food (Abbas et al., 2010). Animals under rearing in the axis include goats and sheep with limited population of camel and donkeys. Therefore, the state is one of the sources of hide and skin in the region. Geographically, the state has the coordinates of 12.5139° N, 7.6114° E, covered a land mass of > 24, 000 km<sup>2</sup> and house 34 local government areas (i.e. specifically, those visited for the study include Katsina, Funtua, Kankara, Batagarawa and Dutsinma). Studies have revealed abundance of mineral resource deposits of kaolin, feldspar, diamond, gold and others (Kashim, 2011; Ladan, 2009; Obaje, 2009; Wakili and Danmola, 2013). However, the concentration depends on the local government and its geographical history.

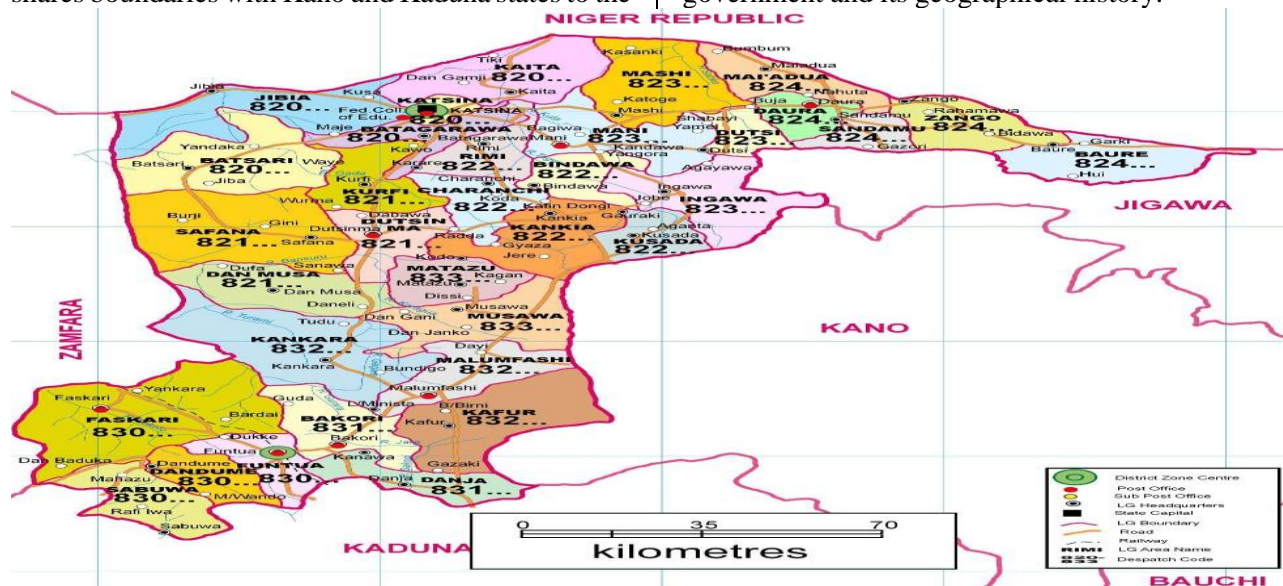


Figure 1. A Typical Geographical Map of Katsina State Showing the Study Areas. Source: <https://nigeriazipcodes.com/441/katsina-state-zip-code-map/>

### 2.2 Farmers' Interaction Methodology

Five hundred (i.e.500) farmers across five (5) local government areas of the study state (i.e. Katsina state) were targeted and interacted with for the purpose of this investigation by administering pre-

designed and eco-evaluated questionnaires. The selection of interviewees was done using a multistage random sampling technique. Rapid Rural Appraisal involving transect-walks, identification and inspection of farmlands was used to encourage the

respondents to describe their relationships with their natural resources, particularly the indigenous adaptive measures.

The interview schedule was divided into five (5) sections (A-E). Sections B-E, however, had more relevance to the main aim of the research. Section B determined rural households' climate change awareness. Respondents were asked to indicate the extent to which variables such as high/low rainfall, floods, food insecurity and hunger, extinction of animal and planting species, desertification etc. represented their level of climate change awareness. Section E looked at the effective indigenous, emerging technologies and innovations adopted by the farmers to mitigate the negative effects of climate change in their neighbourhoods. The methodology was generally in line with our earlier adopted strategy (Galadima and Lawal, 2018).

