FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 4 No. 4, December, 2020, pp 56 – 66
DOI: https://doi.org/10.33003/fjs-2020-0404-436

ANALYSIS OF THE RELATIONSHIP BETWEEN CLIMATE CHANGE AND PATTERNS OF FARMERS'/PASTORALISTS' CONFLICTS IN ZAMFARA STATE, NIGERIA

[1]JEJE, O. G., [2]SAWA, B.A and [2]ARIGBEDE, Y.A

[1]Department of Geography and Regional Planning, Federal University, Dutsin-Ma, Katsina State, Nigeria
[2]Department of Geography and Evironmental Management Ahmadu Bello University, Zaria, Kaduna State
Corresponding author: ojeje@fudutsinma.edu.ng

ABSTRACT

Struggle over land and scarce resources have resulted in perennial and growing violent conflicts amongst arable crop farmers and cattle herdsmen in various parts of Nigeria. This study analyses the relationship between climate change and patterns of herders-crop farmers' conflict in Zamfara state, Nigeria. Data for this study were acquired via semi structured questionnaire and Key Informant Interview. Purposeful sampling method was used to select six communities, while 260 farmers and 67 pastoralists were chosen as sample size for the survey based on Krejcie and Morgan's formula. Descriptive statistics such as percentages, arithmetic mean and Likert rating scale were adopted to analyze the data for the study. Results from the findings indicated that farmers and herders in Zamfara state were within active years of economic and productive age (24 to 44 years). Nearly,75% of both farmers and pastoralists in the study communities professed there is high variability in rainfall pattern and increase in temperature. Three-quarter of the respondents confirmed that the nature of the conflicts was assault involving the use of arms; whereas two-fifth of the respondents affirmed that the conflict occurs during harvest and the planting seasons. The study concluded that climate change is the bane of incessant resource use conflicts in the study area. Thus a clearly formulated government policies and implementation framework that would boost climate change information forecasting and dissemination, adaptive capacity and ranch management will salvage the conflictual relationship subsisting between farmers and herders in the study area.

Keywords: Analysis, Climate change, Conflict, Farmers, Herders, Pattern

INTRODUCTION

Farmers and herdsmen conflict has been ongoing over the years across West and Central Africa (Mikailu, 2016) cited in (Luke *et al*, 2019). The Global Terrorism Index (GTI) ranked Nigeria as the third most terrorized country in the world. This is owed to the incessant Boko Haram terrorism and the persistent nomadic herders attacks (GTI, 2018). In 2016, GTI reported that more than 1,200 people lost their lives to herder's attacks. This made the Fulani herdsmen the world's fourth deadliest group (GTI, 2016; Mikailu, 2016) cited in (Luke *et al*., 2019). Myriads of studies have identified resource use such as land and water use, crop damage and obstruction of traditional migration routes as the key causes of disputes between the farmers and the herding pastoralists. These issues are directly and indirectly connected to climate change, which is defined by United Nations Framework Convention on Climate Change (UNFCCC) (2011) as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. According to Hassan (2017), Pastoralists are often defined as the "people who derive more than 50 per cent of their incomes from livestock and livestock products". It can also be seen as a "social organization based on livestock raising as the primary economic activity" (Merriam-Webster, 2018). Pastoralists can be divided into different classes based on the pattern of their livelihood. Pastoral mobility that is high and characterized by irregular patterns is called nomadic, movement characterized by more regular mobility to fixed locations is termed Transhumance, while pastoralists who settled in a place to farm and move within the community are called sedentary (Barfield, 2011). Farmers on the other hand are often conceptualized as "persons who cultivate land or crops or raises animals (such as livestock or fish)" and sometimes even "a person who pays a fixed sum for some privilege or source of income" (Merriam-Webster, 2018). Hence, the livelihood conditions of both farmers and pastoralists can be perceived as deteriorating as the climate variability are proven to affecting both crops and livestock (Mobjörk, *et al*., 2016 ; Adigun, 2019 ; Madu and Nwankwo, 2020). Hence, climate change vulnerability has been seen as pivotal to these conflicts. Although, studies have shown that Africa's contribution to global climate change is small, yet she is most vulnerable to its impacts. (International Panel on Climate Change (IPCC), 2007).

