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# ASSESSMENT OF THE RECENT YEARS OF CATASTROPHIC AND DEVASTATING EFFECTS OF FLOODING ON FOOD CROPS AND ANIMALS IN NIGER STATE, NIGERIA

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## Abstract

*This research is aimed at assessing the recent years of catastrophic and devastating effects of flooding on food crops and animals in Niger state, Nigeria. The objectives of the study among others are to investigate the nature of food crops and animals that was affected by flood, to examine the extent of damage it has caused to each crops and animals. To investigate the socio-economic effects of the flood on the food crop and animal farmers, to suggest the ways to mitigate and curb the disaster management in future in the study area. The study covers seven (7) Local Government Area of the state. Time frame for the study was 2010 – 2019 (10 years). Multi-stage sampling techniques was employed in the selection of the samples which are Katcha LGA Agaie LGA, Bida LGA, Wushishi LGA, Lavun LGA Borgu LGA and Shiroro LGA respectively. Multivariate Regression Model of Dickey-Fuller Test were applied to test run the multiple variables. The negative correlation of 0.12387 and 0.36624 revealed that the effects of flooding were great on both Agricultural crops and animals alike, as many farm lands both arable, agro-forest and animals were swept away by floods and many .peasant farmers were returned to poverty.*

***Keywords:*** *Assessment of Recent Years, Catastrophic and Devastating effects of Flooding, Food Crops and Animals, Niger State, Nigeria*

## Introduction

According to Umar A. (2009) flooding occurs when an abnormally large quality of water body cannot be contained within the channels. Flooding occurs mainly

along river valleys. When it occurs it may lead to loss of lives of human being, animals, farm crops, environmental degradation and all sorts of properties. Flooding may be cause by natural factors and sometimes it may be caused by man's activities. Natural factors including heavy rainfall which man cannot control, and which fall on surfaces that are low lying with a high water table or hilly areas where water flows at high speed and where water flows at high speed and where water infiltration is poor. Other factor that cause flooding includes, human factors which includes erection of the building along river channels, dumping of solid refuse along river channel or when a Dam is deliberately open or Naturally collapses.

Ajayi et al (2012) ascertained that when surface or overland-flow increases after rainfall or snow-melt, the depth of the river and volume will increase. When it just occupies the entire channel, it is at bankfull stage, beyond which it may rise to the flood or overbank stage, when it overspills the banks. There is therefore a lag after heavy rainfall over the basin, depending on the nature of its surface and constituent rocks, the overall gradient and the number of tributaries before the flood were passes down the main river, its maximum being the crest. In the United States of America (U.S.A) where flooding is frequent, weather Bureau office usually provide warning and forecast services to its citizens to prepare for the coming flooding and its height periodically.

Flood hazards are the most common and destructive of all natural disasters. Floods are defined by Mwape (2009) as extremely high flows of river, whereby water inundates flood plains or terrains outside the river channel. Floods occur when water particularly from rainfalls accumulates across an impermeable surface and cannot rapidly dissipate or evaporate (Efobi and Anierobi 2013). Flood disasters cause tremendous losses on farm crops and animals and other valuables worldwide. In recent time extreme flood occurrences had affected England, Wales, Phillipines, Indonesia and other parts of the world including. Africa and Nigeria in particular where Sudano-Sahelian States of Kano, Jigawa, Bauchi and Sokoto were Unsafe for man and Animals due to heavy flooding. A greater percentage of populace were affect by flood resulting in road closures, service disruption and loss of properties worth Millions of Naira. Bury (2001) observed that properties in flood prone areas are usually of low value compared to properties affected by flood in uplands. Meaning that farm crops and animals destruction by flood may not be costumer than Houses and industries in upland. The American meteorological society AMS (2012) observed that a flash flood is a short-term, localized, and often unexpected rise in stream level above bankfull, usually because of torrential rain falling over a relatively small geographical area.

Typically, the stream level rises and falls within 6 hours of the rain event as shown in figure 1 and 2. Excessive rainfall may occur when a succession of thunderstorm cells, parts of a squall line or MCC, matures over the same area.
Alternatively, a stationary or slow moving intense thunderstorm cell may produce flooding rains. A thunderstorm is a stationary or slow moving when the system is embedded in weak steering wind aloft and / or maintained by a persistent flood of humid air up the slopes of a mountain range.
The atmospheric conditions that favour flash floods differ somewhat from those that give rise to other types of severe weather (e.g, hail and tornadoes) thunderstorms producing flash floods are more common at night and form in an atmosphere with weak vertical wind shear and abundant moisture through great depths. Flash flooding is most likely in an atmosphere that is precipitation efficient with high values of perciptitable water and relative humidity, reducing the amount of precipitation that vaporize. In addition, temperatures of the cloud base are above freezing, favouring the collision – coalescence process that leads to exceptionally heavy rainfall resulting into flooding.
Flood that claimed more than 4, 000 lives in Philippines, Indonesia, Big Thompson Canyon of Colorado on 31st July 1976, range about 80km (50mi) Big Thompson River was estimated at 25 to 30cm (10 to 12 in) with perhaps (20cm or 8 in) falling in only 2hrs. Runoff Cascaded down the steep mountain slopes and into the river that winds along the narrow Canyon floor. The river level rose abruptly and overflowed its bank as a flash flood and at ones the discharge volume rose to 200 times greater and almost 6m or (20ft) high and destroyed more than 418 houses, 213 Vehicles, Stadiums, Hotels, Park and Gardens including Farm crops and some Animals lost their lives. In fact it was catastrophic and devastating.

## Statement of Problem

Facts abounds that agriculture was the mainstay of Nigeria economy before the 1960s and 1970s oil boom – Earnings from the cash crops from Northern Nigeria such as groundnut was E293.2 million, cotton E223.5 million, Beni seed E25.2, were substantially high, white exports of cash crops from the Southern Nigerian such as cocoa was E203.2 million, palm produce E202.8 million coffee E74. 4 million and Rubber E27.6 million were equally significantly high. Jubrila and Olayemi (2006). Food crops such as rice, cowpea, maize, millets, melon, yams, cassava and sweet potatoes also played a major role in Domestic food production then as there was enough food supply for Nigerians then.

Global changes in climates across the world resulting from human activities have been seen where several fossil fuels were burnt daily as a result of industrial revolution resulting in global patterns of land use (Salami 2010). The United Nations Environmental Programme UNEP 2015 observed that the recent Global climate change phenomenon was as a result of industrial activities. Human activities are largely responsible for climate change in different parts of the work today. These activities have led to the increase in concentration of some poisonous gases called Green House Gases (G.H.Gs) in to the atmosphere. These Green House Gases include Carbon dioxide ($C0_2$), methane ($CH_1$), Nitrous Oxide ($N_20$), and Chloroflouro Carbons (CFCs). (Cunningham and Cunnigham 2006). The four gases GHGs result in the increase in global temperature resulting in global warning. It was observed that industrial countries such as Western Europe, North America and Japan are the major emitters of those dangerous gases, that have resulted in heat trapping which accelerates Global climate change.

United States Environmental Protection Agency USEPA 2014 observed that despite the advances in science and technology agriculture still depends on climate to do well. In recent times floodings as a result of climate change and extreme temperature and precipitation had prevented crops from growing well. For example in 2008 the Mississipi River flooded its bank just before harvest and caused an estimated loss of 8 billion US dollar for farmers (USEPA, 2014). In 2018 several farm crops and animals were killed in Indonesia, Pakistan and Philippines, England and Wales were also not left out.

In Africa the inflow of excess water had affected West African countries like, Ghana, Burkina Faso, Chad Basin, and almost all the Coastal States of Africa where several millions, crops, animals and other aquatic lives were destroyed by floods. In Nigeria agriculture is the major form of human economic activities which also provide food, raw materials for trade and commerce it is therefore the main basis of livelihood of the vast majority for source of food, income and employment. Flood disaster in Nigeria has been perilous to people, farm lands and crops, animals institutions and so on (Folorunsho et al 2001). In Sokoto State Area around Usumanu Danfode University and other communities were affected by catastrophic and devastating floods chasing many inhabitant away, claimed many lives and million naira of properties destroyed. In Ibadan, Oyo State in August, 1988 flood killed an estimated 142 people, swept away 18,000 houses destroyed 14,000 hectare of farmland (Fagbohun, 2010).

Sunday Tribune (2011) slao reported that hundreds died in Ibadan floods. Daily Herald (2012) revealed that Nigerian president declare floods a National

Disaster Gwaram et al (2014) observed that climate change results into floods and has a great implication on food security and environment safety, Jechomiah, Folashade (2014) opion that flood has a devastating effects on environment in Birnin Kebbi in the year 2012. Eves (2001) ascertained that flooding as having a negative impact on property values thereby resulting in inability of investor to recover their capital outlay in good time. As observed by Van Niekerk (2014). Flooding has been experienced in the Niger through Benue basin and Sokoto Basin in the flooding years of 1987, 1991 and 1994 and this affected agricultural landuse to a great extent. He also reported that ocean inflow in Victoria Island Lagos and Ibadan urban areas by River Ogunpa had Devastating effect on human lives and properties worth millions of Naira including agricultural crops, Opondo (2013), Oruonye (2011) Efobi (2013) Timothy (2011) and Weiten (2008) all ascertained that, flood in September 2010 and 2012 caused a catastrophic and devastating effects on Lokoja and Sokoto environment where more than 4896 Houses, more than 7943 million tons of stored grains, were completely destroyed. Areas around Kpata, Ganaga and Lugard House were almost submerged by water from flooding.

In Zamfara State Towns like Goronyo, Silame, Shagari, Isa, Binji and Rabah were Submerged by flood and farm crops like Rice, Wheat, Cowpea, Onion, Millets were complete destroyed by flood in those area where more than 50 smaller villages were covered, 143 persons killed and more than 4546 people displaced from their homes. Oruonye (2012) also reported that Lav Local Government Area of Taraba State that is located along the bank of River Benue were recently along the bank of River Benue were recently affected by 2012. Floods and reported it was devastating. Timothy (2011) also reported that in 2011 flood destroyed over 2,068 farmland, more than 797,000 tons of unharvested maize, 9,864 tons of Rice, 8,113 tons of Cowpea. Over 6213 persons were displaced in Jalingo, Lav, Ardo Kola and Yorro LGA. Recently, Daily Trust Monday July 1, 2019 reported that two sibling in lake Nguembi near Saint Thomas Catholic in Gboko South of Gboko local government area of Benue state, due to excess rainfall in the area. The same paper also reported that Federal Capital Territory Administration FCTA Abuja has issued a quick notice to owners of houses on waterways in Lokoguma Estate to avert the recent coming flood as predicated by National metrological centre Abuja. Daily Trust July 3rd 2019 reported that heavy rainfall and flood at Odubanjo street Lagos had forced out Home owners. Many cars, Lorries, shops, Keke Napep among others were swept away by flood. Also in Rivers, Bayelsa, Akwa Ibom, Cross Rivers were affected by recent flood as many farmlands,

animals, houses and other valuables worth millions of Nairas were swept away by floods.

From the literature search so far on the devastating and catastrophic effects on farm crops and animals across Nigeria, No systematic study have been carried out on the subject matter in Niger State, Nigeria. Hence the essence of this research to fill the particular literature gap.

## Objectives of the study

The main aim of this study is to make an investigation into the recent years of catastrophic and devastating flooding on farm food crops and animals in some selected Local Government of Niger State Nigeria. The specific objectives are as follows:

i. To investigate the Nature of flooding in the study area
ii. To examine the major causes of flooding in those areas
iii. To assess the rate of damages to farm food crops
iv. To also examine the level of damages done to various animals
v. To proffer a permanent solution to the problem of flooding in the study area.

## Hypothesis

1. There is no significant relationship between catastrophic and devastating effect of flooding and farm food crops destructions
2. There is no significant relationship between catastrophic and devastating effects of flooding and animals destructions.

## Scope of the Study

The scope of this research was limited to the assessment of the recent years of catastrophic and devastating effects of flooding on farm crops and animals in Niger State, Nigeria. This research cover (7) seven Local Government Area of Niger State. They are Agaie L.G.A, Gbako LGA, Borgu LGA, Lavun LGA, Katcha LGA, Shiroro LGA and Wushishi respectively. Time frame for the study was 2010 – 2019.

