



CLIMATE CHANGE CHALLENGES DUE TO GEOGRAPHICAL LOCATION AND HUMAN INDUCED ACTIVITIES IN COMMUNITIES OF LAKE CHAD, BORNO STATE NORTH-EAST NIGERIA

ABSTRACT

This study is aim at assessing the community's challenges due to changes associated with climate change impact on vegetation in Lake Chad Basin Borno State, north east Nigeria. The objectives were to: investigate the evidences of climate change in the communities of Lake Chad Basin Borno State, assess the communities challenges due to climate change, recommend possible solutions to the problems associated with the effects of climate changes in the affected communities; Data for the study were generated from secondary source, rainfall data for the period of 30 years were obtained as

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Introduction

According to International Union for Conservation of Nature (IUCN), Climate change is here and will be with us for the long-term. The challenge facing water professionals is how to make decisions in the face of this new uncertainty. This paper outlines some aspects of local mitigation measures to the management approach that moves beyond technical quick fixes towards a more adaptive style that is inclusive and innovative. Only by thinking, working and learning together we can collectively tackle the impacts and uncertainties on wetland water resources induced by climate change (IUCN, 2003).

The United Nations Framework Convention on Climate Change (UNFCCC) has as its ultimate objective "the stabilization of greenhouse gas concentrations in the atmosphere at a level which is not dangerous to the climate system" a goal often referred to as "mitigation."⁴ Since the reduction of greenhouse gas emissions is proving to be a difficult process, it is becoming ever clearer that mitigation alone will not be sufficient to protect societies from the



secondary data from meteorology station Maiduguri International Airport and trend equation of time series and coefficient of determination was done to examine the evidences of climate change by establishing fact in the study area, other data also include table indicating various challenges associated with both geographical location and human induced activities in study area Lake Chad Borno State north-east Nigeria.

effects of climate change. It is now recognised that adaptation has a major role to play in reducing the impacts of climate change on people, businesses and society at large (UNFCCC). Adaptation in the context of climate change is defined by the Intergovernmental Panel on Climate Change as “the adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits opportunities” (IPCC, 1992). Practically, adaptation to climate change means doing things differently because of climate change (UNDP 2004). Most often, it does not mean doing completely new things, but rather purposefully modifying development interventions. Adaptation itself is not a development objective, but necessary for safeguarding beneficial outcomes. Adaptation measures may be compared with a baseline of ‘doing nothing, resulting in bearing losses and not making use of opportunities. Bearing losses occurs particularly when those affected have no capacity to respond in any other way (for example in extremely poor communities) or where the costs of adaptation measures are considered to be high relative to the risk or expected damage (UNDP, 2004).

Aim and Objectives of the study

The aim of this study is to assess some of the community’s challenges associated with climate changes effects. The specific objectives are to:

- i. Assess environmental challenges that occurred due to geographical locations in study area.
- ii. Investigate what are the human induced activities that led to climate change in the study area.
- iii. Determine those effects that are associated with geographical locations and climate change impacts in communities of Lake Chad Borno State north-east Nigeria.

Study Area

Borno state lays in the north eastern corner of Nigeria between latitudes 11.00 and 13.45 east. It occupies an area of 69.435 Sq km sharing border with three states, Adamawa to the South, Gombe to the South Westland Yobe to the West as well as three countries, namely, Republic of Niger, Chad and Cameroon to the North, North-East and East respectively. (Waziri, 2009). According to National Population Commission Borno state has a total population of 4, 151, 103 people, with annual growth rate of 2.8% per annum (NPC, 2006).

Maiduguri Metropolis is situated in a semi-arid climate zone. It has basically two seasons: dry and wet seasons. These are further distinguished by the local population into:

Binəm (cool dry season), harmattan season from December to February; Bey, (hot dry season), from March to late May: Nəngəli, raining season from June to September and Biila, humid dry



transitional period between September and November (Waziri, 2009). According to (Wakil *et al.*, 2009) empirical findings have shown that rainfall is dwindling in Maiduguri both in volume and number of rainy days since the 1970s. The raining season never exceeds four months in the area, with an annual rainfall mean of 577mm. The rainfall type is usually convectional which is mostly in the afternoon hours (Iloeje, 2009). Rain fall is usually heavy and within a short duration with some variations within a small distance. Temperatures generally range between 29.4°C and 35°C. There is a sudden rise in temperature during the day around April, May and June, occasionally exceeding 40°C, and high terrestrial radiation in the night. With these weather conditions coupled with the low humidity (40% to 60% relative humidity), evaporation is always high and the environment can only support the growth of a scanty vegetation (Iloeje, 2009).

The economy of the state is anchored on natural resources such as clay, salt, nitron, limestone and kaolin. Iron ore and uranium and micas petroleum is prospected intensively on the shore of the Lake Chad in the state. There are only few industries in the state. These are flour mills, shoe factory, ginnery, dairy products, and corn milling just to mention a few (Waziri, 2009). Different kinds of land uses can be identified: such as settlements, agricultural, road, forestry, but the dominant type is the agricultural land use. Majority of the people in the area are peasant farmers although they may be engaging in other activities.

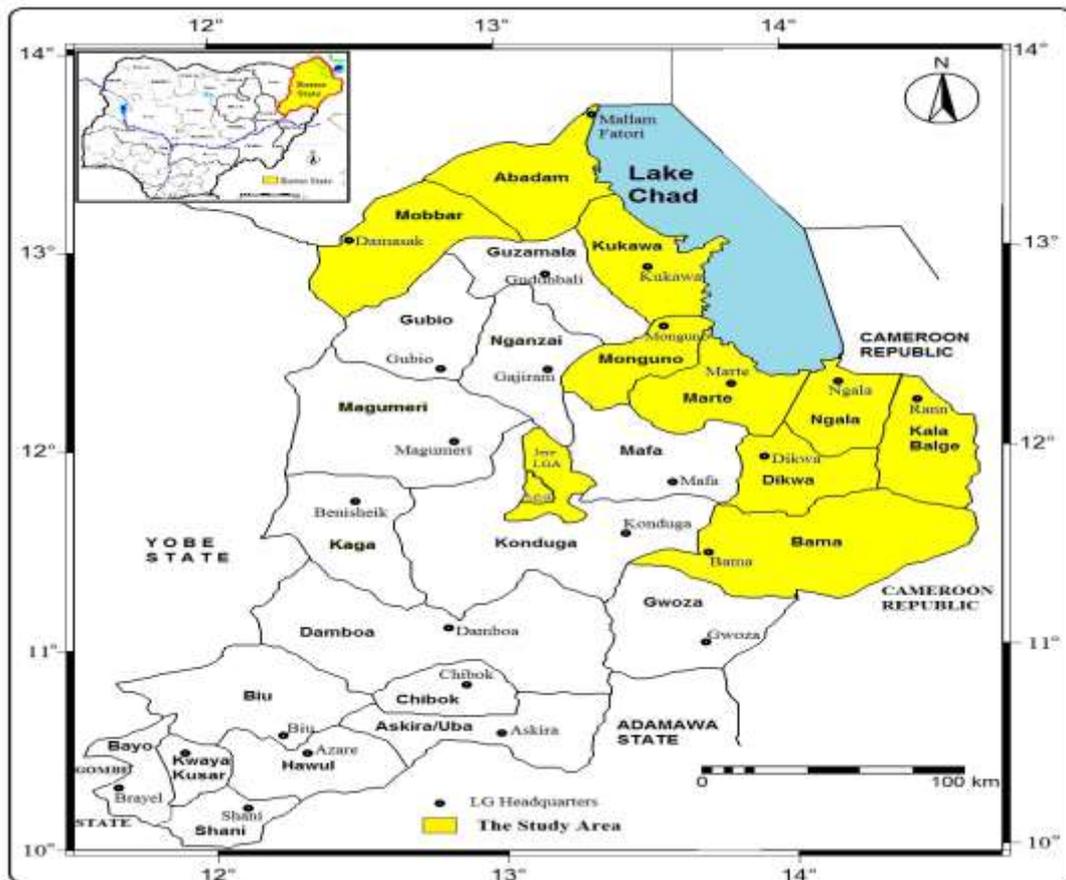


Fig.1 BORNO STATE SHOWING SAMPLE SETTLEMENTS AND STUDY AREA THAT CONSTITUTED THE FORMER (MEGA LAKE CHAD)

Source: GEONETCast Unit, Department of Geography, University of Maiduguri, 2018



Methodology

Data for the study were generated from secondary source, rainfall data for the period of 30 years were obtained as secondary data from meteorology station Maiduguri International Airport and trend equation of time series and coefficient of determination was done to examine the evidences of climate change by establishing fact in the study area, other data also include table indicating various challenges associated with both geographical location and human induced activities in study area Lake Chad.

Furthermore, other secondary sources include Journal articles, Conference proceedings papers, Books, Photographs and other relevant sources were all consulted to have related information's on facts that led to different impacts of climate change challenges due to geographical location and human induced activities in those communities located along the shores of the Lake Chad Basin Borno state north-east Nigeria.