The research problem identified in this study concerns the issue of climate change as a threat multiplier regarding the causes of the tensions between the farming and pastoral communities. Previously, most studies reported pastoral issues as ethnic or religious clashes in Nigeria. This perception of the causes of farmers/pastoralists crises generates more

misinterpretation of the conflict and hampers the implementation of effective solutions. However, studies in recent past (Mobjörk *et al*, 2016) has shown that generally pastoral conflicts emanates from tussles over land or water resources, hence any research focusing on farmers/pastoralists' crises needs to take cognizance of this phenomenon. It is important to note that struggles over land and water resources are closely linked to the climate; therefore, any variations in this area can directly exacerbate the pressure on the common resources. This research, therefore, explores the new patterns of violent conflicts based on the following research questions:

i. What are the demographic and socio-economic characteristics of farmers and pastoralists in Zamfara State?
ii. What were the patterns of climatic elements in Zamfara state between 1980 and 2018?
iii. What is the nature and frequency of conflicts between 2009 and 2018 in the study area?

The choice of Zamfara state is premised upon the high population of farmers and pastoralists in the state, which constitute over 80percent of the population. This is coupled with the divergent climatic conditions and relative large number of grazing reserves (Zamfara grazing reserve) (Abubakar, 2010). The relationship between the probabilities of farmers/pastoralists involvement in conflict and the perceived causes of conflict in Zamfara state was evaluated with the aid of regression analysis.

.

MATERIALS AND METHODS

Study Area

Zamfara State is located between 10^0 7'50"N and 13^0 05' 38"North of the equator, and Longitude 6^0 52' 30"E and 9^0 20'40"East of the Greenwich meridian and a total area of 62,610 km^2 (Patrick, 2012). Sokoto State, Kebbi and Niger States bound Zamfara to the North to the southwest, Kaduna State to the Southeast and Katsina to the East (See Figure 1).

