Gombe Journal of Geography and Environmental Studies (GOJGES)

Vol. 1 N0.3 Dec. 2020

e-ISSN: 2714-321X

p-ISSN: 2714-3201

http://www.gojgesjournal.com

Gombe Journal of Geography and Environmental Studies (GOJGES) Vol. 1 N0.3 Dec. 2020, e-ISSN: 2714-321X; p-ISSN: 2714-3201

ANALYSIS OF PUBLIC PERCEPTION ON CLIMATE CHANGE AND ADAPTATION STRATEGIES IN MANGU LOCAL GOVERNMENT AREA, JOS PLATEAU STATE NIGERIA.

[1]FWANG'AR, Pankyes Bulus*, [2]MAINA, Benjamin and [3]BINBOL Nankap Latur
[1]Faculty of Social Sciences, Department of Geography, Federal University Lokoja, Kogi State, Nigeria.
[2]Faculty of Science, Department of Geography, Gombe State University, Gombe, Nigeria.
[3]Faculty of Environmental Science, Department of Geography, University of Jos, Plateau State, Nigeria
***Corresponding author's email: Pany4real@yahoo.com**

Abstract

This study examined public perception of climate change and adaptation strategies in Mangu LGA. The research made use of two sources of data. The primary data was obtained through questionnaire administration to elucidate required information from respondents with regard to climate change and adaptation strategies in the study area. The secondary data consisted of meteorological data on rainfall and temperature obtained from the weather observatory station, College of Education Gindiri, spanning a period of 27 years (1987-2014). The questionnaire was administered using purposive random sampling. The research made use of simple descriptive statistic for primary data analysis while the use of graphs, tables and charts were employed for secondary data analysis. Results obtained showed that 56% of the respondents were male; majority of the respondents (50.2%) had tertiary education. In terms of climate change knowledge, findings showed that 52.8% of the respondents were of the opinion that the present climate is moderate and that the nature of change observed is tending towards hot. 39.4% of the respondents attributed the climate change to global warming which is linked to natural factors (54.4%) and human factors (38.9%). Respondents opined that the impact of climate change is felt more on food production and biodiversity. The research also undertook a cross tabulation with demographic characteristics and findings revealed that perception on local climate is changing is corroborated more with the age grade 60years and above. Cross tabulation result for local climate changing and level of education shows that tertiary level has a better understanding of climate change issues in Mangu LGA. On the issue of effect and adaptation, 52.8% of the respondents were of the opinion that climate change leads to decrease in crop yields. Some of the adaptation strategies practiced in the study area include cultivation of crops that are tolerant to low moisture requirement, increased fertilizer usage and cultivation of different crop varieties. The research concludes that climate change knowledge is rather poor among the people in Mangu LGA. It is therefore recommended that there is need to introduce climate change courses in primary schools and sensitization programmes on climate change should be organized in the study area to create awareness and enlighten the public on climate change.

Keywords: Adaptation strategies, Analysis, Climate Change, Perception, Public

1. Introduction

There is pervasive inadequate clear conceptualization in the debate for climate change. Climate change is an environmental, social and economic challenge on a global scale (Scholze et al, 2006; and Mendelsohn et al, 2006). The industrial revolution, which began so many years ago, has been identified as the turning point of human induced climate change action (Hug et al, 2008). This position was a support built on the outside of a wall when the IPCC published its first assessment report in 1990. This drew the attention of the global community to the significant increases in atmospheric greenhouse gas concentration since then climate change issue have been viewed from three major perspectives; climate change and global warning, Stratospheric ozone depletion and ultraviolet radiation as well as significant variation in seasonal climates (Adelakan and Gbadegesin; 2005). The extent of climate

change is manifested in several folds ranging from increasing diurnal temperature seasonal changes in precipitation patterns, through increasing sun of intensity to decreasing rainfall, thus, introducing several distortions to all aspects of life. Besides, these consequences, climate change invokes high spending on structures provision, commercial activities and other coping strategies with ascending livelihood implication and poverty level (Ferguson 2006). The inter-governmental panel on climate change (IPCC) defined climate change as change which is attributed directly or indirectly to human activities that alters the composition of global atmosphere and which is in addition to natural climate variability observed over a comparable time period, (IPCC, 2007) .Gina et al, (2008) defined climate change in the aspect of biophysical environment as a complex biophysical process; climate change refers to a change in climate that is attributable directly or indirectly to human activities, that affects the atmospheric conditions of the earth leading to global warming. Climate change can be exacerbated by human induced actions such as; the widespread use of land, the broad scale deforestation, the major technological and socio – economic shift with reduced reliance on organic, Fuel, and the accelerated uptake of fossil fuels .(Millennium Ecosystem Assessment (MED) (2005). Climate change has become a phenomenon that requires global responses. The issue of climate change is however complex that it has defied scientific and political solutions. For these reasons, policy makers and communicators face challenges to raise awareness to promote appropriate behavior towards adaptation on climate change (Weingart, 2000). People who understand and are aware of the effect of climate change have strong will to take personal initiatives and to support government initiatives, even if it requires some personal sacrifice. Good public information on people‘s perception on climate change is of paramount importance so that policy makers could develop policies and strategies which can gain public confidence and support of which would be least tolerated. This work will focus on climate change andglobal warning, which is one of the three major perspectives of climate change issue as identified by Adelakan and Gbadegesin (2005). There is need to understand the level of people‘s perception on climate change, causes, effects and possible coping strategies and mitigation measures. Although, Nigeria has made some efforts to adapt and mitigate climate change risks, the efforts are still rudimentary especially when compared with the impending catastrophe. People had carried out research in most part of the world including Africa and Nigeria in particular on climate change and other climate related issues, the public generally understand little about climate change. This prompted the researcher to carry out this study to know what and how people at the local level, Mangu L.G.A to be precise perceive climate change and the strategies taken to adapt to this topical issue. The research is aimed at generating empirical information on the way people perceive climate change in the study area and to identify adaptation strategies in relation to its effects on the people. Specifically, the study examined the level of perception and evidence of climate change in the study area, determined the knowledge of people on climate change in the study area, identified the problems faced due to the effects of climate change and assessed the indigenous adaptation practices in the study area. The study in fact will create a framework for awareness amongst the people in Mangu and the neighboring areas on climate change and its threat, it will create strategies for adaptation and sustainability amongst peoples. In addition to that, the findings of this study will be relevant to the agrarian rural poor, the researchers, NGOs, policy makers, the government and international organizations for information and policymaking.

