

## Historical Analysis of the Economic Effect of Drought on Tropical Forest Management in Northern Nigeria

Nwokocha Chibueze\*

Babcock University, Ogun State, Nigeria

\*Corresponding author: Chibueze N, Babcock University, Ogun State, Nigeria, Tel: +234 905 920 8261; E-mail: [okaysimoh@gmail.com](mailto:okaysimoh@gmail.com)

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### Abstract

This paper examined the historical analysis of the economic effect of drought on tropical forest management in Northern Nigeria, causes and effect of drought and recommended solutions to curb the menace of drought in the affected regions in Northern Nigeria.

Literatures on concept of drought, causes, effect and tropical forest management in Nigeria were discussed. The adopted a historical review of literatures using secondary data such as internet articles, textbooks, journals and magazines to conduct the research through qualitative study approach.

The study finding reveals that the causes of drought were identified as the changing weather patterns, uncontrolled buildup of heat on the earth's surface, meteorological changes which result in a reduction of rainfall, and reduced cloud cover, all of which results in greater evaporation rates and reasons for drought harming Northern Nigerian were identified thus: widespread poverty, poor infrastructure, heavy disease burdens, high dependence on and unsustainable exploitation of natural resources, and conflicts.

The study therefore recommends that government should support the rural farmers through the initiation of programs or policies that monitors reduction in post-harvest crop losses, weather forecast, storage of excess production and livestock management and forest management research centers should be established in institutions in the region where drought is experience

**Keywords:** Drought; Economic effect; Tropical forest; Forest management; Northern Nigeria

### Introduction

The effect of drought in Northern Nigeria over the past years cannot be overemphasized since it has an adverse impact on the crops being planted and affect the farmers produce in this part of the country. However, drought is associated with protracted absence, and or poor distribution of precipitation. In other words, it is categorized as a season in weather condition of the year where deficient rainfall is witnessed in a long term within a region in a country. This situation is often experienced when the rain is unable to meet the evapo-transpiration demand on crops and when this occurs, we experience general water stress and we start seeing crop failure all around the region where this situation is manifested [1].

This is often an experience witnessed in the Nigerian Sudano-Saharan region and it is identified by a considerable amount of instability in recent years. Drought can be referred to as dry spells at the beginning or at the end of each season and it has been reported from research that it has a constant reoccurrence decimal result since the beginning of the 20th century (Lester, 2006). This is true because the large areas of Northern Nigeria which are falling within the Sahel and Sudan ecological zones were between the latitude of 9-14°N are prone to recurrent droughts in one form or the other [2].

It is pertinent to note that Nigeria is divided into six vegetation zones which are known according to zone such as Coastal Mangrove Swamp Forest, Rain forest, Southern Guinea, Northern Guinea, Sudan and Sahel savannah vegetation zones. These vegetations are regionally different in terms of their climate pattern. The Northern region of Nigeria is estimated to be about 38% of the total land area of Nigeria and it is the grain belt of the country populated by small scale subsistence farmers and nomadic livestock herders. Drought is perceived as one of the costliest natural disaster of the world and affects more people than any other natural disaster in the world [3]. Drought is a temporary aberration; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate [4].

A study carried out by Okorie, [5] revealed that the drought of 1973 resulted in approximately 250,000 people to die and this was recorded in the six worst affected Sahelian countries and agricultural productivity dropped to 70% of the pre-drought level. According to the study revealed that 10.3 million people in the Northern part of Nigeria were faced with starvation and an estimated 600,000 heads of cattle were discovered to be dead. Similarly in 1978, another occurrence too place that caused 5 million metric tons of grain like millet and sorghum, which were valued at over US\$400 million were recorded lost to drought.

Many scholars have come to conclude that there are four types of drought namely; meteorological drought, agricultural drought, hydrological drought and socio-economic drought [6-8].

Many studies have been identified that drought is a reoccurring incident in Africa. For instance in West Africa, there has been annual decline in rainfall since the later part of 1960s with 20-40% decrease from 1968-1990 which when compared with that of 30 years ago is different between 1931 and 1960 [9-11]. Also, the Sahelian droughts of 1970s (80s) was very terrible that it left most farmers impoverished [12]. The frequent occurrence of drought in this zone causes social backwardness and is responsible for poor quality of life of less privileged people [13].