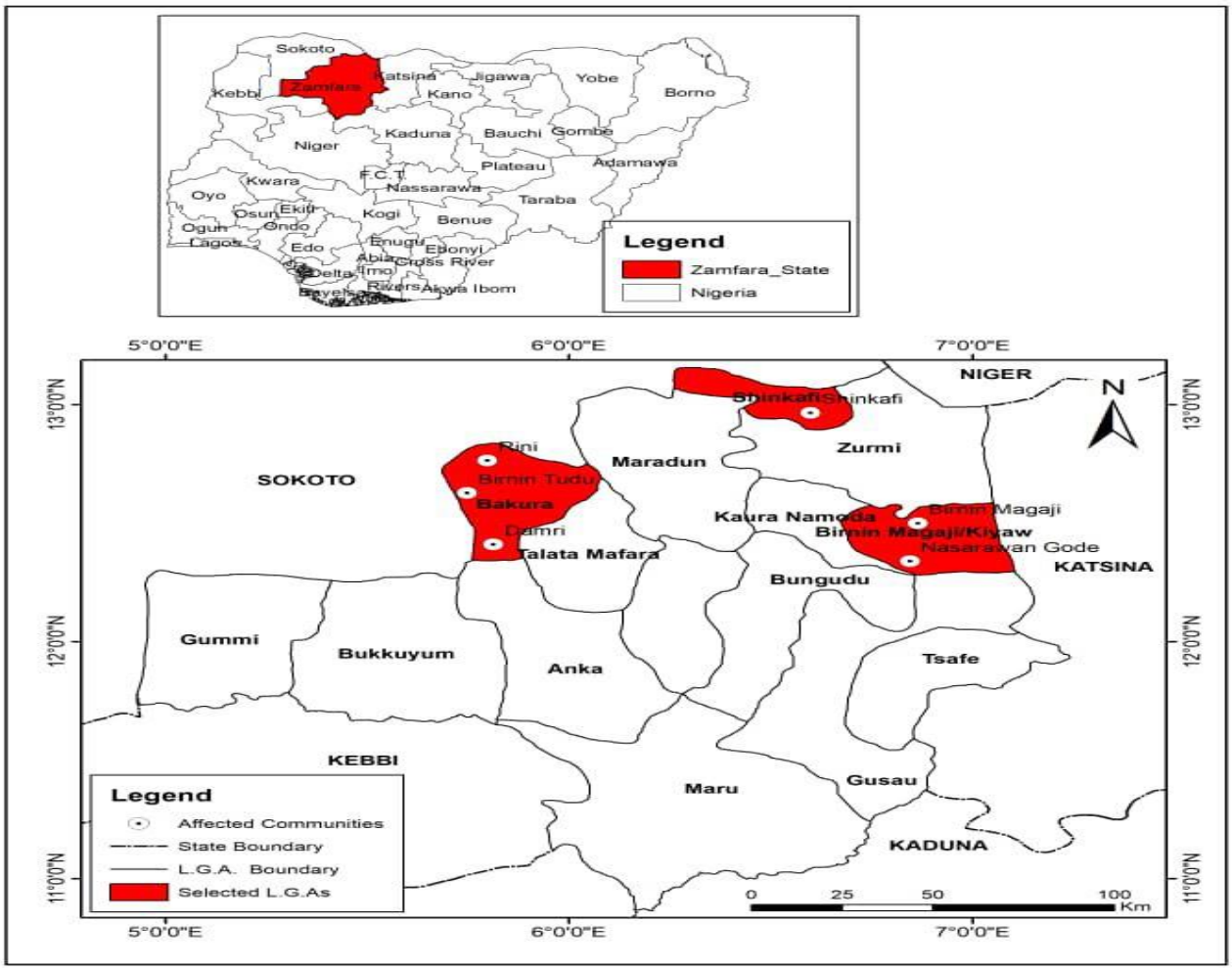


Figure 1: The study area
Source: GIS Unit, Dept. of Geography and Environmental Management, ABU, Zaria (2019)

Zamfara consists of fourteen (14) Local Government Areas. Zamfara State's climate is close to that of semi-arid continental zone. It is driven by two principal wind currents; one from the South-West which carries a high degree of moisture and the

other from the north, bringing cool dry, dusty and hazy (Max Lock group, 1978). During the dry season, pastoralists prefer to stay at the Middle Belt (Benue) and other Southern parts of the country since the climatic condition of these places are conducive for their cattle and migrate back up North during rainy season when the grasses are available for their cattle. This movement often triggers conflicts whenever there is an intrusion of the cattle into the farmers' territory (Patrick, 2012).

Research Design, Types and Sources of data

The study used a cross sectional survey design. The design employed a sample population of selected pastoralists and farmers, and from these, data was collected to answer the research questions. Data collection tools included secondary data review, Focused Group Discussions (FGDs), questionnaire, key informant interviews and personal observation.

The types of data needed and sources of acquiring them were both primary and secondary. These include information on demographic and socio-economic characteristics of farmers and pastoralists in the study area acquired through structured questionnaire. Monthly rainfall and temperature records for Zamfara state from 1980 to 2018 obtained from NIMET office at Gusau, farmers/pastoralists perception of climate change and conflict sourced via interview session and questionnaire, records of conflicts among herders and farmers between 1989 and 2018 gathered from Zamfara state Bureau of Statistics and state divisional police offices. Information on the patterns of conflict between farmers and pastoralist were collected through group discussion and questionnaire.

Sampling size and Sampling Techniques

The sample frame for this study is the population of the most predisposed LGAs in Zamfara State to herder/farmers' crises. Purposive sampling technique was adopted in selecting six communities from three LGAs with greater incidences of herders/ farmers' conflict in the study area. These LGAs are: Shinkafi, Birnin Magaji and Bakura, the communities include Shinkafi, Birnin Magaji, Nasarawangode, Damri, Rini and Birnin Tudu. Krejice and Morgan (1970) Required Sample Table was used to determine the sample size for the study. The population of Zamfara State as at 2018 is 7,660, which according to Krejice and Morgan (1970) falls within the range of 7,000 to 7,999; it has a sample size of 364. The number of respondents for each community was arrived at proportional to the population as estimated. Owing to the nature of pastoralists' movements, snowball-sampling technique was used to select respondents in each of the affected communities. Three hundred and sixty four copies of questionnaire were administered in the study area. Questionnaire for both farmers and pastoralists was proportionally administered according to the sample size in each community as estimated (Table 1)