### 3.0 RESULTS AND DISCUSSION

The key results of the farmers' interactions derived from this investigation are provided and discussed in the following subsections.

#### 3.1 Familiarity with the Situation

In Table 1, the level of understanding of climate change among the farmers of the study areas has been presented. It could clearly be established that the understanding of climate change causes and consequences among these farmers is very poor. In fact, in all the local governments visited, the percentages of farmers without prior knowledge of the problem ranges between 55 and 60%. One major concern here is that considering the projected impacts of the climate change consequences in the Nigerian areas, its knowledge among the inhabitants become a necessity. Therefore, the policy makers must provide the mandatory frameworks for ensuring that all people are aware on the situation. In fact, some researchers have considered situation awareness to account for at least 50% of the climate change mitigation campaign (Azadi et al., 2019; Hewawasam and Matsui, 2019; Hochachka, 2019; O'Donnell, 2019). From Table 1, only Batagarawa and Dutsinma have some few farmers (i.e. 5 and 4%, respectively) that were able to prove an excellent understanding of climate change situation. Farmers in Funtua local government have the poorest understanding (i.e. 65% unawareness) of the situation owing to their over-dependence on inherited farming practices.

**Table 1: Farmers' Understanding of the Climate Change Situation and Challenging Factors among the Targeted Inhabitants.**

	<b>Katsina</b>	<b>Kankara</b>	<b>Funtua</b>	<b>Batagarawa</b>	<b>Dutsinma</b>
Excellent:	-	-	-	05	04
Very Good:	-	10	-	10	08
Good:	30	15	15	10	17
Fair:	15	15	20	20	13
Poor:	55	60	65	55	58
<b>Total (%)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

#### 3.2 Access to the Climate Change Information

In Table 2 given below, the summary of the sources of climate change information for those farmers that have certain level of understanding of the situation is presented. According to the analysis, in local governments such as Katsina, Kankara, Funtua and Batagarawa the process of extension service does not exist (otherwise it existence haven't cover dissemination of the climate change details). Generally, radio/television programs provided the farmers with the main details about climate change and its consequences. In Dutsinma local government

it could be seen that 80% of the farmers said to heard the situation over the radio/television. In Funtua local government, 35% of the local farmers claimed for heard the issue from their co-farmers. When interviewed about sourcing the relevant information from the immediate politicians, the farmers claimed no any political leader has time for climate change campaign. The major issue of interest from the responses is that the local farmers listen to their radio stations and watch television frequently. Therefore, policy makers shall carefully consider this phenomenon in reaching out to the farmers for any

extension activity. Information sourcing is fact an unavoidable parameter in the climate change mitigation campaign (Banerjee et al., 2019; Di Falco and Sharma-Khushal, 2019; Ogallo, 2010; Rickard et al., 2014; Vano et al., 2018). Certainly, not only the climate change situation, radio/television programs are prominent pathways for communicating to local people on many local, national and international

issues with successful impacts (Coleman et al., 2011; Domatob and Hall, 1983; Eastman, 2003; Eko, 2001; Liddell and Masilela, 1990). However, the low patronage of internet services by farmers across the region must be addressed because vital research findings and solutions to the climate change menace are published in valuable internet databases.

**Table 2: Sources of Information (In Percentage) about the Climate Change and Associated Consequences.**

<b>Information Source</b>	<b>Katsina</b>	<b>Kankara</b>	<b>Funtua</b>	<b>Batagarawa</b>	<b>Dutsinma</b>
Extension workers:	-	-	-	-	15
Friends:	20	25	35	-	-
Cooperatives:	10	10	05	23	5
Radio/TV:	65	65	45	67	80
Internet:	05	-	15	10	00
Politicians:	-	-	-	-	-
<b>Total (%)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

### 3.3 Adaptation Strategies in Existence

Climate change adaptation refers to the procedure or the approach of anticipating the adverse consequences attributed to the climate change and implementing suitable actions/principles to prevent and/or minimize the resulting dangers. It can also cover the proper utilization of available opportunities and knowledge for combating the climate change inconsistencies. Certainly, proper planning and implementation of strategies can go a long way in saving lives and money that could be destroyed by the menace. Several adaptation measures are commonly considered depending on the region, level of government, situation before hand and farmers' capabilities. In some regions for instance, efficient utilization of available water reserves, afforestation, application of drought-resistance crop varieties and

many other strategies have been found efficient (Lim et al., 2005; Lobell et al., 2008; Moser and Ekstrom, 2010). As shown in Table 3, farmers in Katsina state emphasized on cultivating crops that are well acclimatized to the rainfall and drought patterns of the area. Dutsinma and Kankara local governments have the highest percentages of respondents that prioritized this strategy (i.e. with 73 and 70%, respectively). Other strategies that include mixed farming, cover crops planting and the employment of pest-resistance varieties are only partly considered by the farmers across the state. It is therefore in our own opinion that the government and NGOs shall educate these farmers to fully explore all the available strategies for comprehensive climate change combat model.

**Table 3: Strategies Used as Measures for Adapting Climate Change by the Farmers in Targeted Areas.**

<b>Adaptation Strategy</b>	<b>Katsina</b>	<b>Kankara</b>	<b>Funtua</b>	<b>Batagarawa</b>	<b>Dutsinma</b>
Planting Cover Crops	15	-	15	08	20
Planting Pest Resistance Crops	10	05	04	10	-
Mixed Farming Practice	-	07	05	14	06
Use of crop Varieties that are well acclimatized:	65	73	68	63	70
Use of Crops that are harvested in short period:	10	15	08	05	04
<b>Total (%)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>



### 3.4 Approaches to Mitigation

Although the public perception of climate change mitigation has been tilted toward emissions reduction by industries, the local farmers also have a key role to play. Climate dangers are global issues affecting all the living creatures in the planet. Therefore, every person has a given role to play in its proper mitigation. Several strategies could be employed depending on the status of farmers, governmental/NGOs policies and location of the region in the planet (Azevedo et al., 2017; Lucena et al., 2018; Wood and Roelich, 2019; Yu et al., 2019). As illustrated in Table 4, the farmers in the targeted study areas has no concern for the contour bounds creation around their farmlands as a mitigation

option. Fundamentally, they emphasized on tree planting (i.e. afforestation and reforestation). This can be understood bearing the fact that these farmers are closer to the desert areas of Niger Republic. In Batagarawa local government, 81% of the farmers understood why afforestation/reforestation is necessary in mitigating climate change. A similar trend (i.e. 75-78%) could be observed in all other local governments. About one-third of the targeted farmers also pointed out that they are practicing wetlands draining as another strategy and have previously found it as effective. The analysis indicates that provision of resistance trees and campaign by government shall be intensified to ensure further compliance and farmers' commitment.

**Table 4: Perceptions on the Appropriate Climate Change Mitigation Strategies in the Targeted Areas.**

<b>Mitigation Strategy</b>	<b>Katsina</b>	<b>Kankara</b>	<b>Funtua</b>	<b>Batagarawa</b>	<b>Dutsinma</b>
Reforestation/Afforestation:	78	75	75	81	79
Making Contour bounds around farmlands:	-	-	-	-	-
Draining of wetlands for crops production:	22	25	25	19	21
<b>Total (%)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

### 4.0 CONCLUSIONARY REMARKS

Climate change challenges are visible and consistently attracting action both at the national and international scales. The earlier its consequences are understood by local farmers the better their commitments toward the adaptation and mitigation. While governments and industries are applying policies and handling emissions reduction, the farmers can apply appropriate methodologies to aid the combat-campaign. In Katsina state, the level of awareness among farmers on these factors is poor and therefore huge government effort is necessary. To those farmers that understood the situation, consistent implementation of afforestation, reforestation, cover crops and resistance varieties planting should be promoted. Improved crop varieties must also be made available to these farmers by government agencies. To this note, the campaign for climate change awareness and mitigation in the area needs rapid intensification.

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