According to Abubakar, [14] the issue of droughts is often caused by factors such as the changing weather patterns e.g low rainfall, reduced cloud cover and greater evaporation rates which are exacerbated by human activities such as deforestation, bush burning, overgrazing and poor cropping methods, which reduce water retention of the soil. When this occurs it leaves many lives with devastating effect and such effects may include but not limited to mass starvation, famine and cessation of economic activity especially in areas where agriculture is the major booster of the economy [15].

Drought is the major cause of people forcefully migrating from their comfortable place to unknown location for safety and shelter purposes; it causes environmental refugees, deadly conflict over the use of scarce natural resources, food insecurity and starvation, destruction of critical habitats and loss of biological diversity, socio-economic instability, poverty and climatic variability through reduced carbon sequestration potential [16].

It is no more news that drought is a devastating occurrence in Northern Nigeria and should be curtailed to avoid its rapid growth and obvious negative effect on the production of agricultural crops, migration of people from one community to another death of lives and destruction of properties.

From the study background, it has been established that drought is an extreme weather event that causes more harm than good to the land, lives and properties in the Northern region of Nigeria. Ways to combat this issue is therefore an urgent need in our country today. The present study is set to investigate the historical analysis of the economic effect of drought on tropical forest management in Northern Nigeria. The study would therefore make recommendations based on data gathered in the course of the study on possible techniques suitable to curb the situation based on research finding.

## Statement of Problem

The better practice of parasite control and herds management is the best practice the government could adopt to prevent the occurrence of drought in the Northern region of Nigeria. It is the inability of rainfall to meet the Evapo-transpiration demands of crops resulting in general water stress and crop failures.

It is obvious from research that up to one-third of the people in Africa live in drought-prone areas and with more danger to the effect of droughts upon their existence. Therefore, the problem of drought from research for agriculture and water resources is experienced in the reduction in soil weight, the increased deaths of livestock, food shortages, and soil depletion. This also manifest in the existence of few rivers and streams, and the lowering of the water table to the soil.

The problem of drought in this part of the country is a great concern to the people but reason for the problem is not well understood by policy makers due to unknown reasons. Even though it has been established from research that drought is dangerous to the existence of

man, little or no research has been conducted to critically understand and analyze the historical study of economic effect of drought on tropical forest management in Northern Nigeria.

## Purpose of the Study

The purpose of this study is to investigate the historical analyzes of economic effect of drought on tropical forest management in Northern Nigeria. The study was discussed under the following specific objectives, to:

- Examine the concept of drought in Northern Nigeria
- Identify the causes of drought in Northern Nigeria
- Identify the effect of drought in Northern Nigeria
- Examine best forest management practices in Nigeria

Suggest better ways to curb the problem of drought against tropical forest management in Northern Nigeria

## Research Question

The following research questions were considered for this study:

- What is the concept of drought in Northern Nigeria?
- What are the causes of drought in Northern Nigeria?
- What are the effects of drought in Northern Nigeria?
- What best practices are adopted for forest management in Northern Nigeria?
- What are the suggested ways to curb the problem of drought against tropical forest management in Northern Nigeria?

## Concept of Drought

The truth is, there is no universally accepted definition of drought because the numerous variety of sectors affected by drought. That is why drought is seen as having a diverse geographical and temporal distribution and the demand placed on water supply by human-use systems [3]. Drought happens in almost every climatic zone. However, its characteristics vary significantly from one region to another. More so, Drought is seen as a temporary aberration; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate [4].

Research have been done on the issue of drought and according to Loukas and Vasiliades, [3] drought is one of the most important natural disasters that show its influences slowly by time. It is one of the costliest natural disasters of the world and affects more people than any other natural disaster. It has also been noted that the frequent occurrences of drought in any region of the world could because an adverse effect for the social backwardness and general poor quality of life especially among the less privileged people in rural areas of Africa. Drought is an extreme weather event which is been aggravated by the increase in human population, which appears to be stressing the natural support system (FRM, 2005).