Results and Discussions of Findings

Lake Chad has been subject to the same extended drought as the Niger Basin. The area of the lake was reduced to 1,350 km², over 90 % smaller than during the mid- 102 S. A. Mitchell twentieth century. The mean annual river inflow decreased by approximately 50 % from a pre-drought volume of 39.8 km³ (Brown 2005; Odada *et al*, 2006). The history of Lake Chad indicates the existence of a much longer climatic cycle. During the Holocene, the Sahara received regular monsoon rains and was well forested. There were several large lakes, of which Lake Mega Chad was the largest. It is estimated that approximately 7,000 years before present Lake Mega Chad covered 400,000 km². During the period 20,000 12,500 BP the Sahel was arid and Lake Chad is thought to have been completely dry for at least part of this period (Thiemeyer 2000; Odada and Olago 2005; Brown 2005; Drake and Bristow 2006).

There is a single major factor behind the cause for the shrinking of the Lake: a natural fluctuation is a brain behind the long-term cycle and as well as the uncontrolled used by human for the purpose of irrigation activities, and more so, deforestation has also contributed greatly. Change in climate is another principal factor for the gradual residing of the lake from the earlier 25,000 square kilometres in 1963 to as low as only 1,300 square kilometres in the recent time (P. Burnett, 2014).

Table: 1.1 Indicating Various Challenges Associated with Both Geographical Location & Human Induced Activities in Lake Chad

Environmental Problems Associated with Geographical Location	Environmental Problems Associated with Human Activities aimed at Human Development
Aridity Four Climatic Zones Notably Hyper Arid, Arid, Semi-Arid & Sub Humid Climate Variability	Habitat & Community Modification Unsustainable Agricultural Practices (Fishing & Grazing)
Persistent Drought (1960s1980)	Mining
Desertification Water Shortages Erosion	Deforestation Pollution Indiscriminate Bush Burning



Sedimentation due to

Unsustainable Farming &
Irrigation Practices

Source: Adapted from Ngounou 2009 and the Natural Resource Group 2001

The major and critical challenge associated with climate change in the African continent is the way that multiple stressors such as the spread of diseases like HIV/AIDS, the effects of economic globalisation, resources privatisation, and also conflict are all converge with climate change. The existence of climate change in Africa has led to so many problems like increase in health challenges such as malaria, meningitis, and dengue fever. Some other problems are as follows: (Neha Sinha, 2012).

It is obviously known that water resources play a vital role in human prosperity and crop productivity. The world's agriculture, hydroelectric power and water supplies depend on different components of the hydrological cycle, including the natural replenishment of surface and groundwater resources. Water availability issue is a key, because it includes how much water can be diverted, when the water can be available and how much water can be stored also in surface and ground-water reservoirs.

Climate change as a change in the state of the climate that can be identified, for instance by the used of some (statistical tests) to determine the changes in the mean, and perhaps the variabilities of its properties, and that persists for an extended period either for a decade or even beyond. Although the time length taking before the manifestation also matters a lot in the level of deviation from the normal climatic condition, and its impact on the ecology plays a very fundamental role, (IPCC, 2007).

Table: 1.2 Rainfall Trend Equation & Coefficient of Determination

Rainy Season with Transition Period

$$\text{May } y = 0.4404 * x + 39.1522$$

$$r^2 = 0.0115$$

$$\text{Jun } y = 3.5403 * x + 123.9589$$

$$r^2 = 0.3513$$

$$\text{Jul } y = 2.3993 * x + 31.834 \quad r^2 = 0.1019$$

$$\text{Aug } y = 2.7898 * x + 62.9623$$

$$r^2 = 0.1022$$

$$\text{Sep } y = 1.2737 * x + 130.0979$$

$$r^2 = 0.025 \quad \text{Oct } y = 2.3474 * x$$

$$+ 7.0441$$

$$r^2 = 0.1047$$

Conclusion

Climate change will continue to have effects on the environment of the communities located along the shores of Lake Chad Basin Borno state. People living along the shores of the lake



should learnt to practice local adaptation measures to counter the effects of changes and fluctuations occur, most water bodies and green areas around start to be deserted. Drying up of wetlands and deforestation could bring severe impacts on communities in such a way as to improvise on human wellbeing. There is a need to improve the understanding of communities on the changes, risks and hazards associated with the effects of climate change. Adaptation measures alone may not be sufficient to meet the challenges of current environmental degradation due to the climate change.

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