2. Study area and Methodology

2.1 Study area

Mangu L.G.A. lies between latitude 8^0 55' 2 '' and 9^0 45' 05'' North of the equator and 9^0 01' 29''and longitude 9^0 17' 38'' East of the Greenwich Meridian (Fig.1). It shared boundaries with Bauchi State in the North East, Pankshin L.G.A in the East, Qua'anpan L.G.A in the South, Bokkos L.G.A in the West, Barkin Ladi L.G.A in the North – West and Jos – East L.G.A in the North, Mangu L.G.A comprises of eleven districts and has a total land area of about 3619km^2 (Plateau State Ministry of Land and Survey,2008). The weather and climate of Mangu are determined largely by the influences of two major air masses; the humid Tropical maritime air mass, which comes as a southwesterly wind from the Atlantic Ocean, and the Tropical Continental air mass that originates over the Sahara Desert as a dry, dusty Northeasterly wind. The raining season at Mangu really starts towards ending April or early May, but it is not uncommon for rain to fall in February or even January, the early period of the wet season is characterized by sporadic rainfall, accompanied by strong winds, as the two air masses try to gain control over each other. From the middle of April to early October, over 95% of the annual rainfall will have occurred, concentrated in the months of June to September. The dry seasons sets in from the end of October to early April, when the mean monthly temperature approaches 30$^{oc.}$ The dry season is characterized by weather conditions associated with the familiar hamattan; dry, hazy (dusty), and cool. The cooler temperatures are due to combination of two main factors; (a) the relatively, low angle of the sun during this (winters) season, and (b) the rapid loss of insolation at night owing to cleaver skies From the environmental point of view, the dry season is one of enormous constraints for the inhabitants; for although most farm products are harvested at that time, water shortage becomes an acute problem, and dry season farming is confirmed to a few scattered Fadama areas, which, in extreme case, dry up. Still, the inhabitants have developed ingenious adaptation methods to the vagaries of weather Diche, (2009). The climate of Mangu generally is not different from that of Jos Plateau. It is a semi–temperate climate with the temperatures ranging from 18^{oc} (64.4^{of}) to 25^{oc} (77.0^{of}), (www.en.wikipedia.org/wiki/jos-plateau).

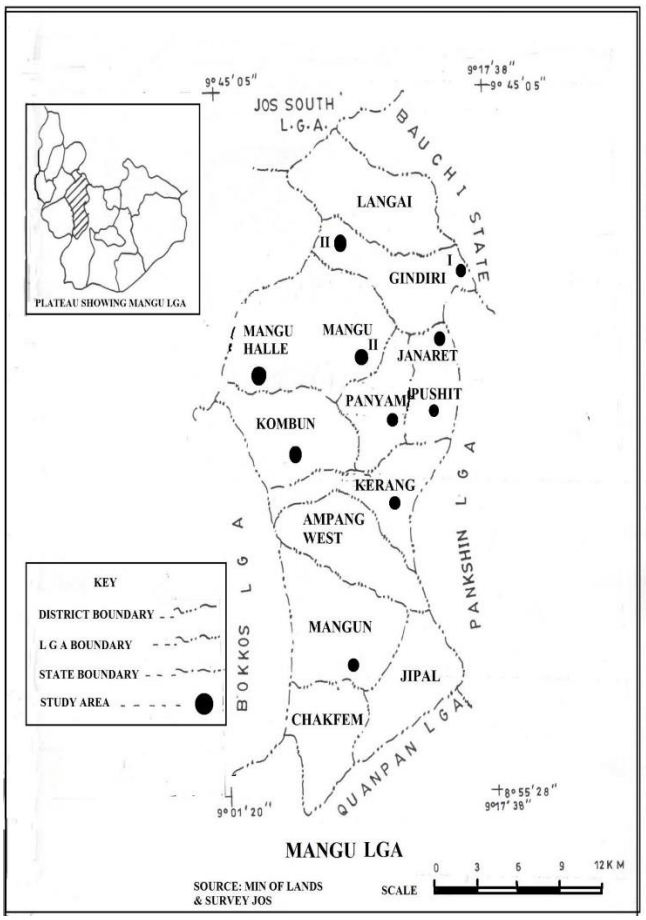

Figure 1: Study Area
Source: Ministry of Lands and Survey, 2014.

2.2 Methodology

The primary data used for the study include information generated from the field through questionnaire, which was administered to the public; interview was conducted as well as field observation. Secondary data on the other hand include recorded data on rainfall and temperature from weather observatory station, College of Education Gindri, Mangu L.G.A, Geography department, College of Education Gindri, Plateau Agricultural Department Programme (PADP) North Central Office Mangu, Journals, bulletin, Maps from the ministry of Land and Survey Plateau State etc. Due to time and financial constraints, it is impossible to cover the twenty wards;

consequently, ten wards were evenly selected among the twenty wards to have even coverage of the entire local government. Data collected were summarized and presented in tables and graphs as absolute frequencies, percentages and ratios. Other statistical techniques used in the data analysis, were descriptive statistical technique and cross tabulation among others.