Drought is as an extended season in a year, or in different years of deficient rainfall relative to the long term average rainfall for a region. It is the inability of rainfall to meet the Evapo-transpiration demands of crops resulting in general water stress and crop failures. The probability of drought at the on-set and towards the end of the rainy season is usually very high in Northern Nigeria as studied by CRISAT, [17] Adeoye, [18]. Dry spells at the beginning of the season usually result in multiple plantings and low or no yields leading to low food

security index. In the same vein, end of season drought could bring about water stress at critical periods of need during the reproductive stages of most crops thus resulting in crop failures and shrinking of yields. Large areas of Northern Nigeria falling within the Sahel and Sudan ecological zones between latitude 9-14°N are prone to recurrent droughts in one form or the other [7,18-20].

### **The Causes of Drought in Northern Nigeria**

Large numbers of inhabitants of the drought prone areas are small arable farmers, who depend mostly on the highly variable rainfall for crop cultivation and maintenance of their herds. The causes of drought can be the nature of the changing weather patterns which often seen via uncontrolled buildup of heat on the earth's surface, meteorological changes which result in a reduction of rainfall, and reduced cloud cover, all of which results in greater evaporation rates. Another cause is the over active participation of human activities which affects the climatic condition of the land and forest. These human activities are bush burning, deforestation, overgrazing and poor cropping methods, reduction of water retention in the soil, and improper soil conservation techniques, which lead to soil degradation.

According a research done by Lester, [21] it was discovered that between 1950 and 2006, the Nigerian livestock population grew from 6 million to 66 million, which was an 11-fold increase. Meanwhile, the needs of livestock exceeded the carrying capacity of its grasslands. It was reported that overgrazing and over-cultivation of land was converting 351,000 hectares of land space into desert annually. That made the rate of land degradation acute when used for farming practices on marginal land such as arid and semi rid lands, hilly and mountainous areas and wetlands.

### **The Effect of Drought in Northern Nigeria**

Generally speaking, drought has a vast effect on mass starvation, famine and cessation of economic activity especially in areas where rain fell agriculture is the main stay of the rural economy. Forced human migration and environmental refugees, deadly conflicts over the use of dwindling natural resources, food insecurity and starvation, destruction of critical habitats and loss of biological diversity, socio-economic instability, poverty and climatic variability through reduced carbon sequestration potential are common knowledge of the causes of drought.

Several research have been conducted on the effect of drought and they have come to terms that drought especially in Africa and with particular reference to Nigeria assert that several challenges such as the widespread poverty, the fact that Nigeria's economy depend on climate-sensitive sectors mainly rain fed agriculture, poor infrastructure, heavy disease burdens, high dependence on and unsustainable exploitation of natural resources, and conflicts are major reasons why drought often harm the Northern region of Nigeria [20,22].

Other forms of effect of drought was identified in the work of Jibrin [15] such as low or no crop yields resulting in low food security index; mass famine; death of livestock; low groundwater levels resulting in dry wells (which needed to be dug deeper and deeper to obtain water for drinking); drying of lakes and dams; loss of biodiversity and impoverishment of ecosystem; acute shortage of water for domestic use and for livestock; decline in GDP; migration into urban areas; separation of families; and increased indebtedness. Other identified

categories of drought effect includes; on agriculture and food security [23], on water availability, on biodiversity, and energy availability.

### **Forest Management Practices in Nigeria**

The beauty of tropical forests has brought the attention of the world to it due to its potential for economic exploitation. This is due to the fact that they catered for the people's need in terms of timber, fruits, firewood, medicinal plants etc., and also, indirectly, animal meat. The native people lived in harmony with the forest as their populations were small and their demands did not exceed the forest's capacity to regenerate. The situation changed drastically in the colonial era between the mid seventeenth and mid twentieth century's.

Large areas of tropical forest were cleared during this period to help human settlement and large-scale cultivation of agricultural and estate crops like sugar cane, tea, coffee, rubber and wattle. Forests were also logged for selective extraction of valuable timbers such as teak and rosewood in Asia, mahogany in Latin America and khaya in Africa, mainly for export. By the mid eighteenth century, forest plantation technology had developed and the natural forests were increasingly replaced by plantations. After the Second World War, forest plantation programmes received a further boost in the newly independent nations due to international exchange of information and availability of international development funds [24].

