

23. EFFECTIVE ONSET RAINFALL AND INTER-SEASONAL VARIABILITY OVER SOKOTO NORTH-WESTERN NIGERIA

Ibrahim Ishiaku¹, Usman M. T², Abdulkadir A.², Emigilati M.A²

¹Department of Geography Federal University Birnin Kebbi

²Department of Geography Federal University of Technology Minna

Email: ishiaku.ibrahim@fubk.edu.ng

ABSTRACT

The study investigates effective onset rainfall and its inter-annual variability over Sokoto, North-West Nigeria. Daily rainfall data were collected from the archive of Environmental Management Programme, Federal University of Technology Minna from 1971-2015. The data were aggregate into pentad and analysed with intra-seasonal rainfall monitoring index (IRMI). The inter-annual were determine by subtracting the succeeding onset from the previous. The results revealed one worst off year (1987) of onset (49 pentad) and one good year (1997) of onset (27 pentad). The general pattern of the rainfall has been erratic. The average onset rainfall in the study area were found to be 40 pentad (20 July). The implication of this is that the onset rainfall have been poor. Owing to high variability of onset date of rainfall, continue monitoring and communication of exact onset date to the rain-fed farmer is recommended.

Keywords: Onset, Rainfall, Inter-Annual Variability, Agriculture

INTRODUCTION

Rainfall onset is defined as the period, at the beginning of the rainy season, when rainfall distribution has become adequate for crop development (Odekunle, Balogun, & Ogunkoya, 2005). Of all the climate parameters, rainfall is said to be a major input which significantly impacts on socio-economic wellbeing of the population who depend on rain-fed agriculture (Recha, et al., 2012). The rainfall over Sokoto is understood to show high temporal and spatial variability on a wide range of scales. The implication of this is that the large rural population of the area, who mainly depend on rain-fed agriculture, are greatly influenced by climate variability. It is noted generally that considerable studies exist on onset rainfall in marginal and sub-humid areas of African (Recha, et al., (2012), Hachigonta, Reason, & Tadross, (2008)) Odekunle, Balogun, & Ogunkoya, 2005, Camberlin & Okoola, (2003), Omotosho, Balogun, & Ogunjobi, (2000)). Most of this has been mainly concerned with onset and cessation date. While these efforts are noted, peasant farmers are continuously exposed to uncertainty in variability in the onset of seasonal rainfall. Investigating this is important as the onset date of the rainy season as well as other characteristics such as the number of dry spells within it are understood to be typically of more interest and applicability than seasonal rainfall totals to user groups such as farmers, water resource managers and health and tourism officials (Hachigonta, Reason, & Tadross, 2008). In this study, we investigate the onset date and inter- seasonal variability within the growing seasons of May to October each year.

MATERIALS AND METHODS

Data Used

The daily rainfall data for the period of 1971-2015 from globally referenced meteorological stations of Sokoto were acquired from the archive of Environmental Management Programme, Federal University of Technology Minna.

Data Analysis

To achieve the objective of this study, a drought monitoring and Early Warning (EW) methodology based on an Intra-seasonal Rainfall Monitoring Index (IRMI) developed by (Usman & Abdulkair, 2013) were adopted. IRMI is a tool for determining the real onset date of the summer monsoon rains. IRMI were computed on a pentad-by-pentad basis from the beginning of May using the expression here under:

$$IRMI = \frac{(Cpt)^2}{(hpt \times Nb \times 100)}$$

Where:

Cpt = cumulative pentad rainfall since May 1

hpt = the highest pentad total rainfall since May 1

Nb = number of breaks in rainfall (pentads with less than 5mm of rainfall) and

100 = a factor

Similarly the inter-annual variability were calculated by subtracting the succeeding onset date from the previous.

RESULT AND DISCUSSION

The effective onset date of Sokoto is depicted in figure 1. The pattern indicated the onset date has been erratic. The worst off onset date is noted in 1987 (49 pentad; 5 September) and the best onset date is noted in 1997 (27 pentad; 15 May). The average onset date across the years was found to be 40 pentad (20 July).