Table 1: Copies of Questionnaire administered to farmers and pastoralists in the Study Area

S/N	Communities	Number of Farmers	Number of Pastoralists	Copies of Questionnaire
1	Shinkafi	92	27	119
2.	Birnin Magaji	57	15	72
3.	Nasarawangode	50	13	63
4.	Damri	23	9	32
5.	Rini	32	10	42
6.	Birnin Tudu	26	10	36
	TOTAL	**280**	**84**	**364**

Source: Fieldwork, 2019

Data Analysis

Table 2 indicated the statistical tool used for analyzing each objective of the study:

Table 2: Statistical Techniques for analyzing farmers /pastoralists' climate change induced conflicts

Objectives	Statistical tools	Purpose of use	Software used
Assessment of farmers/ pastoralists' socio-economic characteristics	Frequencies and Percentages	For analyzing categorical variables, e.g., socio-demographic profile of respondents	SPSS 20
Analysis of the pattern of climate elements	Line chart	To observe the trend in climate variables	Excel 2016
Investigation of the nature and frequency of conflict between farmers and herders	Likert Scale	To represent the pattern of farmers/Pastoralists' conflicts.	Excel 2016

Regression Estimates of the factors responsible for farmers/ pastoralists conflict	Regression analysis	To quantify factors responsible for farmers/pastoralists conflicts	SPSS 20

Source: Fieldwork 2019. Note:[Five percent (0.5) and one percent (0.01) levels of probability] [were used throughout the study as the basis for statistical significance.]

Results and Discussion

364 copies of questionnaires were administered to both pastoralists and farmers in the study area. 327 copies were returned representing 88% response rate, which is excellent for analysis.

Demographic and Socio- Economic Characteristics of Respondents

Respondents were grouped based on sex, age, occupation and income status (Table 3). Results show that in Zamfara State, a greater proportion 90and and 76and of the farmers and pastoralists correspondingly are males, a greater proportion (27.3and) of the farmers were aged between 35 and 44 years, while the majority (28.4and) of the pastoralists fell within the age bracket of 15 to 24 years. The forgoing analyses show that farming and pastoral activities are male subjugated in the study area and the respondents are within active years of economic and productive age. Okunlola (2016) who investigated pastoral activities in Oyo state, Nigeria, validated the aforementioned results indicating that a greater (62 and 100) percentage of crop farmers and nomads respectively were also males. This underscores the fact that the nature of farming and pastoral work requires much physical exertion of energy, which could be beyond the scope of most females.

Table 3: Distribution of Famers and Pastoralists based on Sex and Age structure, Occupation and Income status. (n=260/67(Farmers/Pastoralists)

Categories	Farmers		Pastoralists	
	No	**%**	**No**	**%**
Sex				
Male	235	90	51	76
Female	25	10	16	24
Age				
< 15	25	9.6	11	16.4
15-24	41	15.8	19	28.4
25-34	42	16.2	16	23.9
35-44	71	27.3	13	19.4
45-54	30	11.5	4	6.0
55-64	27	10.4	3	4.5
Above 64	24	9.2	1	1.5
Occupation				
Arable farming	91	35.0	3	4.5
Animal farming	63	24.2	48	71.6
Trading	35	13.5	5	7.5
Civil servants	51	19.6	2	3.0
Artisan	20	7.7	9	13.4
Income Level				
<50,000	47	18.1	5	7.5
51,000- 100,000	83	31.9	6	9.0
101,000-150,000	66	25.4	37	55.2
151,000-200,000	23	8.8	17	25.4
Above 200,000	41	15.8	2	3.0

Source: Fieldwork, 2019.

With respect to income and occupation, Table 1 depicts that in Zamfara state, 35and of the farmers practiced arable cropping, whereas 72and of the pastoralists rear animals. Above three-tenth of the farmers earned between ₦ 51000 and ₦ 100,000, while more than half (55.2and) of the pastoralists earned between ₦101,000 and 150,000. The preceding investigations are indicative of the fact that herding is the predominant occupation in Zamfara state and that both farmers and pastoralists in the study areas have low economic base. The prevalence of herding activities in Zamfara state is due to the presence of vast semi-arid, land well suited for grazing livestock the potential source of livelihood in this region (Abubakar, 2010). The average incomes of respondents interviewed fell below the international poverty line of two USD per day. Tsegaye and Moe, (2013) who confirmed that all pastoralists household surveyed in Afar, Ethiopia fell below the international 2 USD a day poverty line validated the preceeding analysis.

Table 4: Distribution of Famers and Pastoralists based on Education, Household size, Years of experience and size of farm /livestock. (n=260/67(Farmers/Pastoralists)

Categories	Farmers		Pastoralists	
	No	**%**	**No**	**And**
Level of Education				
Tertiary	31	11.9	5	7.5
Secondary	42	16.2	6	9.0
Primary	68	26.2	37	55.2
Islamic	73	28.1	17	25.4
Informal	46	17.7	2	3.0
Household size				
<5	27	10.4	3	4.5
6-14	48	18.5	27	40.3
15-24	87	33.5	17	25.4
25-34	51	19.6	14	20.9
Above 34	47	18.1	6	9.0
Duration of farming/herding (yrs.)				
<10	27	10.4	3	4.5
11-20	48	18.5	27	40.3
21-30	87	33.5	17	25.4
31-40	51	19.6	14	20.9
Size of farm (Hect.)/livestock				
< 5/20	27	10.4	7	10.4
6-10/20-30	48	18.5	15	22.4
11-21/31-41	87	33.5	33	49.3
22-32/42-52	51	19.6	9	13.4
Above 32/52	47	18.1	3	4.5

Source: Fieldwork, 2019.

Concerning the level of education and household size in the study area, information in Table 4 revealed that majority (28and) of the farmers had Islamic education, whereas, 55and of the pastoralists attained primary education. 33.6and of the farmers had household size of 15-24 persons, whereas, 40and of the pastoralists had a family size of 6-14 persons. The preceding analysis revealed that the pastoralists and farmers in Zamfara state have low level of education and have large housed hold sizes. Large household implies more people to cater for and more hands to work on the farm and help with cattle herding. Furthermore, majority of the pastoralists had non-formal education while most of the farmers had one form of formal education. This implies that most of the pastoralists have lower level of literacy compared to the farmers. A study by Olaleye *et al.* (2010) corroborated the above analysis as they reported that the majority of nomads do not have formal education when compared to farmers. In addition, Adelakun *et al.* (2015) affirmed that large household implies more labour force to assist in both farming and herding activities.

Farmers' and Pastoralists' Perception of the Pattern of Climatic Elements

Farmers and Pastoralists perceptions on different events of climate change particulaly variabilities in rainfall and temperature patterns in the study areas are presented in Table 5 .From the results in Table 5, farmers and pastoralists of the study villages are clearly aware of climatic variability. They perceived that overall changes have occurred in rainfall and temperatures patterns. Approximately, three-quarter of both farmers and pastoralists of the study villages perceived there is high variability in rainfall pattern and increase in temperature. The preceding claim is validated by Rosenzweig *etal.* (2002), Mertz *et al* (2009) and Fosu-Mensah *etal.*(2010) who also reported that 91and of interviewees perceived a long term variability in temperature and rainfal as well as increase in temparature.

Table 5: Pattern of Climatic Elements Perceived by Farmers and Pastoralists in Zamfara State (n=280/84)

Variables	**Farmers**				**Pastoralists**			
	Yes		**No**		**Yes**		**No**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Are you aware of changes in climatic conditions?	155	55	125	45	71	85	13	15
Is rainfall in the area adequate?	137	49	143	51	67	80	17	20
Is there any difference in rainfall in the last 30 years?	110	39	170	61	61	72	23	28
Do you experience a decrease in rainfall?	133	48	147	52	57	68	27	32
Is there any difference in temperature in the last 30 years?	125	45	155	55	75	89	9	11

Do you experience an increase in temperature?	131	47	149	53	66	79	18	21
Do you have problem of floods?	231	83	49	17	45	54	39	46
Do you experience soil erosion?	200	71	80	29	43	32	57	68

Source: Fieldwork, 2019.

Comparison of Farmers' and Pastoralists' Perception of Climate Variability with Meteorological Records.

To authenticate farmers' and pastoralists' perceptions regarding the precipitation trend and temperature varaiability in the study area, existing historical annual mean rainfall and temperature data from 1980 to 2018 were obtained from NMetS Gusau. The results indicated high variability rather than a clear declining trend in precipitation (Figure 2). The total annual rainfall for Gusau meteorological stations for the period 1980 to 2018 has an increasing trend (y = 22.895x + 644.25)

According to Federal Ministry of Environment (FME), (2003.), this situation is contrary to previously experienced and documented rainfall pattern in Nigeria prior to the 1970s, in which there is double rainfall maxima in June and September with a break in August, which supports Odjugo (2005) and Odjugo (2007) which indicated that the short dry period during the raining season is gradually moving from August to July. These are key disorders in the climatic patterns of Nigeria showing indications of a changing climate. The shifts in rainfall pattern are becoming a worrisome development, as among other things farmers find it difficult to time their farming operations.

Figure 3 discloses the trend analysis of record of the level of temperature between 1980 and 2018 in the study area (Zamfara state) that shows an increasing trend. It shows average minimum (20.2ºC) and average maximum (34.5ºC) temperature recorded in 2005 and 2008 respectively. The forgoing investigation is authenticated by Odjugo (2010) showing that the temperature trend in Nigerian since 1901 indicates increasing pattern. The increase was slow up to the late 1960s and there was a sharp rise in air temperatures from the early 1970s, which continued until date. Thus, the slight difference between farmers' perceptions and statistical results is because of the fact that farmers' responses are based exclusively on ability to remember. The low literacy rate among farmers and pastoralists inhibits their competency to keep official records. Undoubtedly, remembering priciely long-term trends of climatic elements could be challenging.