The forest in a dry land environment of sub Saharan Africa is an important natural resource which provides environmental, social, economic and cultural factors. Millions of people are estimated to live in dry land areas taking the hazard of desertification. The consequences of this are environmental degradation, low level of economic development and lack of good agricultural practices which directly affect the livelihood of people in addition to factors such as population growth, poverty, migration and political disturbances [25].

Estimates of forest cover range from 9.7 million hectares to 13.5 million hectares [26]. The dry region of Nigeria lies between latitude 13°E, covering a land mass of 342,158 km<sup>2</sup> or 85% of the total land area of Nigeria [27]. The region has a population of about 42.6 million [27] and generally has a lower precipitation with an annual rainfall of about 400-1140 mm. The trees are often very scattered and tend to be well adapted to drought [27]. In the northern part of Nigeria, rainfalls seldom exceed 1000 mm [16]. This area constitutes largely the dry land part of the country. In addition to inadequate precipitation the area has a low relative humidity and a high rate of evaporation [26].

Therefore rainfall intensity is a parameter that must be considered in planning and management of forest (natural) resources. Because the soil of dry land environment often cannot absorb all of the rain that fall in large storms, water is often lost from a site by runoff process [28]. Nigeria has a land area of 92.4 million hectares and population of about 134 million people, making it Africa's most populous country [29,30].

### **Research Methodology**

The study made use of a historical review of relevant literatures as the methodology through quantitative research. This involved the use of secondary data to gather relevant information on past studies which were in relation to the present study. The secondary data employed in the course of the study include; text book, journals, literatures, and internet sources were used as deemed relevant to the present study

which was focused on the historical analysis of the economic effect of drought on tropical forest management in Northern Nigeria.

## Findings

Finding from the study shows the following

- Drought is one of the most important natural disasters that show its influences slowly by time.
- Drought is caused by the changing weather patterns, uncontrolled buildup of heat on the earth's surface, meteorological changes which result in a reduction of rainfall, and reduced cloud cover, all of which results in greater evaporation rates.
- The major reasons why drought often harm Northern Nigerian people is because of the widespread poverty, poor infrastructure, heavy disease burdens, high dependence on and unsustainable exploitation of natural resources, and conflicts.
- Forests management were known for its selective extraction of valuable timbers such as teak and rosewood in Asia, mahogany in Latin America and khaya in Africa, mainly for export.

## Conclusion

Drought can be referred to as dry spells at the beginning or at the end of each season. Drought is perceived as one of the expensive natural disaster of the world and affects more people than any other natural disaster in the world. Drought affects Nigeria by affecting its economy, agriculture, environment and biodiversity, population dynamics, and health, animal population and water resources.

The best ways to remedy the situation is to adopt irrigation, development of drought tolerant early maturing and high yielding crop varieties, reduction in post-harvest crop losses, efficient weather forecast, storage of excess production and development of fishery and livestock industries assist greatly in reducing the risk of drought.

## Recommendations

Based on the causes and effect of drought and tropical forest management in northern Nigeria, the researcher therefore recommends that;

- The government should support the rural farmers through the initiation of programs or policies that monitors reduction in post-harvest crop losses, weather forecast, storage of excess production and livestock management.
- Forest management research centers should be established in institutions in the region where drought is experience
- Policy makers or ministry of forestry in Nigeria should curb the misuse of natural disasters within the regions
- The policy makers of forest management should put measures in place to reduce the effects of drought on lives, natural resources and properties.