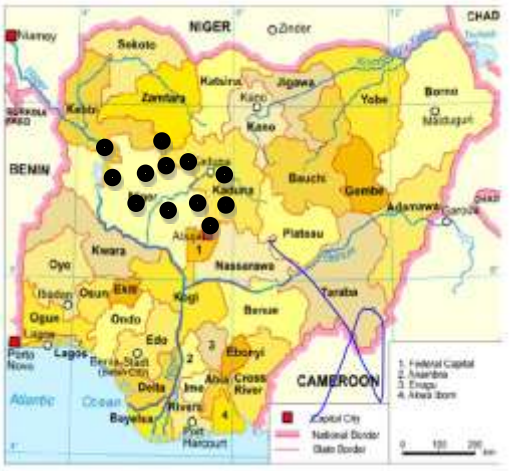


Fig. 1: Map of Nigeria showing Niger State
Source: Macmillan Map 2019


Fig. 2: Map of Niger State showing the Study Area Source: Macmillan Map 2019

Fig. 3: Maize Farm affected by Flood
Source: Field Survey, 2019

Fig. 4: Dead Goats & Sheeps affected by Flood Source: Field Survey, 2019

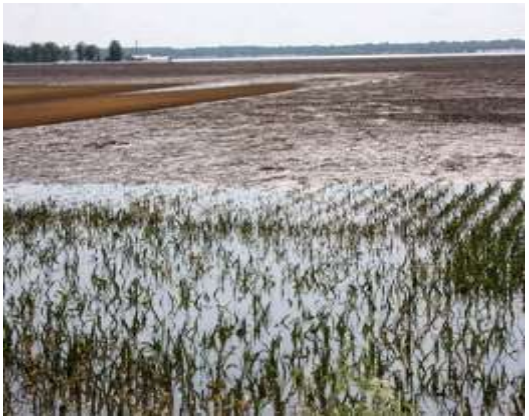

Fig. 5: An almost completely submerged Crops By flood in Katcha Local Government Area
Source: Field Survey, 2019

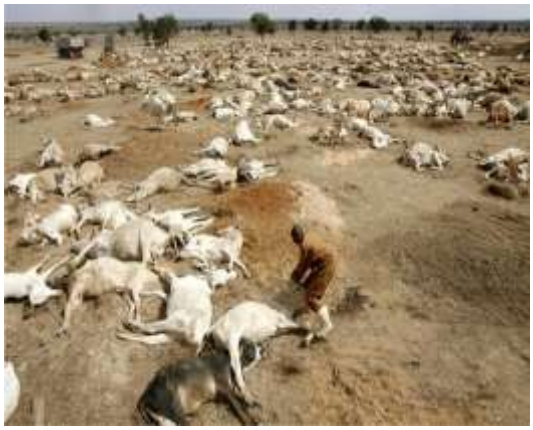

Fig. 6: Dead young Cows affected by flood nearWushishi Local Government Area
Source: Field Survey, 2019

## Materials and Methods

The bulk of the information needed for this research were obtained from Minna Air port meteorological station, National Cereals Research Institute Badeggi meteorological Station, The Federal Polytechnic Bida meterological station, Federal Girls College Bida meteorological Station, Shiroro Dam, Jeba dam and Kainji dam meteorological station were consulted. Ibrahim Badamasi, Shiroro Dam, Jebba Dama and Kaivi Dam meteorological stations were consulted. Babangida (IBBUL) Lapai meteorological station, Federal, University of Technology Minna to mention but a few. Data were obtained on mean yearly Rainfall (MM), Sunshine (h), Evaporations, Maximum Temperature, ($^0$c), Minimum Temperature ($^0$c), Relative humidity (%) and Soil temperature ($^0$c) respectively. Reconnaissance visits, pilot visits and Convenient visits were made to all the study area. While secondary sources of data includes information from News papers, Bulletins, Magazines, Textbooks, International and Local Journals, Periodic and so on.

Multi-stage sampling techniques were involved in the selection of the seven LGA under study. The selection was purposeful because they are all very close to each other and traversed by one by one River or the other. Agaie, Katcha, Borgu, Lavun share common boundaries with River Niger the largest River in Nigeria yet they are been traversed with other smaller River/Stream like Gbakogi, Ebba, River Yaba, River Kaduna, River Ndaduma, River Kaduna and River Jibwa met at Wushishi, while Lavun LGA was traversed by River Lavun. Borgu LGA is the Home of Kainji Dam Lake. Reservoir yet it was traversed by other smaller streams/River like Wagga, Sera, Kwamga, Swaza and so on. Therefore, all the seven selected Local Government Area are really liable to floods yearly.

Participatory Rural Appraisal Techniques (PRAT) were employed in the process of data generation. The peasant farmers were invited to their various fields and measurements were made in some places, while other were estimated to determine the level of damages and destructions in the preceding years of flooding and its impacts on their crops and Animals.

The patterns of Agro-climatic variables in Niger State were determined from 2010 – 2019 as shown in table 1. Crops yield data were obtained from Niger state agricultural transportation Agency and National Cereals Research Institute Badeggi and National Bureau of Statistics (NBS) while that of animal data were obtained from various farmers on estimation in Minna and Bida veterinary offices were consulted for data on Animals. Data were analysed by SPSS computer window. Mean separation of Duncan's New Multiple range test. Descriptive and Inferential Statistical Techniques were employed. Multiple Regression Analysis

of Unit root Dickey – Fuller Test (ADF) and Stationary Tests on time series, Philips Perron Test (PP) Intercept and ANOVA were used to determine effects of floods on crops and animals.

**Table 1:** Pattern of meteorological Data (2010 - 2019).

| *Year Rainfall (Mean)* | *Rainfall (mm)* | *Sunshine hour (h)* | *Evaporation* | *Maximum temperature (°C)* | *Minimum temperature (°C)* | *Relative humidity (%)* | *Soil temperature (°C)* |
|---|---|---|---|---|---|---|---|
| *2010* | 1028.5 | 5.6 | 3.6 | 36.44 | 20.30 | 77.00 | 29.6 |
| *2011* | 811.75 | 5.7 | 5.9 | 31.17 | 17.50 | 83.00 | 29.3 |
| *2012* | 1597.4 | 6.4 | 5.4 | 33.33 | 20.15 | 82.00 | 29.2 |
| *2013* | 1144.5 | 6.3 | 5.7 | 35.90 | 23.90 | 82.50 | 29.9 |
| *2014* | 1236.99 | 6.2 | 5.7 | 36.47 | 22.79 | 81.40 | 28.8 |
| *2015* | 1481.63 | 6.7 | 6.0 | 37.08 | 22.50 | 78.60 | 29.9 |
| *2016* | 1381.9 | 6.0 | 6.2 | 36.00 | 22.00 | 84.00 | 29.1 |
| *2017* | 1526.57 | 6.3 | 6.2 | 38.00 | 23.40 | 87.10 | 29.7 |
| *2018* | 1165.7 | 5.5 | 6.7 | 36.00 | 23.30 | 87.40 | 29.0 |
| *2019* | 1253.4 | 6.8 | 7.1 | 36.10 | 22.91 | 84.42 | 29.4 |

**Source: Field Survey, 2019**

**Table 2:** Estimated Cumulative Grain crops yields in million tons, area cultivated (Ha) affected by floods (2010 – 2019)

| *Crop* | *2010* | *2011* | *2012* | *2013* | *2014* | *2015* | *2016* | *2017* | *2018* | *2019* | *TOTAL* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Rice yields / tons* | 122.72 | 118.71 | 147.47 | 171.90 | 218.31 | 234.21 | 345.69 | 440.43 | 480.80 | 384.44 | 2674.68 |
| *Farmlands / ha* | 8.19 | 8.20 | 20.85 | 31.3 | 50.01 | 97.18 | 135.04 | 142.81 | 147.13 | 128.75 | 769.46 |
| *Maize yields / tons* | 270.91 | 10,40 | 16.74 | 213.40 | 250.38 | 249.89 | 264.53 | 289.78 | 396.56 | 410.70 | 2642.29 |
| *Farmlands / ha* | 57.66 | 57.66 | 64.05 | 82.9 | 110.42 | 109.20 | 114.66 | 126.22 | 133.27 | 141.16 | 997.20 |
| *Sugarcane yields / tons* | 173.27 | 142.65 | 147.47 | 160.30 | 175.33 | 202.97 | 212.70 | 231.05 | 237.96 | 446.00 | 2129.7 |
| *Farmlands / ha* | 40.32 | 33.47 | 30.67 | 47.6 | 57.12 | 67.30 | 80.50 | 84.93 | 87.32 | 96.26 | 625.49 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sweet Potatoes* | 112.20 | 113.00 | 18.74 | 111.30 | 114.66 | 125.39 | 228.44 | 119.54 | 220.50 | 226.01 | 1470.78 |
| *yields/ tons Farmlands / ha* | 11.87 | 112.00 | 5.02 | 6.5 | 8.06 | 13.43 | 15.05 | 16.64 | 17.09 | 19.26 | 124.92 |
| *Cowpea yields/* | 14.95 | 15.56 | 10.67 | 60.721 | 60.70 | 80.968 | 81.08 | 93.12 | 73.27 | 103.58 | 431.04 |
| *tons Farmlands / ha* | 7.04 | 7.74 | 1.47 | 1.5 | 1.39 | 4.34 | 5.12 | 5.42 | 5.54 | 5.91 | 45.47 |

**Source: Field Survey, 2019**

**Table 3:** Estimated Cumulative Animal Species Yields 2010-2019 affected by Floods

| ***TYPES ANIMALS*** | ***2010*** | ***2011*** | ***2012*** | ***2013*** | ***2014*** | ***2015*** | ***2016*** | ***2017*** | ***2018*** | ***2019*** | ***TOTAL*** | ***MEAN*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Crikets* | 8,410 | 7243 | 9,001 | 6,962 | 7,313 | 8,310 | 7,711 | 7,421 | 7,581 | 8,542 | 78,494 | 7849.4 |
| *Rabbits & rats* | 4,311 | 3,324 | 4,721 | 5,003 | 6,414 | 7,211 | 6,874 | 4,114 | 3,714 | 4,713 | 50,399 | 5039.9 |
| *Goats* | 510 | 476 | 391 | 421 | 293 | 310 | 294 | 311 | 321 | 313 | 3,181 | 318.1 |
| *Sheeps* | 560 | 490 | 521 | 500 | 271 | 342 | 376 | 389 | 314 | 317 | 4086 | 408.6 |
| *Fowls & tortoise* | 10,317 | 9,111 | 11,471 | 11,960 | 8,764 | 9,881 | 10,101 | 9,642 | 8,721 | 7,642 | 97,610 | 97601 |
| *Cows* | 8 | 7 | 4 | 36 | 17 | 22 | 18 | 16 | 15 | 22 | 165 | 16.5 |
| ***Annual Total*** | 24116 | 20657 | 26109 | 24882 | 23072 | 26076 | 25374 | 21893 | 13869 | 21549 | 233935 | 14,008.6 |

**Source:** Field Survey 2019 **Mean of Mean 2,434.7**

**Table 4:** Descriptive Statistics of Grain Yield Data (2010-2019).

| *Crops* | *Mean* | *Std. deviation* | *Median* | *Variance* |
|---|---|---|---|---|
| *Rice* | 216.47 | 182.88 | 176.26 | 3.344E4 |
| *Maize* | 143.33 | 48.60 | 150.135 | 2.362E3 |
| *Sugarcane* | 92.97 | 38.22 | 89.15 | 1.461E3 |
| *Sweet Potatoes* | 17.98 | 6.97 | 17.1 | 48.535 |

| | | | | |
|---|---|---|---|---|
| *Cowpea* | 2.46 | 1.874 | 2.1 | 3.512 |

**Source: Field Survey, 2019**

**Table 5:** Regression Analysis

| *Crops* | *R* | *R2* | *Adjusted R* | *F* | *Significance* |
|---|---|---|---|---|---|
| *Rice* | 0.995 | 0.989 | 0.952 | 26.53 | 0.037 |
| *Maize* | 0.998 | 0.995 | 0.979 | 59.83 | 0.017 |
| *Sugarcane* | 0.996 | 0.991 | 0.960 | 31.72 | 0.031 |
| *Sweet Potatoes* | 0.978 | 0.956 | 0.800 | 6.14 | 0.147 |
| *Cowpea* | 0.851 | 0.725 | -0.237 | 0.75 | 0.675 |

**Source: Field Survey, 2019**

**Table 6:** Prediction model for Crops

| *Parameter* | *Rice A* | *Maize B* | *Sugarcane C* | *Sweet Potatoes D* | *Cowpea E* |
|---|---|---|---|---|---|
| *(Constant)* | -9678.39 | -2515.47 | -2771.38 | -342.48 | -28.90 |
| *Rainfall* | -0.798 | -0.369 | -.663 | -.191 | -0.04 |
| *Maximum Temperature* | 51.12 | 26.967 | 23.447 | 3.479 | 0.99 |
| *Minimum Temperature* | 22.94 | -4.310 | 4.413 | .572 | 0.58 |
| *Evaporation* | 197.34 | 61.277 | 49.704 | 12.726 | 0.98 |
| *Relative Humidity* | -27.65 | -8.710 | -12.796 | -4.554 | -0.66 |
| *Sunshine Hours* | -204.33 | -47.897 | -48.828 | -7.619 | -2.51 |
| *Soil Temp.* | 319.32 | 78.419 | 93.968 | 15.867 | 1.214 |

**Source: Field Survey, 2019**

**Table 7:** Correlation (r) Analysis.

| *Crop* | *Rainfall* | *Maximum temperature* | *Minimum temperature* | *Evaporation* | *Relative humidity* | *Sunshine hours* | *Soil temperature* |
|---|---|---|---|---|---|---|---|
| *Rice* | 0.668* | 0.612 | 0.491 | 0.715* | 0.290 | 0.120 | 0.399 |
| *Maize* | 0.544 | 0.546 | 0.268 | 0.841** | 0.386 | 0.295 | 0.372 |
| *Sugarcane* | 0.539 | 0.613 | 0.443 | 0.610 | 0.266 | 0.195 | 0.509 |
| *Sweet potatoes* | 0.545 | 0.324 | 0.199 | 0.613 | -0.133 | 0.296 | 0.278 |
| *Cowpea* | -0.120 | 0.360 | 0.564 | -0.159 | -0.064 | -0.516 | -0.375 |

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

**Table 8:** Unit for Crops and Animals affected by Floods

Dickey-Fuller test (ADF(stationary) / k: 4 / N):

| | |
|---|---|
| Tau (Obse | -4.960 |
| Tau (Critic | -0.791 |
| p-value (on | 0.000 |
| alpha | 0.05 |

As the computed p-value is lower than the significance level alpha=0,05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.
The risk to reject the null hypothesis H0 while it is true is lower than 0,05%.

Phillips-Perron test (PP(no intercept) / Lag: Short / N):

| | |
|---|---|
| Tau (Obse | -10.642 |
| Tau (Critic | -1.944 |
| p-value (on | < 0,0001 |
| alpha | 0.05 |

As the computed p-value is lower than the significance level alpha=0,05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.
The risk to reject the null hypothesis H0 while it is true is lower than 0,01%.

KPSS test (Level / Lag Short / N):

| | |
|---|---|
| Eta (Obse | 0.056 |
| Eta (Critic | 0.451 |
| p-value (on | 0.872 |
| alpha | 0.05 |

As the computed p-value is greater than the significance level alpha=0,05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 87,16%.

## Results and Discussion

Cumulative results obtained from the meteorological stations across the study area indicated a high amount of mean Annual rainfall in (mm) from 2010 – 2019. It was 10288.5 in 2010 mm, 811.75mm in 2011, 1597.4 mm in 2012, 18445 in 2013, 1236. 5mm in 2014, 1481.63 in 2015, 1491.63 in 2016, 1381.9 in 2017, 1526.57 in 2018, and 1166.8 in 2019 as shown in table 1. This mean annual rainfall were high as we know that, one of the major determinants of flooding is excess rainfall. This excess rainfall resulted into flooding and removes valuable crops like rice estimated 2,674.68 million tons of yields which were cultivated on farmland of cumulative 769.46 hectares were swept away by floods in the study area. Estimated Maize yields of 2642.229 million tons cultivated on farmlands of cumulative estimation of 997.20 were also swept away by floods. Sweet potatoes value was 1470.78 Million tons and farmland hectare were 124.94 that was swept away by flood. Ajayo et al (2012) and Nwape (2009) ascertained that when surface water in the river channel overflow its bank or overspills it used to be

very catastrophic and devastating. Sugarcane value was 2,129.7 million tons and farmland/ha was 625.49. While that of Cowpea stood at 431.04 million tons and involved 45.47 hectares of farmlands with crops swept away as indicated in Table 2. The catastrophic and devastating effects of floods were shown in Table 3 where estimated 78,494 cricket were consumed by floods, Rabbits and Rats were estimated to be 50,399.

Goats and Sheeps were estimated to be 3,181 and 4,086. Fowls and Tortoise 97,610, Cows 165 respectively. The annual mean for each animal column was 7,849.4, 5039.9, 318.1, 408.6, 976.1, 16.5 making a total mean 14,608.6 and Grand total 233,939 respectively. The mean of mean of the whole animals were 2,434.7. The Regression analysis of crops and farmland was $R^2$ adjusted for rice 0.952, Maize 0.979, Sweet potatoes 0.956, Sugarcane 0.991 and cowpea 0.725 respectively and significant at 0.05 alpha, 0.013, 0.037, 0.147 and 0.675.

The correlation (r) analysis of Rainfall and the crops were 0.544, 0.539, 0.668, 0.545 and 0.120 respectively. The Dickey Fuller Test and Phillip – Perron test for animals affected by flood was interpreted as tau (obse – 2779, tau (Critic-0.791, P-value (on 0.196 at alpha 0.05. the Phillips Perron test (PP intercept) I Lag short / N (r=1) was tau (obse – 1.690, tau (critic – 2891, P value (on – 0.433 at alpha 0.05, KPSS test Trend / Lag Short / N(r=1): read thus Eta (obse 0.164, Eta (critic 0.145 P-value (on 0.0306624 at 95% degree of confidence on the catastrophic devastating effects of floods on those animals in the study area. No wonder in studies of Eves (2001), Van Niekerk (2014), Opondo (2013) and the rest agreed that floods in 2010, 2012 and 2018 had caused a great havoc on property values ranging from Houses, shops, park and gardens, Agricultural fields, Human beings, Animals and the host of valuable crops across Nigeria and beyond.

## Conclusion and Recommendations

The results of the analysis as shown in the discussion indicated that the impact of flooding of the recent years of between 2010-2019 was enormous on the farm crops like Rice, Maize, Sugarcane, sweet potatoes and cowpea while that of animals were great on crickets, Goats, Sheeps, fowls, cows and the host of other animals in the study area. Many farm crops were lost to floods and thousands of animals alike, climate change which is now a reality is the major single factor resulting into global warming, ozone deplation, coastal location of houses / residence and population explosion all resulting into climatic changes leading to ice melting and resulting into flooding. It is due to this factor that climate change is the biggest environmental issue facing the world today which Africa and Nigeria are not exclusive. The effects of flooding resulting from climate change

have been observed as bringing a negative effects on the agricultural crops yields, and Animals alike. However, the most conscious and functional efforts must be taken towards mitigating these negative impact on crops and Animals alike to defend Nigerians from food insecurity.

The study recommends that River Niger and Benue Channels be dreged, stop dumped of refuse in water ways, adopt modern farming systems, centrifugal water pumps and pipes be laid from south and middle belt to pump excess water from south to far North, more water reservoirs be built in the North to store this water. Stop or reduce emissions from manufacturing industries for protecting the Ozone layer from depletion, proper control of water erosion in the coastal Area of Nigeria. Our existing Dams like the Rainji Dam, Jebba Dam and Shiroro Dam be properly managed in water control system.

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