

## Drought Occurrence in Northern Nigeria: It's Effects on the Developmental Efforts of the Sub-Region

Dr. Aloni Clinton<sup>1\*</sup>, Mr. Alexander Budnuka Chinago<sup>1</sup>

<sup>1</sup>Department of Transportation Planning and Logistics, Captain Elechi Amadi Polytechnic, Rumuola, Port Harcourt, Nigeria

\*Corresponding author: Dr. Aloni Clinton

| Received: 06.08.2021 | Accepted: 13.09.2021 | Published: 30.09.2021 |

**Abstract:** The steady decline in the amount of rainfall in the Sahel caused by natural and anthropogenic factors and especially the equator-ward spread of the dry sub-tropical high pressure system in the sub-region that influences the moisture laden tropical maritime air mass to be restricted to the southern part of the country. And the drought condition is enhanced through over-cultivation, deforestation and over-grazing, thereby leaving the soil bare that aids the free movement of desert sand commonly noticed on the Northern sub-region of the country. This leads to serious repercussions on productive capacities and basic social services and to overcome this threat, hence the campaign for three planting, forestation, dam constructions and irrigation projects.

**Keywords:** Anthropogenic factors, Drought, Natural factors, Over-grazing and Precipitation.

### INTRODUCTION

The history of mankind shows that he had experienced one form of climate variability or another. Sometimes these variations are extreme, leading to extreme weather condition such as floods or droughts as was the case in Noah's and Joseph's days in the Bible (Chinago, 2020).

Drought is a period of inadequate rainfall either in time or in space, which results in crop failure, sufficient to cause a severe shortage of food in a rural population (Abdullahi *et al.*, 2006) Drought is the opposite of flood. It is a state of insufficient water for crops, animals and human utilization. It is also defined as an extended period of months or years when a region notes a deficiency in its water supply. But unlike flood that is immediate in occurrence and abrupt in cessation, drought is difficult to determine, since it is a function of a lack of precipitation, temperature, evapotranspiration, capacity of soil to retain moisture, and resilience of flora and fauna in dry conditions or environment (Dearden and Mitchell, 2009).

### TYPES OF DROUGHT

Meteorological drought is as a result of prolonged period of dryness or rainfall less than mean precipitation of the area. It is the first form of drought that occurs in an area. All other drought depends on it.

Agricultural droughts are droughts that affect crop production or the ecology of the region. This

condition can also arise independently from any change in precipitation levels, when soil conditions and erosion triggered by poorly planned agricultural endeavours cause a short fall in water available to the crops. However, in a traditional drought, it is caused by an extended period of below average rainfall.

Hydrological drought is as a result of reduced surface water, ground water and even the water table. This can affect the urban areas as a result of reduction in water reserve and underground water reserve.

In many of the Sub-Sahara countries of West Africa including Nigeria, drought and its consequences are historical as well as contemporary problem. It is periodic phenomenon and its occurrences vary in duration, severity and geographical extent (Betterson and Gazama, 1987). Drought is always associated with desertification and aridity, which are common with the Sahel savannah (Enabon, 1987; Abdullahi *et al.*, 2006).

The Northern Sub-region of Nigeria is drought stricken, and it has been attributed to both anthropogenic and natural causes. Drought is a recurrent feature in the Northern parts of West Africa that the Northern sub-region of Nigeria is part of, and which is due to periodic deficiency of rainfall relative to the previous averages. The deficiency experienced is significant enough to affect the cultivation of crops and the survival of livestock.

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**Citation:** Aloni Clinton & Alexander Budnuka Chinago (2021). Drought Occurrence in Northern Nigeria: It's Effects on the Developmental Efforts of the Sub-Region. *Cross Current Int J Peer Reviewed J Human Soc Sci*, 7(8), 155-158.

Udo (1985) observe that the Sahelian drought has become a household name in the West African sub-region and including the whole of Africa in recent times, dating back from 1972-1973 to 1982 and to the present time, with its occurrence being attribute to both natural and man-made factors.

### **NATURAL FACTORS**

Generally, rainfall is related to the amount of water vapour in the atmosphere, combined with the upward forcing of the air mass containing that water vapour. If either of these is reduced, the result is a drought. This can be triggered by an above average prevalence of high pressure systems, wind carrying continental, rather than oceanic air masses (i.e. reduced NMcwater content), and ridges of high pressure areas form with behaviours which prevent or restrict the developing of thunderstorm activity or rainfall over one certain region.

In Nigeria the responsible natural factors include the natural shifting of climatic zone, leading to the equator ward shift of the tropical rainy monsoon. There is also the steady decline in the amount of rainfall in the Sahel region year after year, that probably may have been caused by the equator-ward spread of the dry sub-tropical high pressure system in the sub-region, with a narrowing of the wet equatorial belt due to the cooling effect of the westerlies equator-wards, since the influence of the moisture laden tropical maritime air mass is restricted to the southern part of the country's sub-region.

Global warming (increase in temperature) high evaporation and evapotranspiration and soil capability to retain moisture are additional natural factors that can cause drought.

### **ANTHROPOGENIC FACTORS**

Human activities can directly trigger exacerbating factors such as over-cultivation, deforestation and over-grazing by herdsmen, and excessive irrigation. Therefore, leaving the soil bare, thus aiding free movement of desert sand that is prevalent in the northern sub-region of the country. Urbanisation and excessive abuse of water resources, unregulated bore holes reduces the available water.

### **DROUGHT EFFECTS ON DEVELOPMENTAL EFFORTS**

The actions of man strip the soil of vegetation that causes;

- i. High albedo and keeps the atmosphere warm, disperses cloud and reduces rainfall.
- ii. As human activities change the landscape this results into retaining less water and therefore may produce a drier local climate.
- iii. The stripping of vegetation from the soil allows the wind to throw more dust into the air, and this reduces the amount of sunshine reaching the earth's

surface, which will have the same rain-reducing effect because more solar radiation is shielded off the earth's surface.

Generally, the lowering of soil moisture could also suppress rainfall prevalent in such a forests comes from water evaporated off the vegetation and not from outside influence, therefore explaining the concept of evapotranspiration and water balance.

The rate of evapotranspiration greatly influences the amount of water available for plant growth, and also agricultural production to a large extent depends on it, which is subject to the availability of moisture at the evaporating surface and the ability of the atmosphere to vaporize the water and remove the vapour.

The term evapotranspiration therefore refers to the combined processes of the loss of water into the atmosphere from water and land surfaces, and water loss through transpiration from plants.

The rate of air evaporation is determined by temperature, humidity, wind and radiation that makes open water evaporation to be at a high rate in arid areas of West Africa that the sub-region of Northern Nigeria is part of it. This therefore explains why the rate of evapotranspiration governs the incidence and intensity of drought.

The occurrence and prolong drought militates against the sub-region developmental efforts which are geared towards self-sufficiency in food production, man-power development and the enhancement of the citizenry general living standard.

As a result of poor rural developmental efforts, it has led to increase in urban areas population due to the rural-urban migration, thereby putting more pressure on the resources of the urban areas, which in turn is capable of depleting these resources within a limited time frame.

The prolonged drought has also lowered water tables in Rivers, lakes, aquifers and dams with serious implications for countries that are developing their hydro-electrical potential such as Nigeria, thereby having serious repercussions on productive capacities and basic social services.

The resultant effects of drought therefore include, the hampering of grain crops harvest an cattle rearing due to lack of forage, and this forces the inhabitants within the region to the status of refugees that are crowded into camps close to major cities, and despite the provision of relief materials supplies, thousands of the refugees die of starvation and diseases infectious on the Sahel region, which is therefore a

waste of human resources who were to supplement the developmental efforts of the sub-region.

Gabriel and Kreutzwiser (1993) stated that drought reduces the amount of water for use by depleting soil moisture and groundwater resources as well as by lowering stream flow and lake levels. These reductions can start depletion cycles less than normal rainfall leading to low soil moisture, triggering demand for irrigation development, in turn depleting non-recharging surface and groundwater supplies. The high evapotranspiration rate associated with hot, dry period also contributes to depleting soil moisture and surface water supplies, which are not restored to normal level without unusually high or extreme rainfall.

### MITIGATION OF DROUGHT

In order to overcome the threat of drought, there is this yearly tree-planting campaign to replenish the resources which have been lost, dam construction and irrigation projects as well as the tapping of underground water resources by digging wells which are being hampered by the persistent drought. It is also observed that the Nations Relief Rehabilitation Commission had maintain that drought could be avoided with the start of forestation programme, irrigation, soil and water conservation projects, the technology an capability to properly utilize existing water.

Alexander (2020) therefore observed that drought may threaten pasture and feed supplies, since drought reduces the amount of quality forage available to grazing livestock. And that some areas could experience longer more intense droughts, resulting from higher summer temperatures and reduced precipitation. The resultant effect is that for animals that rely on grain, the changes in crop production due to drought could also become a problem.

Other possible mitigation strategies include:

- Cloud seeding- artificial technique to induce rainfall by seeding the cloud with silver iodide.
- Rainwater harvesting – Collecting and storage of rainwater from roof or any other catchments.
- Recycled water – Former wastewater that has been treated and purified for reuse
- Land use – Proper planning and management of the land and crop rotation will reduce wastage and minimize erosion. It will limit water loss.
- Introduction of drought resistant crops. Crops that use less water need to be planted in drought prone areas.

### RECOMMENDATIONS

The Water Basin Development Authorities, especially in the North need to educate the populace on water friendly usage.

As a matter of urgency polluting, lavishing and misuse of water should be treated as an offense punishable by law.

Proliferation of bore holes should be discouraged; therefore Water board should be saddled with the responsibility to provide drinkable water for the citizenry

Open grazing should be discouraged, as it is a key factor for removal of cover crops. Modern system of rearing should be introduced

Water should be transported to the arid region of Nigeria from the areas of abundant fresh water.

Drought resistant crops should be planted. Bio technician and agricultural engineers should provide a crop that uses less water,

### CONCLUSION

Drought occurrence which is prevalent in the Northern sub-region of Nigeria is as a result of natural and man-made factors. These are shifting of climatic zone, decline in the amount of rainfall over cultivation, deforestation and over-grazing by herdsmen.

The action of man affects the soil and thus the vegetation cover, rainfall amount is reduced leading to drier climate. In order to mitigate the threat of drought there is the campaign for tree planting to replenish lost resources, forestation an irrigation programmes enhancement.

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