## References

1. Abaje IB (2007) Introduction to soils and vegetation. Kafanchan: personal touch productions.
2. Nyong AE, Adesina, Elasha BO (2007) The Value of Indegenous Knowledge in Climate change Mitigation and Adaptation Strategies in the African Sahel. *Mitigation and Adaptation Strategies for Global Change* 12: 787-797.
3. Loukas A, Vasiliades L (2004) Probabilistic analysis of drought spatiotemporal characteristics in Thessaly region, Greece. *Natural Hazards and Earth System Sciences. European Geosciences Union.* 4: 719-731.
4. National Drought Mitigation Center, NDMC (2006) What is Drought? Understanding and Defining Drought.
5. Okorie FC (2003) Studies on Drought in the Sub-Saharan Region of Nigeria Using Satellite Remote Sensing and Precipitation Data.
6. Ayoade JO (2004) Introduction to climatology for the tropics. (2ndedn) Ibadan: Spectrum Books Limited.
7. Barry RG, Chorley RJ (2003) Atmosphere weather and climate (8thedn) London: Routledge Taylor and Francis Group, UK. p: 536.
8. Trenberth KE, Jones PD, Ambeje P, Bojariu R, Easterling D, et al. (2007) Observations: Surface and atmospheric climate change.
9. Nicholson SE, Some B, Kone B (2000) An Analysis of Recent Rainfall Conditions in West Africa, Including the Rainy Seasons of the 1997 El Niño and the 1998 La Niña Years. *J. Clim* 13: 2628-2640.
10. Chappell A, Agnew CT (2004) Modelling climate change in West African Sahel Rainfall (1931-90) as an artifact of changing station locations. *Int J Clim* 24: 547-554.
11. Dai A, Lamb PJ, Trenberth KE, Hulme P, Jones D, et al. (2004) The recent sahel drought is real. *Int J Climatol* 24: 1323-1331.
12. Ati OF, Iguisi EO, Afolayan JO (2007) Are we experiencing drier conditions in the Sudano-Sahelian zone of Nigeria? *J of Appl Sci Res* 3: 1746-1751.
13. Alatise MO, Ikumawoyi OB (2007) Evaluation of drought from rainfall data for lokoja. A confluence of two major rivers. *Electronic Journal of Polish Agricultural Universities.*
14. Abubakar IU (2008) Issues on crop production in northern Nigeria: Poor Crop Yields and Irrigation.
15. Jibrin MJ (2010) Coping with Droughts in Nigeria's Sudano-Sahelian Zone.
16. Nnaji AO (2001) Forecasting seasonal rainfall for agricultural decision making in northern Nigeria. *Agricultural and Forest Meteorology* 107: 193-205.
17. ICRISAT (1984) Agrometereology of sorghum and millet in the semi-arid tropics. Proceedings of an International Symposium. ICRISAT Center, Pantancheru, India. p: 322.
18. Adeoye KB (1986) An Evaluation of drought incidence and hazard in northern Nigeria. Paper Presented at the 22nd Annual Conference of the Agricultural Society of Nigeria.
19. Glantz MH, Katz RW (1977) When is drought a Drought. *Nature* 267: 192-193.
20. Apeldoorn GJ Van (1981) Perspectives on drought and famines in Nigeria. George allen and Unwin Ltd, London. p: 184.
21. Lester RB (2006) The earth is shrinking: Advancing deserts and rising seas squeezing civilization. Earth Policy Institute.
22. Mortimore M (1989) Adapting to Drought. Farmers, Famines and Desertification in West Africa. Cambridge University Press, Cambridge p: 299.
23. Van Den Beldt RJ, Napompeth B (1998) Leucaena psyllid comes to Africa. *Agroforestry Today* 4: 11-12.
24. Evans J (1992) Plantation forestry in the tropics (2ndedn) Oxford: Oxford University Press.
25. FAO (2003) State of the World forests, Rome Italy.
26. FAO (2005a) State of the world forest, Rome, Italy.
27. FAO (2001) Management of FGR. State of genetic resources in the dry north of Nigeria.
28. Ffolliott PF, Brooks KN, Gregersen HM, Lundgren AL (1994) Dry Land Forestry: Planning and Management.
29. Oladipo EO (1993) Some Aspects of the Spatial Characteristics of Drought in Northern Nigeria. *Natural Hazards.* 8: 171-188.
30. Federal Republic of Nigeria, FRN (2005) Combating Desertification and Mitigating the Effects of Drought in Nigeria. The Revised National Report

on the Implementation of the United Nations Convention to Combat Desertification (UNCCD) in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa.