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Analysis of Rainfall Trend in Sokoto State, Nigeria (1987-2016)

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ABSTRACT

Rainfall is an important climatic parameter. The study examined the nature of trend in annual rainfall amount and rainfall attributes, such as onset, cessation dates and hydrological growing season. This study was carried out to determine if there was any significant change in rainfall in the study area. Walter's (1967) formula was used to determine the onset, cessation and hydrological growing season. The results obtained were then subjected to a time-series analysis. The findings showed that annual rainfall in Sokoto from 1987 to 2016 is on the increase. Onset dates showed early onset of recent. The rains stopped late thereby increasing the hydrological growing season. The latest onset date occurred on 4^{th} July in the years 1995 and 2016 and the earliest onset date on 12^{th} April in the year 2015. The earliest cessation date was recorded on 22^{nd} August in the year 1987 and the latest on 18^{th} October in the years 2009 and 2010. The Hydrological growing season was the longest (162 days) in 2015, this was seen to be a result of the onset dates of rainfall occurring earlier and cessation dates later. Despite of the upward trend rainfall is variable and unreliable and insufficient to meet the water needs of the plants, this has a great implication resulting in cases of seasonal drought occurrences and reduced agricultural yield. The government policies, as related to agriculture and water resources development, should be based on recent rainfall parameters.

***Keywords*:** Cessation, Trends in Rainfall Pattern, climatic parameter, climate change

1. INTRODUCTION

The earth's climate is dynamic and naturally varies on seasonal, decadal, centennial, and longer time-scales. Climatic fluctuation can lead to conditions which are warmer or colder,

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wetter or drier, stormier or quiescent (NOAA 2007). These changes in climate may be due to natural internal processes or external forcing or persistent anthropogenic changes in the composition of the atmosphere or in land use.

Recently the world is becoming warmer experiencing global warming. Climate change is one of the biggest crisis facing humanity, the United Nations Framework Convention on Climate Change, (UNFCCC 1992) in (https://www.wired.co.uk/article/what-is-climate-change-definition-causes-effects) defines it as a change in climate that is attributed directly or indirectly to human activity, altering the composition of the global atmosphere. Human activity include the pollution that arises from industrial activity and other sources that produce greenhouse gases. These gases such as carbon dioxide, have the ability to absorb the spectrum of infrared light and contribute to the warming of our atmosphere. Once produced these gases can remain trapped in the atmosphere for tens of hundreds of years.

Rainfall is a climate parameter that affects the way and manner man lives. It affects every facet of the ecological system, flora and fauna inclusive. Rainfall constitutes an essential backbone of the earth hydrological cycle. Thus, without it, the movement of water on or below the earth water and the individual or combined effects of other attributes of climate on life, existence will not hold and may become detrimental to life form on earth. Atmosphere water is therefore a key reservoir in the hydrological cycle, hence the availability of this water from the atmosphere is highly variable in both, time and space.

2. STATEMENT OF THE RESEARCH PROBLEM

Given the fact that rainfall is dynamic, there are variations in yearly rainfall which make it reliable in some years and unreliable in other years, as a result of its onset and cessation period. Hence there is the pressing need for information on past, present and forecast of future rainfall distribution in order to develop strategies for timely planting in order to avoid drought.

With increases in global temperatures, processes, such as desertification are transforming once thriving areas into arid environments. Climate variability describes short term changes in climate that take place over months, seasons, and years. The variability is the result of natural, large-scale features of the climate, El Nino and La Nina events drive changes in circulation, winds, rainfall and ocean surface temperatures.

The knowledge of climate variability over the period of instrumental records and beyond on different temporal and spatial scale is important to understand the nature of different climate systems and their impact on the environment and society.

Inter-governmental panel on climate change (IPCC 2007) recent "warming of the climate system is unequivocal" as it is now evident from observations of increase in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. The impacts of climate change such as rising global average temperature and changes in precipitation are undeniable clear with impacts already affecting ecosystems, biodiversity and human systems throughout the world.

Future impacts are projected to worsen as the temperature continues to rise and as precipitation becomes more unpredictable. IPCC assessed that the African continent is the most vulnerable continent to climate change. Climate change is therefore a key challenge facing sustainable fresh water availability, security and the general sustainable development of the African continent.

Rainfall is the single most important physical environmental factor affecting human activities in West Africa, in areas in the drier savanna and Sahel zones scarcity of water and frequent droughts result from relatively low and unreliable rainfall amounts.

The Intergovernmental Panel on Climate Change (IPCCC, 2007), reported that by 2020, agricultural production including access to food in many African countries will be compromised by climate variability and change. The area suitable for agriculture, the length of the growing season and yield potentials, particularly along the margins of the arid and semi-arid areas of Africa are expected to decrease. This would further adversely affect food security and exacerbate malnutrition in the continent.

Rainfall in Nigeria has been varying in dimension, especially regionally (increasing in some areas regions and decreasing in some regions, causing floods and droughts). The total rain and distribution of rains at any location determine the frequency and intensity of drought and flooding as well as the length of the growing season in that location. Rainfall stands out as perhaps the single, most unique element of all climatic elements, such that its total amount, intensity, duration, variability, reliability and its spatial and temporal distribution influence phenomena especially in the tropical region where prevailing economic activity is simply agro-based.

Sokoto is a semi-arid region lying in the Sahel zone of North-western, Nigeria, and therefore experiences a low amount of rainfall in a year. Sokoto has an average annual rainfall of 629 mm. Rainy season is from June to October in Sokoto. The showers rarely last long compared to the regular torrential showers known in many tropical regions. The hydrological growing season experiences a late onset of rainfall mainly in June and an early cessation in September according to Seasonal Rainfall Prediction (2016). Onset of raining season follows a migratory pattern of the ITCZ as also is the cessation until by August. Climate in many parts of Africa can be classified as arid and semi-arid, with recurrences of severe droughts.

The livelihood of many in the society are largely nomadic pastoralist. The economies of many states in areas that receive reliable rainfall rely heavily on rain-fed agriculture. The IPCC 2007 assessment indicates that both, droughts and floods have increased in frequency and severity in recent years and is projected to increase in future.

This gives rise to the research questions:

1) What has been the pattern of rainfall onset and cessation in the study area between 1987-2016
2) What has been the trend in annual rainfall in the study area between 1987 and 2016
3) What has been the trend in hydrological growing season between 1987-2016.

3. AIM AND OBJECTIVES OF THE STUDY

This research aimed at analyzing the rainfall trend of sokoto state, Nigeria (1987-2016). The aim of this research was accomplished via the following objectives which include to:

(A) Examine the trend in the onset and cessation dates of rainfall in the study area for the study period.
(B) Examine the pattern of annual rainfall in study area within the study period.
(C) Examine the trend in the hydrological growing season of the study period.

3. 1. Hypothesis

In this study a null hypothesis was given thus: There is no significant change in the rainfall characteristics of Sokoto state, Nigeria between 1987 and 2016.

3. 2. Scope of the Study

The scope of this work includes the spatial context covering the entire region of Sokoto state, Nigeria analyzing the trend of the annual rainfall, pattern of onset and cessation of rainfall and the hydrological growing season and the temporal context covering a duration of 30 years (1987-2016).

3. 3. Significance of the Study

Rainfall has a dramatic effect on agriculture. This study will be useful to Farmers, Federal Ministry of Agriculture, State Ministry of Agriculture, Agricultural Extension workers, and Irrigation Projects. Plants require varying amounts of rainfall, as drought can kill crops and cause harmful fungus growth.

This study is important as it can be used as a target research in understanding the trend, onset, duration and cessation of rainfall in the study area so that it could be used to educate inhabitants of that region and guide them in agriculture which is the most dominant form of business in the study area. The nature and magnitude of these rain-related environmental problems (and their implications to land management, agriculture and water resources development) can be better appreciated with increased knowledge in rainfall dynamics.

3. 4. Study Area - Location

Sokoto is geographically located within the Sudan Savannah zone between latitudes 13°35'N to 14°0'N and longitudes 4°E to 6°40'E. Sokoto state is located in the extreme Northwest of Nigeria and shares borders with the Niger republic to the North, Kebbi state to the West and Zamfara state to the East and South (see **Fig. 1**). The state covers a total area of about 25,973 km^2 ranks 16th out of 36 states of Nigeria.

3. 5. Climate

According to Koppen's classification the climate of the study area is classified as Hot Semi-arid climate (BSh). Sokoto state is in the dry Sahel with an annual average temperature of 28.3 °C, it is one of the hottest cities in the world. Maximum daytime temperatures are generally under 40 °C most of the year, and the dryness makes the heat unbearable. The dry season lasts for more than seven months, being particularly dry from mid-November to mid-May when no drop of rain may fall. The warmest months are February to April when daytime temperatures can exceed 45 °C.

The rainy season is from June to October during which showers are a daily occurrence. The showers rarely last long and are far from the regular torrential rain known in wet tropical regions. Rain starts late and ends early with mean annual rainfall ranging between 500 mm and 1300 mm.

From late October to February during the "cold season", the climate is dominated by the Harmattan wind blowing Sahara dust over the land.

3. 6. Relief and Drainage

The north and western parts of the region consist of a plateau of sandstone capped by a resistant layer of lateritic ironstone. It is lateritic capping that has given rise to many flat topped hills found in the areas where the plateau has been broken by river erosion.

In the drier areas of the North and North east of Sokoto town, the relief of the sandstone plateau is more uniform since many of the depressions and smaller villages have been covered up by large deposits of windblown sand. The escarpments are found in Dange and Kalambaina and along the hills, they rise up to 488 m.

The Sokoto River and its tributaries constitute the main drainage features of this region. The main river flows through a flat-bottomed trench-like valley between two steep and heavily eroded escarpments. In certain areas the cliffs bordering the river valleys exceed 30 m. Soil erosion at the head-water of the Sokoto Rima system has resulted in the sitting up of the valley floors, giving rise to increasing flood heights. The periodic destruction of settlements and farms by flood water is largely responsible for the migration of village from flood plains to the nearby sandstone plateau.

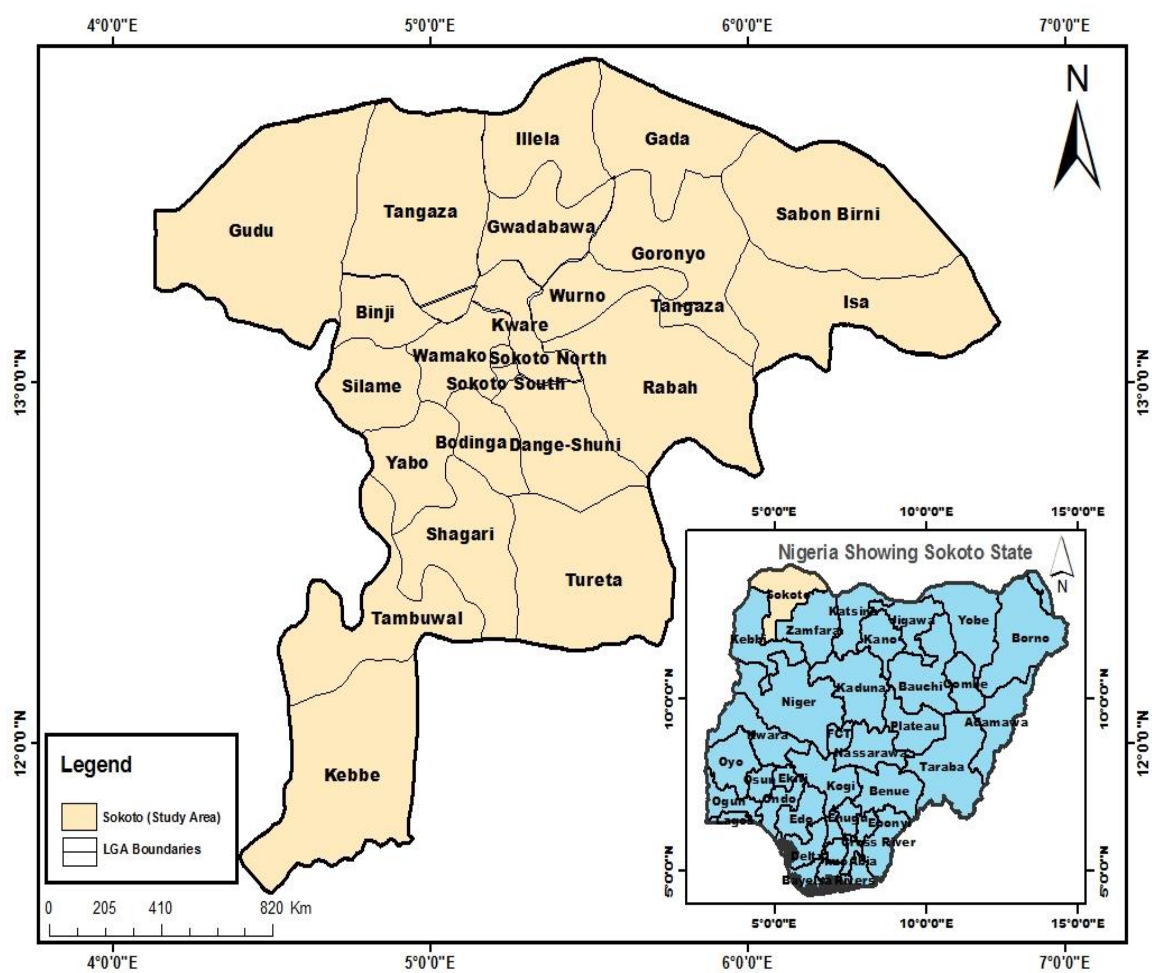

Fig. 1. Map of Study Area
Source Administrative map of Sokoto, 2018

4. METHODOLOGY - RECONNAISSANCE SURVEY

The researcher made enquiries on data availability on rainfall for the study area and discovered that data for rainfall were available at Nigerian Meteorological Agency (NIMET), Abuja for the study period.

Types and Source of Data

Secondary data were used in this research, Daily rainfall records of Sokoto from 1987 to 2017 were used. The researcher obtained rainfall data from the supervisors' office and the Nigerian Meteorological Agency (NIMET), Abuja.

Derivation of Rainfall Parameters

The parameters of rainfall referred to in this work are the annual rainfall, onset, cessation and hydrological growing season in deriving them. However, it was adopted for this study mainly because it gives results that are very realistic.

A) Annual rainfall

Annual rainfall is the record of total rainfall received in a given year. The rainfall data obtained for the period of study from January to December were added for each year to give the annual rainfall.

B) Onset date

Walter's (1967) definition of Onset Date is expressed mathematically as:

$$Onset = \frac{\mathrm{DM(51-A)}}{\mathrm{TM}}$$

where:

DM = number of days in the month with cumulative rainfall greater than or equal to 51 mm
A = total rainfall of the previous month
TM = total rainfall of the month in which 51 mm or more is reached
51 mm = minimum soil moisture index.

C) Cessation date

The reverse of Walter (1967) formula was used in determining the cessation, starting from December to January.

$$Cessation = \frac{\mathrm{DM(51-A)}}{\mathrm{TM}}$$

where:

DM = number of days in the month with the cumulative rainfall greater or equal to 51mm
A = total rainfall of the previous month
TM = total rainfall of the month in which 51mm or more is reached
51 mm = minimum soil moisture index.

The answer obtained here is subtracted from the total number of days in the month of cessation date.

D) Hydrological growing season

The hydrological growing season is the number of days between the onset and the cessation dates of rain.

In order to acquire comprehensive results for this research, the following methods were adopted in the data analysis:

To achieve objective i: Walter's method was used to calculate the onset and cessation dates and the results were later subjected to time-series analysis, where trend lines and fitted linear trend line equations for each of the parameters were plotted in order to visualize the direction and magnitude of change. The average onset and cessation dates were gotten from the Julian calendar.

To achieve objective ii: Annual rainfall data obtained were subjected to time-series analysis. Trend lines and fitted linear trend line equations for each of the parameters were plotted in order to visualize the direction and magnitude of change.

To achieve objective iii: Walter's method was used to calculate the hydrological growing season and the results were then subjected to time-series analysis, where trend lines and fitted linear trend line equations for each of the parameters were plotted in order to visualize the direction and magnitude of change.

5. RESULTS AND DISCUSSION

5. 1. Pattern of Annual Rainfall of the Study Area

Figure 2 presents the pattern of annual rainfall in Sokoto state for the study period of (1987 to 2016), (see Appendix 1 for computation).

Fig. 2 shows that the year 1987 experienced the lowest annual rainfall of 324.5 mm while 2010 experienced the highest annual rainfall of 1,146.7 mm. The mean annual rainfall for the study period is 663.9 mm. Years 1987, 1989, 1990, 1992, 1993, 1995, 1996, 1997, 1998, 1999, 2004, 2005, 2007, 2008, 2009, 2011, 2012 and 2016 experienced annual rainfall below the mean value while 1998, 1991, 1994, 2000, 2001, 2002, 2003, 2006, 2010, 2013, 2014 and 2015 experienced annual rainfall above the mean value.

From the graph, the trend line equation ($y = 7.0056x + 554.31$) is positive, which implies there was a progressive increase in annual rainfall in the study area during the study period.

This result is supported by Ati, Stiger, Iguisi and Afolayan (2009) who stated that the evidence from nine stations in northern Nigeria, Sokoto inclusive shows that there is a significant increase in annual rainfall amount in the last decade of their study.

5. 2. Onset, Cessation and Hydrological Growing Season, Onset Date of the Rainy Season

Figure 3 presents the trend in the Onset dates of rainfall in Sokoto state from 1987 to 2016 (see Appendix 2 for computation).

It was observed that the earliest onset date of rainy season experienced at Sokoto was on the 12th of April in 2015 while the latest onset date occurred twice on the 4th of July in the years

1995 and 2016. The trend in onset shows an average of the onset date occurring on the 1st of June, as derived from the Julian calendar (see Appendix 2 for computation).

In Figure 3 the trend in rainfall onset dates shows a significant decrease, as indicated by the decreasing linear trend line. The trend line equation is negative ($y = -0.8156x + 43265$) implying that onset dates occurred late as the years went by.

5. 3. Cessation Dates of the Rainy Season

Figure 4 presents the trend in the Cessation dates of rainfall in Sokoto state from 1987 to 2016 (see Appendix 2 for computation).

Figure 4 shows that the earliest cessation occurred on 22nd August in the year 1987 and rainfall started retreating later in the month of October during years 2009, 2010, and 2012, with the latest date of cessation occurring on the 18th of October in the years 2009 and 2010. The trend in cessation shows an average of the cessation date occurring on the 6th of October, as derived from the Julian calendar (see Appendix 2 for computation).

From the graph, the cessation date of rainy season in Sokoto is significantly increasing. The trend line equation ($y = 0.5715x + 43352$) is positive implying that cessation dates is occurring later in recent years.

5. 4. Hydrological Growing Season

Figure 5 presents the Trend in Hydrological Growing Season in Sokoto state from 1987 to 2016 (see Appendix 2 for computation).

Indicating the lowest Hydrological Growing Season of 53 days was experienced in 1987 while the highest of 162 days was experienced in 2015. Mean Hydrological Growing Season is 108 days. 1987, 1988, 1989, 1990, 1992, 1993, 1994, 1995, 1996, 1999, 2003, 2006, 2007, 2008 and 2016 have values below the mean value, while 1991, 1997, 1998, 2000, 2001, 2002, 2004, 2005, 2009, 2010, 2011, 2012, 2013, 2014 and 2015 have values above the mean value.

This Figure shows a significant gradual increase in the trend in hydrological growing season. Furthermore, from the graph, the trend line equation ($y = 1.2712x + 88.43$) is positive; this implies the hydrological growing season is progressively increasing in the area, signifying that duration of rainy season in Sokoto has been increasing over the years, as a result of the onset dates and cessation dates experienced during the study period.

Hydrological Growing Season is between to May to September, which is 5 months.

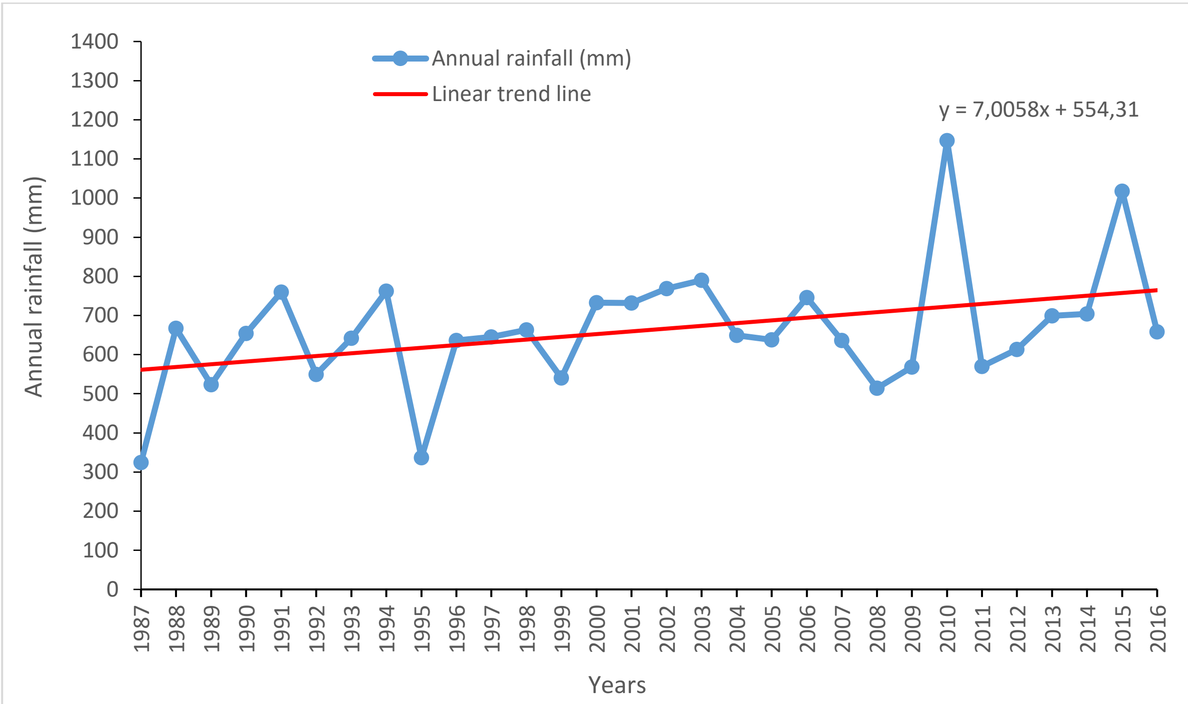

Figure 2. Annual Rainfall Pattern (1987 to 2016)
Source: Author's Compilation (2018)

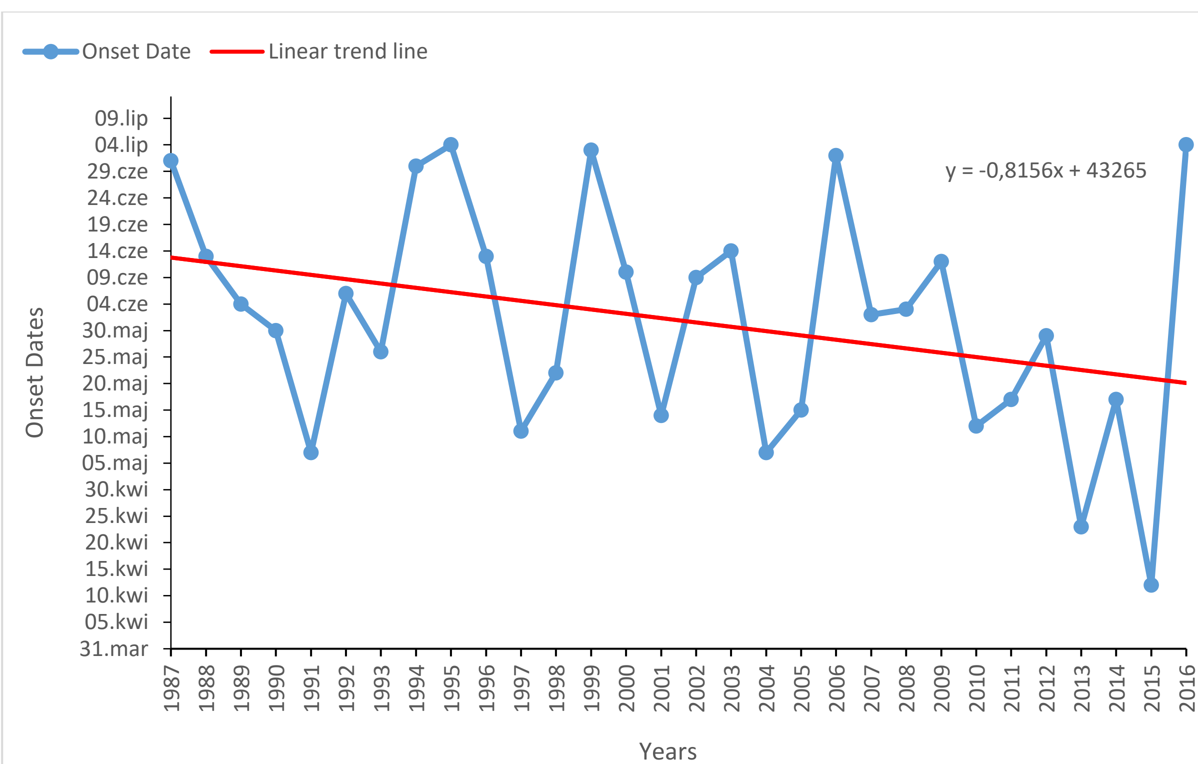

Figure 3. Trend in Onset Date (1987 to 2016)
Source: Author's Compilation (2018)

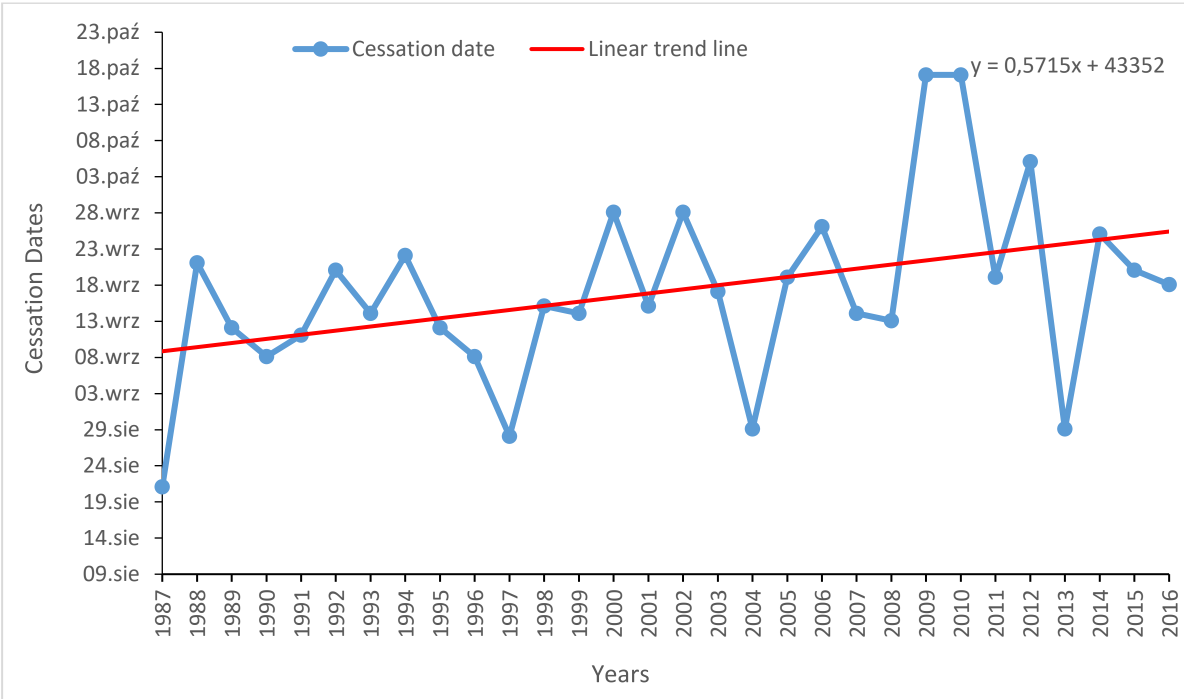

Figure 4. Trend in Cessation Date (1987 to 2016)
Source: Author's Compilation (2018)

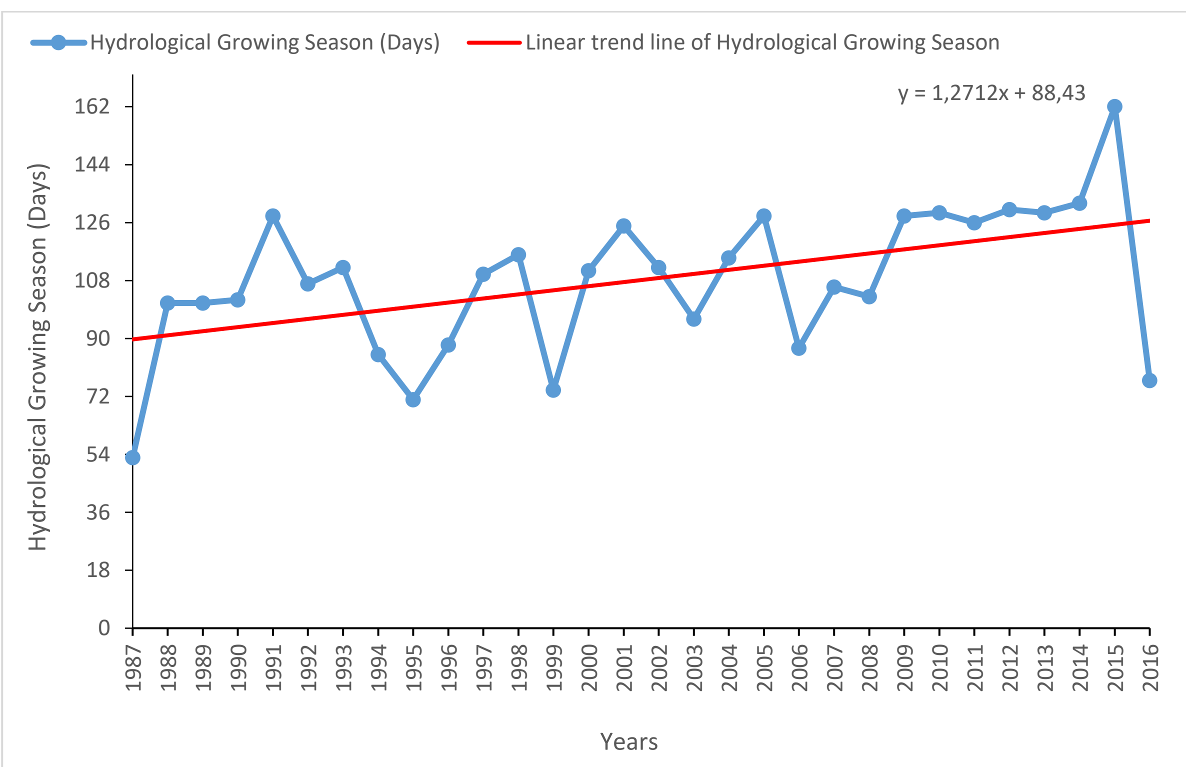

Figure 5. Trend in Hydrological Growing Season (1987 to 2016)
Source: Author's Compilation (2018)

6. SUMMARY, CONCLUSION AND RECOMMENDATIONS

Climate change today is an issue of global concern. This aspect is of a special urgency to the people of sub-Saharan Africa where food availability has already declined. In Nigeria, agriculture is rain-fed and employs about 70% of the population. It accounts for a huge chunk of the country's GDP. This therefore means that anything which affects the sector negatively is of national interest and concern.

Therefore, daily rainfall records of Sokoto (1987-2016) were used to depict the trend of annual rainfall and years of extreme rainfall events. The data for the linear trend were annual rainfall data obtained from the Nigerian Meteorological Agency (NiMet). The data were subjected to Walter's 1967 method of deriving onset, cessation, hydrological growing season and Time series analysis was used to determine the trends in annual rainfall amount, onset, cessation and hydrological growing season, where trend lines and fitted linear trend line equations for each of the parameters were plotted in order to visualize the direction and magnitude of change. The Microsoft excel software was used.

Several researchers reviewed in this study disclosed that rainfall has been declining in the North east region of the country. This study, however, revealed a case of rainfall fluctuations and increasing linear trend line in annual rainfall over the study area during the study period (1897-2016). The highest and lowest rainfall were recorded in the year 2010 and 1897 with records of 1,146.7 and 324.5 mm, respectively.

Onset dates decreased from later to earlier dates with the latest onset date occurring on 4th July in the years 1995 and 2016 and the earliest onset date on 12th April in the year 2015. Trend for cessation dates increased from earlier to later dates, with the earliest cessation date recorded on 22nd August in the year 1987 and the latest on 18th October in the years 2009 and 2010. Trend in Hydrological growing season increased from shorter to longer days, with the highest value being 162 days in 2015. The result showed the annual rainfall trend was significantly increasing. It showed that the onset had a decreasing trend line and the trend line equation was negative, which indicated onset dates occurring earlier. Average onset date occurred on 1st June, as calculated from the Julian calendar.

The trend line showed cessation dates having an increasing trend line, together with a positive trend line equation. Cessation began retreating later. According to Julian calendar used it was calculated that the average cessation date was on 6th October. This information on the average onset and cessation dates can help farmers determine when to start farming certain crops.

The length of the rainy season progressively increased, with a positive trend line equation. Based on the findings of the study, the null hypothesis which states that there is no change in rainfall trend in Sokoto from 1987-2016, is rejected.

Recommendations

Based on the findings of this research, the following recommendations have been made:

1) The government policies, as related to agriculture and water resources development should be based on recent rainfall parameters.
2) Rainwater harvesting should be developed to augment the dwindling annual rainfall at Sokoto.

3) Viable and efficient water management strategies and techniques must be put in place to ensure sustainability of rain water as a natural resource.
4) Government policies and programmes, such as river basin development, afforestation, dam construction, water scheme project and irrigation practices which have direct impact on both agricultural and water resource development should be executed during the dry season in order to avoid rapid evaporation, low water level in the soil and on river banks, as well as reduce persistent drought in the study area during the dry season.
5) Availability of rainfall data has reduced over the years hence continuous monitoring and analysis of these data is thus necessary to verify rainfall trends reported here more thoroughly. This will be of benefit to individual researchers, corporate organizations and government agencies that might need the data for further studies or in the formulation of agricultural based policies.