3. Results and Discussion

3.1Socio-Demographic Characteristics of Respondents

The study revealed that majority (68.9%) of the respondents were between the age of 41-60years and above of which 22.8% and 23.8% were between the age ranges of 41-50 and 51-60 years respectively, 22.3% fell within the age bracket of 61 years and above as shown in Table 1. This findings is in agreement with what Ishaya and Abaje (2008) who stated that 81% of the respondents fell between the 41-65 years and above which implies that more experienced and matured inhabitants were administered questionnaires to because of their age and were in a better position to distinguish climate change from merely inter- annual variation of weather scenarios and respond to climate related questions. The findings did not corroborate the findings of Nwalieji (1999) and (2012) that majority (95%) of the respondents were middle-aged farmers and involved in rice farming. The findings further shows that about 56.0% of the respondents were males and 44.0% of the respondents were females. This implies that majority of the respondents were males that is more males participated in the study and corroborated Nwalieji's findings as presented. Table 1 also reveals that majority (54.9%) of the respondents were married while 32.6%, 4.1% 7.3% and 1.0% were single, divorced, widow and widower respectively. Table 1 indicates that the greater proportion (50.2%) of the respondents had attained tertiary education, 8.3% and 19.2% of the respondents had completed primary and post primary school respectively. Those that had no formal education constituted 22.3%. This implies that 77.7% of the respondents were literate and possess significant educational experienced that can be useful in the study of climate change and their adaption strategies. Table 1 also shows that the majority of the respondents 63.7% earns between ₦ 250,000.00 – ₦ 200,000.000 per 51 annum, whiles the remaining those that earns from ₦201, 000.00 and above per annum account for the remaining percentage. There are different tribes and ethnic groups just like any other local government or state in this world. Table 1 shows few among the many tribes and ethnic groups living in Mangu. Table 1 also revealed that majority (about 30.6%) of the respondents in the sampled population were farmers. This agreed with the findings of Ayanwuyi et al, (2010) that had majority of the respondents in his study had being in farming for many years. The finding also corroborates with the findings of Wanigasundera et al, (2014) that 90% of the respondents had farming experience of 20years or more in Kundasale. The inhabitants also engaged themselves in other occupations such as trading, civil service, cattle rearing, driving and artisan as indicated in the table.

Table 1: Socio-demographic Characteristics of Respondents

S/No	Variables	Class	Score	Percentage (%)
1.	Age	21 – 30	27	14.0
		31 – 40	33	17.1
		41 – 50	44	22.8
		51 – 60	46	23.8
		61 –	43	22.3
2.	Gender	Male	108	56.0
		Female	85	44.0
3.	Marital Status	Single	63	32.6
		Married	106	54.9
		Divorced	8	4.1
		Widow	14	7.3
		Widower	2	1.0
4.	Educational Status	Primary	16	8.3
		Post Primary	37	19.2
		Tertiary	97	50.2
		Non Formal	17	8.8
		None of the above	26	13.5

Source: Field survey 2015.

3.2 Climate Change Knowledge in Mangu

To determine the knowledge of climate change amongst the respondents in the study area, the inhabitants were asked on their general impression of the weather in the study area, majority of the respondents (52.8%) indicated that the weather is moderate while 30.1% of the sampled population opined that the weather is cold, 14.0% were of the opinion that the weather is hot. See Table 2 for details. Considering the issue of environmental changes, an attempt was made to determine whether the respondents notice any changes in the weather during the day, 92.7% of the inhabitants indicated that there has been changes, similarly, in other to know the time they noticed the changes, 26.9% of the respondents said that the 53 changes is always noticed in the morning, majority (45.1%) of the respondents noticed the changes in the afternoon while others opposed that opinion, they believed that the weather changes at any time. This corresponds with Ishaya and Abaje (2008) that 86% of the respondents opine that the environment has been changing over the years due to human activities. In an attempt to know from the inhabitants what is responsible for the changes in weather, more than half of the population (53.3%) subscribed that it is an act of God, they believed that God has his way of doing things and he do it the way he likes and whenever he want. When asked whether there is any sickness associated with the seasons in the area, 72% of the respondents said yes. They further indicated different kind of sicknesses that are easily associated with dry season (February-April) examples cold and catarrh, asthma, rheumatism, just too mentioned but few. Wet season (May-October) examples of such sickness are typhoid, malaria, meningitis, cholera, etc. Hammattan (November-December) examples are catarrh, cold, etc.

Table 2: Climate Change Knowledge in Mangu

S/No	Variables	Class	Score	Percentage (%)
		Cold Hot	58	30.1
		Moderate Don't	27	14.0
	General Impression of the Weather	Know	102	52.8
1.		Others Specify	2	1.0
			4	2.1
2.	Any Changes in the weather during the day.	Yes	179	92.7
		No	14	7.3
		Morning	52	26.9
		Afternoon	87	45.1
		Evening	18	9.3
3.	Time	Night	11	5.7
		Others Specify	25	13.0
		Cold Hot	67	34.7
4.	Nature of changes observed	Moderate	68	35.2
			43	22.3

Source: Field survey 2015.

3.3 Evidence of climate change in Mangu

Climate change is a critical environmental issue that needs immediate attention. The effects of climate change have already been felt in many parts of the country, states and Mangu in particular with the modifications of Intensity and seasonal nature of the rains, elevation of average annual temperatures and increased frequency of widespread, high impact weather phenomena including drought and flooding. From the interview conducted and the result of the data analyzed, there is evidence of climate change in Mangu. The studies showed that 96.4% of the respondents perceived that the local climate changing. In the same vein, 52.3% of the respondents believed that temperature has been rising over the few decades while rainfall on the other hand has been decreasing, this agreed with the findings of other researchers on climate change related issues. Nigeria faces many significant challenges associated with climate change. Low levels of awareness of climate change amongst policy makers and the public at large, and poor understanding of its risks have hindered effective decision making. Temperature and rainfall records of Gindiri Meteorological Station were used as proxy for the study area. The statistical record of rainfall data from the meteorological station Gindiri (Mangu) between 987 and 2014 (27 years) showed an increase trend over the years. Five years moving average graph in figure 2 revealed that rainfall has decreased over the years; this agreed with the perception of the respondents on that the climate is changing. A large proportion of farmers noticed a decrease in rainfall, which corroborate with the outcome of meteorological trend analysis on rainfall and this could be explained by the fact that during the last few years most especially last and present years, there was a substantial decrease for rainfall. Thus, farmers' perceptions of a reduction in rainfall over the years could be explained by the fact that most of the farmers placed more weight on recent information than its efficient as also noticed by Maddison (2006) and Gbetibouo (2009). The issue of rainfall patterns analyzed above was in accordance with several studies but that of temperature has been in contrary with several studies carried out on perceptions of and adaptation to climate change most especially in Sub–Saharan Africa. Ishaya and Abaja (2008), Deressa et al. (2009), Gbetibouo (2009), Benedicta et al. (2010) among others have observed increased in temperature and a decrease for rainfall over the years.

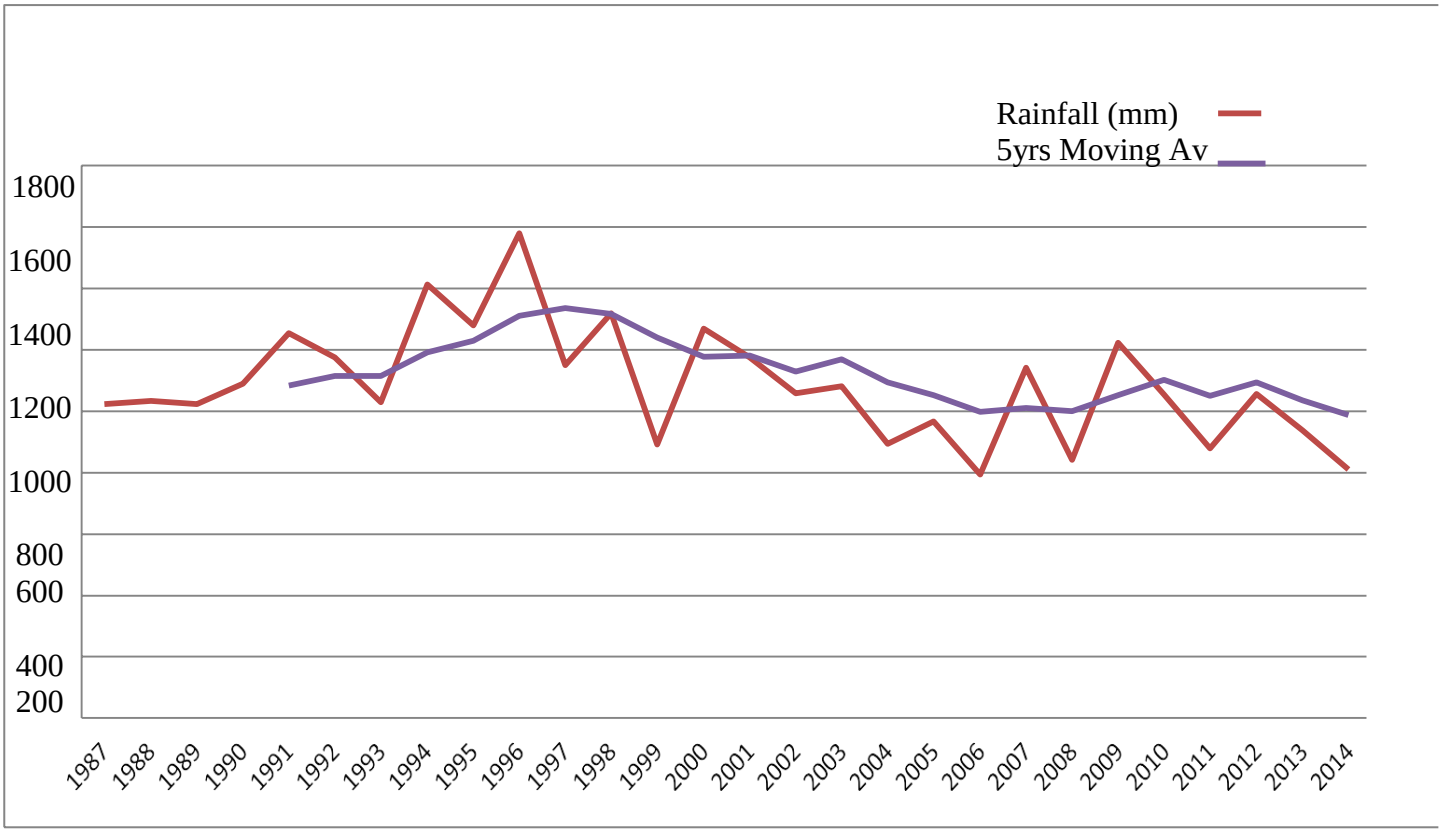

Figure 2: Gindiri Annual Rainfall
Source: Meteorological Station, COE, Gindiri, Mangu, 2015

The perception of climate change by respondents in the study area corroborates the meteorological parameters obtained from Gindiri Meteorological Station. Temperature on the order hand has witnessed changes over the past decades. Temperature during the last 27-year period showed that mean annual temperature, maximum annual temperature and minimum annual temperature data have shown decreasing trends in the study area as shown in figure 3. This is not in accordance with the perception of temperature in the study area. The meteorological data in the study area corroborates with the people's perception of climate change in the study area. This implies that the local climate in Mangu is changing. The sources of peoples' awareness show widespread information from environmental ducation/sensitization by NGOs and extension workers as well as media which now is lacking and limited to radio talks and jingles.