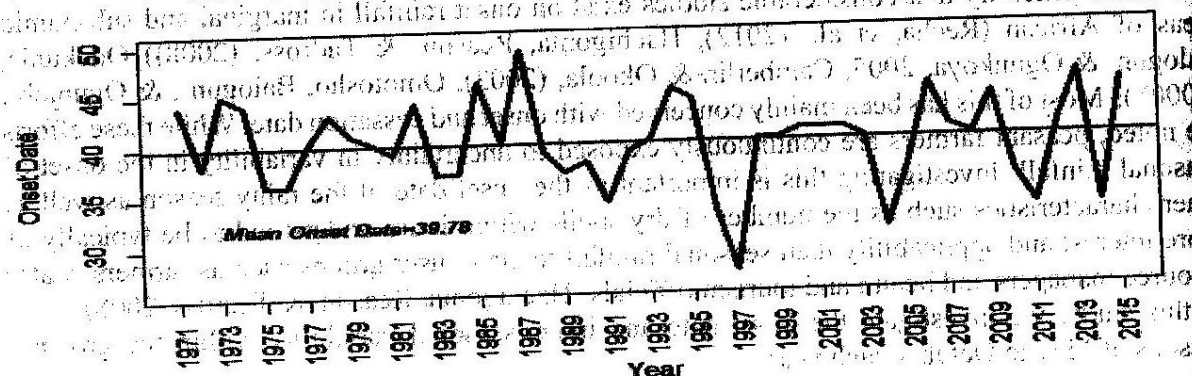


Figure 1: Onset Series of Sokoto

The general pattern of the result is that the onset rain in the study area have not been good (Usman & Abdulkadir, 2014) noted that effective onsets rainfall on or before pentad number 38 will be indicative of a good rainfall season in the semi-arid and dry sub-humid zones of Niger

and if rainfall is not effective before pentad 36 (30 June), it should be an indication of a problem of some sort as this will impact negatively on the length of the growing season and should be used to issue an advisory statement to farmers. They further aver that effective onset of rain at about pentad 41 (25 July) is an indication of deficient moisture conditions.

To understand uncertainties to which farmer are expose to, the onset variability is depicted in figure 2. The irregular pattern of the onset date is again demonstrated by the figure 2. The highest variation is found in year 1998 and 2014.

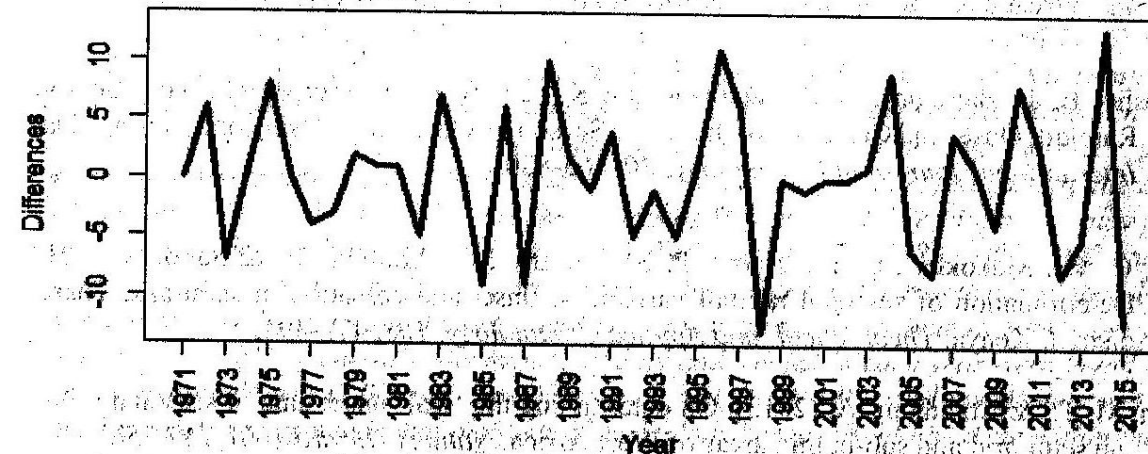


Figure 2: Seasonal Variability of Onset Rainfall

CONCLUSION

The study investigate the effective onset date of rainfall and inter-seasonal variability over Sokoto. The general pattern of the rainfall is found to be erratic. This imply that farmer are exposed to high uncertainty on the start of the rainy season. The average onset date in the study area is found to be in 40 (20th June) pentad. It is therefore concluded that the onset rainfall have been poor over the study period agreeing with (Usman & Abdulkadir, 2014) which state that if rainfall is not effective before pentad 36 (30 June), it should be an indication of a problem of some sort as this will impact negatively on the length of the growing season and should be used to issue an advisory statement to farmers. Owing to high variability of onset date of rainfall, continue monitoring and communication of exact onset date to the rain-fed farmer is recommended.

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