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Appendix 1. Annual Rainfall

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (mm)
1987	0.0	0.0	31.0	0.0	4.5	49.1	56.5	130.5	14.4	38.5	0.0	0.0	324.5
1988	0.0	0.0	0.0	5.8	TR	107.3	168.3	227.9	188.0	0.0	0.0	0.0	697.3
1989	0.0	0.0	0.0	TR	26.7	163.5	126.5	129.5	60.0	16.6	0.0	0.0	522.8
1990	0.0	0.0	0.0	TR	53.2	72.7	347.4	109.6	71.3	0.0	0.0	0.0	654.2
1991	0.0	2.8	10.2	18.3	141.4	117.0	172.6	211.3	85.8	0.0	0.0	0.0	759.4
1992	0.0	0.0	TR	0.0	38.9	61.9	150.9	132.5	164.8	0.0	0.0	0.0	549.0
1993	0.0	0.0	0.0	5.0	54.8	39.7	204.7	238.2	99.8	0.0	0.0	0.0	642.2
1994	0.0	0.0	TR	TR	TR	51.8	163.7	355.6	185.5	5.5	0.0	0.0	762.1
1995	0.0	0.0	0.0	2.7	17.8	23.7	200.5	0.0	92.1	TR	0.0	0.0	336.8
1996	0.0	0.0	0.0	19.25	9.5	99.5	235.5	198.0	74.25	0.0	0.0	0.0	636.0
1997	0.0	0.0	2.8	1.8	141.3	152.8	112.8	175.7	42.0	16.3	TR	0.0	645.5
1998	0.0	0.0	0.0	10.0	55.5	59.25	47.0	384.25	107.0	0.0	0.0	0.0	663.0
1999	0.0	0.0	4.0	33.75	37.75	37.0	143.75	179.0	105.25	0.0	0.0	0.0	540.5
2000	0.0	0.0	0.0	0.0	26.5	72.3	361.6	159.8	63.8	48.6	0.0	0.0	732.6
2001	0.0	0.0	0.0	24.1	60.5	36.8	360.8	141.9	107.5	0.0	0.0	0.0	731.6
2002	0.0	0.0	0.0	33.3	30.8	67.4	231.6	183.1	179.2	43.3	0.0	0.0	768.7
2003	0.0	0.0	0.0	9.2	17.5	71.3	287.9	288.7	108.2	7.4	0.0	0.0	790.2
2004	0.0	0.0	TR	30.1	96.4	68.5	133.7	274.4	46.4	TR	0.0	0.0	649.5
2005	0.0	0.0	0.0	0.0	104.5	82.5	146.7	171.1	124.3	8.5	0.0	0.0	637.6
2006	0.0	0.0	0.0	0.0	19.4	40.6	153.7	314.7	187.3	29.8	0.0	0.0	745.5
2007	0.0	0.0	0.0	6.8	45.6	65.9	183.4	235.6	99.1	0.0	0.0	0.0	636.4
2008	0.0	0.0	0.0	0.7	41.3	94.7	152.2	130.2	93.9	1.6	0.0	0.0	514.6
2009	0.0	0.0	0.0	0.0	24.8	64.1	114.6	146.7	98.0	119.9	0.0	0.0	568.1
2010	0.0	0.0	0.0	0.4	128.7	126.1	322.8	357.6	88.2	122.9	0.0	0.0	1146.7
2011	0.0	0.0	0.0	0.0	92.9	161.2	29.3	174.2	93.2	19.1	0.0	0.0	569.9
2012	0.0	0.0	0.0	0.0	54.5	83.2	178.2	140.7	92.4	64.4	0.0	0.0	613.4
2013	0.0	0.0	0.0	67.4	16.2	61.6	167.8	322.7	41.8	21.7	0.0	0.0	699.2
2014	4.3	0.0	0.0	11.8	72.1	98.3	193.3	129.4	167.8	27.2	0.0	0.0	704.2
2015	4.1	8.9	26.3	60.3	182.8	51.0	193.3	322.7	167.8	0.0	0.0	0.0	1017.2
2016	0.0	0.0	1.5	19.3	30.6	33.4	152.7	286.1	134.8	0.0	0.0	0.0	658.4

Appendix 2. Onset, Cessation and Hydrological Growing Season

Year	Onset Date	Julian Date	Cessation Date	Julian Date	Hydrological Growing Season
1987	1ST July	182	22nd August	234	53 days
1988	13th June	164	22nd September	266	101 days
1989	4th June	155	13th September	256	101 days
1990	30th May	150	9th September	252	102 days
1991	7th May	127	12th September	255	128 days
1992	6th June	158	21st September	265	107 days
1993	26th May	146	15th September	258	112 days
1994	30th June	181	23rd September	266	85 days
1995	4th July	185	13th September	256	71 days
1996	13th June	165	9th September	253	88 days
1997	11th May	131	29th August	241	110 days
1998	23rd May	143	16th September	259	116 days
1999	3rd July	184	15th September	258	74 days
2000	10th June	162	29th September	273	111 days
2001	14th May	134	16th September	259	125 days
2002	9th June	160	29th September	272	112 days
2003	14th June	165	18th September	261	96 days
2004	7th May	128	30th August	243	115 days
2005	15th May	135	20th September	263	128 days
2006	2nd July	183	27th September	270	87 days
2007	2nd June	153	15th September	258	106 days
2008	3rd June	155	14th September	258	103 days
2009	12th June	163	18th October	291	128 days
2010	12th May	132	18th October	291	129 days
2011	17th May	137	20th September	263	126 days
2012	29th May	150	6th October	280	130 days
2013	23rd April	113	30th August	242	129 days
2014	17th May	137	26th September	269	132 days
2015	12th April	102	21st September	264	162 days
2016	4th July	185	19th September	263	77 days

Source: Author's Compilation, 2018