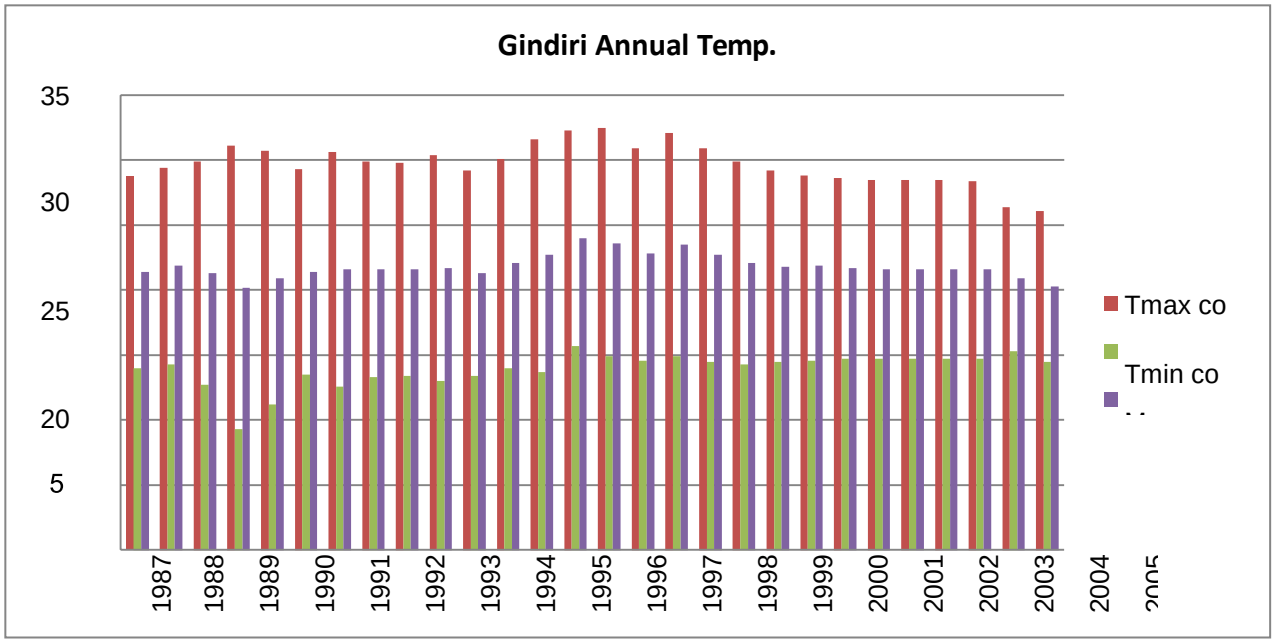

Figure 3: Gindiri Annual Temperatures
Source: Meteorological station, COE, Gindiri, Mangu, 2015

3.4 Effects of Climate Change in Mangu

Looking at how respondents according to their age groups responded to this question, from thirty-one years old and above stressed that the impact of climate change is more on food production as revealed in figure 4. Biodiversity has been under threat since it is more vulnerable to climate change, there has been loss in biodiversity as inclined by more elderly inhabitants 11.4% of the respondent inclined that business are more jeopardized by climate change. Others stressed that the impact is more towards instigating disaster, some were of the opinion that the impact has been on health and crop diseases. This is in agreement with the findings of Ifeanyi, (2012) that climate change is already affecting agricultural activities with the most devastating adverse effects in Nigeria as: extreme weather condition, frequent drought ,increased environmental damage, increased infestation of crops by pests and diseases, depletion of household assets, increased biodiversity loss, depletion of wildlife and other natural resource base, changes in the vegetation type, decline in forest resources, decline in soil conditions, increased health risks and the spread of infectious diseases changing livelihood systems. Eboh 2009 on the order site statedthat the effects of climate change are projected to manifest through changes in land and water regimes, specifically, changes in the frequency and intensity of droughts, flooding, water shortages, worsening of droughts, worsening soil conditions, desertification, disease and pest outbreaks on crops and livestock. Anyadike (2009) in his findings stated that the general environmental effects of climate change include; rise in sea level due to melting of ice caps; changes in dates of onset and end of the rainy season; reduced rainfall amounts in some areas and increased rainfall amounts in others, leading to flooding and increase in intensity of atmospheric disturbances such as thunderstorms and line squalls.

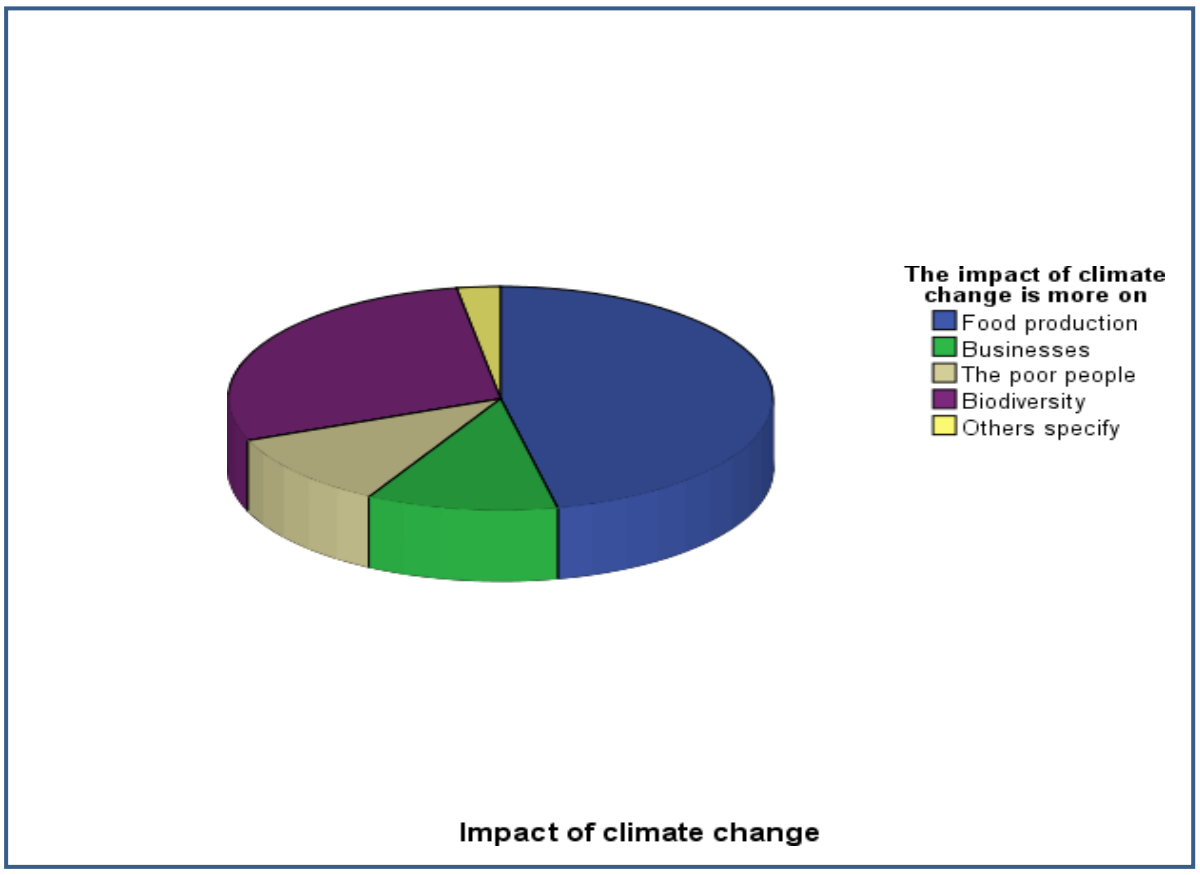

Figure 4: Impact of climate change
Source: Field survey, 2015

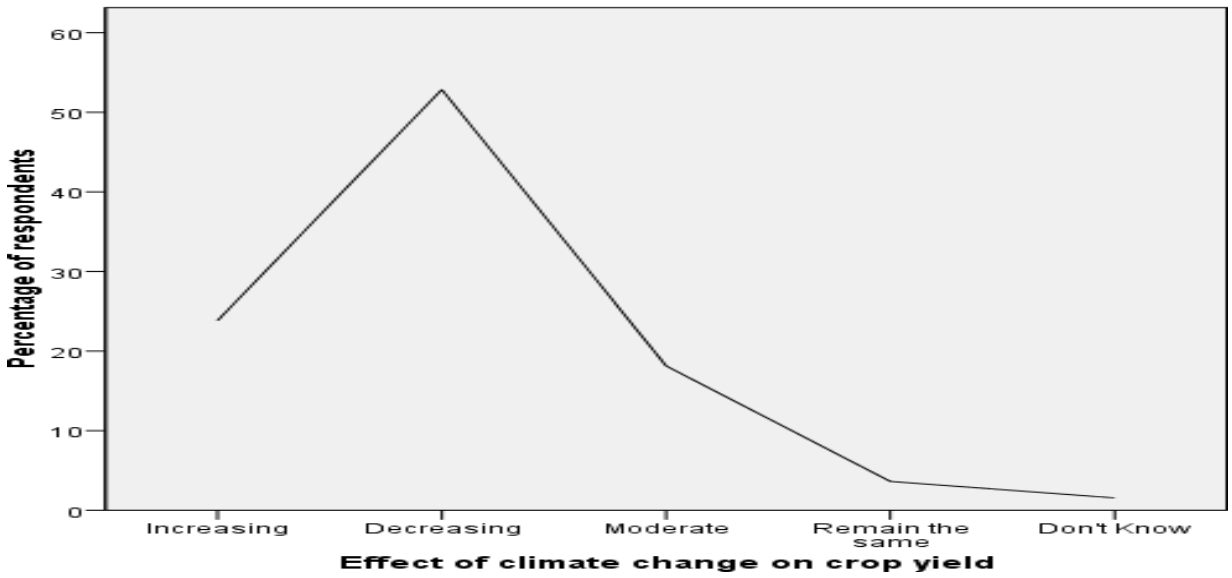

Figure 5: Effect of climate change on crop yield
Source: Fieldwork 2015

In an attempt to know if climate change has effects on crop yield, more respondents were of the opinion that crop yield has decreased (Fig.5) especially those that are within the age of forty one and above as indicated shortage of water for irrigation farming during dry season farming and inadequate drinking water as result of changing climate. This is in agreement with Kurukulasuriya and Mendelsohn, 2006; IISD, 2007; Lobell et al, 2008 that evidence from 67 literature and past studies has revealed that the recent global warming has influenced agricultural productivity leading to declining food production. Ayanlade et al 2010 also shared the same view; his research findings revealed that seasonality of climate greatly influences the seasonality of malaria transmission.

3.5Adaptation/Mitigation Strategies to Climate Change in Mangu.

Mitigation involves finding ways to slow the emissions of GHGs or to store them, or to absorb them in forests or other carbon sinks. Adaptation, on the other hand, involves coping with climatic change – taking measures to reduce the negative effects, or exploit the positive ones, by making appropriate adjustments. In response to adaptation strategies to climate change in Mangu, 28.0% of the respondents said that they cultivate different varieties of crops as adaptation strategies. The strategies adopted in coping with climate change by the respondents in the study area conform to the findings of Ishaya and Abaje 2008 that in adapting to climate change Indigenous people cultivate different/varieties of crops, which are tolerant to climate change and shortening of growing season as adaptation strategies. 11.1% of the respondents restricted themselves to different planning dates by shorting the growing season. These changes occurred when there is a reduction in rainfall and a change in the timing of the rains or cause by temperature increase and insufficient rains.In the same vein, 6.2% of the respondents adopt water maximization by practicing fadama farming. While 7.3% of the respondents believed that increasing the extend of land put into agriculture and 7.8% revealed that increasing fertilizer use is the best way in combating climate changes, this agreed with the findings of Dabi and Jidauna 2010 that soil supplement (fertilizer) are often used by the farmers in a bit to boost crop yield. Ayanwuyi *et al* 2010, Odewumi *et al* 2013, in their findings, it agreed with the responses of inhabitants of Mangu.

Table 3: Adaptation/Mitigation Strategies of Climate Change in Mangu

S/N	Variables	Class	Score	Percentage (%)
1.	Local climate change effects crop yield in Mangu	Yes	171	88.6
		No	22	11.4
2.	What is the effects of climate change on crop yield	Increased crop yield	46	23.8
		Decreased crop yield	102	52.8
		Moderate Crop yield	35	18.1
		Remain the same	7	3.6
		Don‘t know	3	1.6
3.	Measures adopt to counter the effects of climate change on crop yield.	Cultivate crops that tolerate lower moisture requirement.	37	19.2
		Cultivate crops that have higher moisture requirement.	28	14.5
		Increase fertilizer use.	15	7.8
		Increase farm size	14	7.3
		Cultivate different varieties of crop	54	28.0
		Changing planting dates	33	17.1
		Practicing fadama	12	6.2
4	Have you introduced or discontinued any crop as a result of climate change?	Yes	118	61.1
		No	75	38.9

Source: Field survey, 2015

The overall needs are to setup serious environmental conservation ethic among indigenous people. This can only be possible by first and famous educating the indigenous people on the implication of climate change, the significance of conservation of the natural environment. Until recently, policy makers concentrated on mitigation, partly because of worries that highlighting adaptation options might reduce the urgency for mitigation. Mitigation is essential and adaptation is inevitable. It must be stated however, that mitigation and adaptation are not alternatives; both need to be pursued actively and in parallel. Public Awareness programme on climate change and environmental issues, environmental education programmes in schools and zero tolerance to unsustainable lifestyle.

4. Conclusion

The change in climate patterns (rainfall temperature, perception etc.) and the destruction of the natural base leads to unpredictable and erratic rainfall pattern, warmer temperature, increased evapotranspiration, diminishing pasture and water availability, increased incidence of disease and epidemics and displacement from fragile environment. Public perception and knowledge on climate change especially in Mangu is very crucial to combating climate related problems, inhabitants Mangu perceived change in climate the issue of climate change is still being battled with in terms of its understanding among most of the respondents noticed that the climate is changing through how it affects their crop cultivation, some have heard about the term but do not know what it really

entails it is investigated the perception on climate change and adaptation strategies in Mangu. The research assesses the background characteristics knowledge of climate change perception of climate change, effects and adaption strategies in coping with it. The findings revealed that the inhabitants perceived that climate changes. More than half of the sampled population said that climate change is an act of God, that man has no hand in the issues. The implication here would mean to have policy that will provide public education and programmes to create awareness and provided information and adequate knowledge on the causes and mitigation of climate change. A massive campaign is indisputable at this time; the earlier the, public are told of global climate change that is breaking every continental boundary, the better they start knowing the actions to take and how to reduce it.

5. Recommendations

Based on the findings of the study, the following set of actions are suggested as step necessary to ameliorating the scourges of its impacts and thus enhance the ability of the local communities to further cope with the challenges of climate change.

i. Tree Planting Initiatives: Some of the observed causes of climate change are related to change in temperature, which finds its roots in seasonal variation, desertification, encroachment into forested band and accumulation of Green House Gasses. However, in order to forestall the impacts, a free tree planting initiative is envisioned such that the local communities will be encouraged through the planting of a tree per building technique. This will enhance capacity of the earth to further sink carbon dioxide, which is a major GHG that increase global warning.

ii. Provision of Water/Channelizing Flood Plains: In order for forestall shortage of water supply. The researcher is of the opinion that as it were in some of the cities, towns, local committees should be given huge water reservoirs where water can be channeled treated and preserved until the dry season. Dams should be constructed for that will help in bursting agriculture through irrigation farming.

iii. Prohibiting Bush Burning: Management of the forest and grasslands should be upheld at local levels through fire operation techniques such as planting of fire resistant free species, education through ARWs dailies, radio and TV broadcasts and extension services Striker laws should be enacted against deliberate bush burning and the community through Non-Government Organization(NGDs), Community Based Organization (CBOs) and other voluntary organizations should be actively involved in policy making and enforcing against firewood gathering and crude methods of bush clearing.

iv. Farm Practice Improvement: In as much as it was discovered that farming preoccupation is one of the major economic activities of the people of Mangu LGA, it is therefore necessary of think on how the farming activities can be improved without imparadising the climate. Hence, the writer or researcher opines that agricultural practices can be improved using improved technology and drought resistant seedlings on the one how while involvement of relevant government agencies is considered vital on the other hand to enhance management. Irrigation agriculture can be encouraged in the areas since provision of water reservoirs has been suggested as one of the strategies to enhance residents ability to further cope with challenges experienced agriculturally.

v. Environmental Education and Management: It is pertinent at this juncture to say that the major way-out of the challenges of climate change is to get the general public educated on issues pertaining to causes, evidences and problems emanating from human induced activities and possibly as it is done in other developed countries of the world. Environmental studies should be introduced intro school‘s curriculum. This will not only enhance adequate information on climate change issues but it will also equip every individual with detailed understanding of what to do in order to cope with the challenges of climate change (at the worst) and/or with ability to forestall the problems emanating in the present or in the nearest future.

References

Adelekan, I.O, And Gbadegesin A.S. (2005) Analysis of the Public Perception of Climate Change Issues in an Indigenous African City. *International Journal of Environmental Studies 62(1)*

Anyadike, R.N.C. (2009). Climate Change and Sustainable Development in Nigeria; Conceptual and Empirical Issues. Enugu Forum Policy Paper 10. African Institute for Applied Economics, Nigeria.

Ayanlade, A., Adeoye, N.O. and Babatimehin, O. (2010). Climate Change/Variability and Malaria Transmission in Sub-Saharan Africa: A Case of Nigeria an International Conference on the Occasion of the 250th Anniversary of the Royal Norwegian Society of Sciences and Letters, Trondheim, Norway

Ayanwuyi, E., Kuponiyi, F.A., Ogunlade, Oyetoro, J. O. (2010) Farmers Perception of Impact of Climate Changes on Food Crop Production in Ogbomosho Agricultural Zone Of Oyo State, Nigeria. *Global Journal of Human Social Science Vol. 10 Issue 7*

Benedicta, F.; Paul, L.; Vlek, A. and Manschadi, M. (2010). Farmers' Perception and Adaptation to Climate Change: A Case Study of Sekyedumase District in Ghana. World Food System- A Contribution from Europe. Center For Development Research (Zef), University Of Bonn, Walter-Flex-Str. 3,53113, Bonn, Germany.

.

Dabi, D. D., and Jidauna, G, G. (2010) Climate Change and Local Perception in Selected Settlement in the Sudano-Sahelian Region of Nigeria. Journal of Environmental Sciences and Resource Management. Volume 2. Cenresin Publications.

Deressa,, (2009). Determinants of Farmers' Choice of Adaptation Methods to Climate Change in Nile Basin of Ethiopia. Global Environmental Change 19 (2009).

Eboh, E. (2009). Implications of Climate Change for Economic Growth and Sustainable Development In Nigeria. Enugu Forum Policy Paper 10. African Institute for Applied Economics. Nigeria.

Ferguson, J. (2006). Global Shadows: Africa in the Neoliberal World Order. Duke University Press,

Gbetibouo, G.A (2009). Understanding Farmers' Perceptions And Adaptations To Climate Change And Variability, The Case Of The Limpopo Basin, South Africa, IFPRI (International Food Policy Research Institute) Discussion Paper 00849.

Ifeanyi-Obi C.C., Etuk U.R. And Jike-Wai O. (2012). Climate Change, Effects and Adaptation Strategies; Implication For Agricultural Extension System In Nigeria. Greener Journal of Agricultural Sciences Vol. 2 (2).

International Panel on Climate Change, (IPCC (2007). Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group Ii to the Fourth Assessment Report Of The IPCC. Cambridge UK: Cambridge University Press

Ishaya S, Abaje I (2008). Indigenous People's Perception on Climate Change and Adaptation Strategies in Jema'a Local Government Area of Kaduna State, Nigeria. J. Geogr. Reg. Plan. Vol. 1(8):138-143. ISSN – 2141 -2189, 2012 Academic Journals

Maddison, D. (2006). The Perception Of and Adaptation to Climate Change in Africa. CEEPA Discussion Paper No. 10, Centre for Environmental Economics and Policy in Africa, University of Pretoria.

Mendelsohn R, Dinar A, Williams L (2006). The Distributional Impact of Climate Change on Rich and Poor Countries. Environ Dev Econs, 11(2).

Nwalieji, H.U. And Uzuegbunam, C. O. (2012) Effect Of Climate Change On Rice Production Nigeria. Journal of Agricultural Extension Vol. 16 (2), Anambra State University, Igbariam.

Odewumi, S.G., Awoyemi, O. K, Iwara, A.I. and Ogundele, F.O. (2013) Farmer's Perception on the Effect of Climate Change and Variation on Urban Agriculture in Ibadan Metropolis, South-Western Nigeria. Journal of Geography and Regional Planning Vol. 6(6),

Scholze M, Knorr, W. Arnel N.W, Prentice, I.C (2006). A Climate Change Risk Analysis for World Ecosystems. Proceedings of the National Academy of Sciences 103(35): 116-120.

Wanigasundera, W. A. D. P, And Alahakoon, P. C. B. (2014) Perceptions of Climate Change And Adaptation Of Climate-Smart Technology By The Paddy Farmers: A Case Study Of Kandy District In Sri Lanka. World International Journal Of Social, Management, Economics And Business Engineering Vol: 8 No:4.

Weingart, P., Engels, A. Pansegrau, P. (2000) Risks of Communication: Discourses of Climate Change in Science, Politics and the Mass Media. Public Understanding of Science.