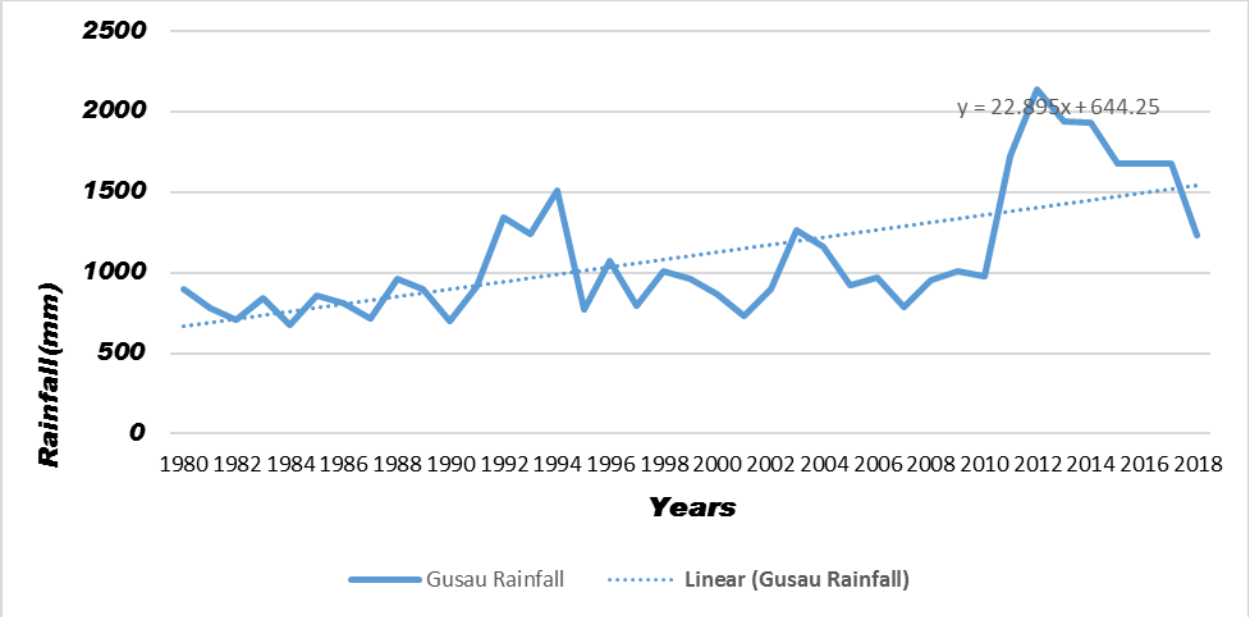


Figure 2: Annual mean Rainfall for Gusau (1980-2018)
Source: NMetS Gusau

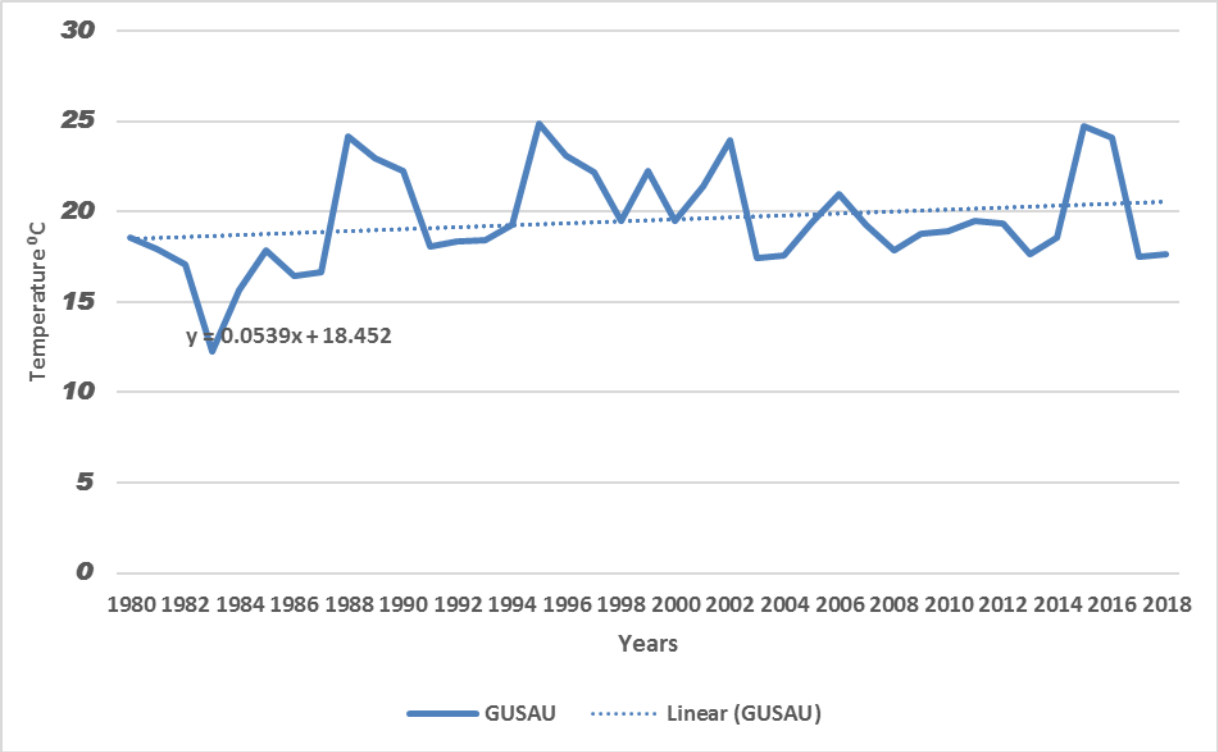


Figure 3: Annual mean Temperature for Gusau (1980-2018)
Source: NMetS Gusau

Nature of the farmers/pastoralists' conflict

Data in Table 6 shows the nature of the conflicts, which occurred between the nomadic pastoralists and the farmers in the study area. Almost, three-quarter of the respondents reported that the nature of the conflicts is assault involving the use of arms. This presupposes that the conflict is usually violent since arms are used. This result is explained by the fact that access to local arms such as farm implements and sticks used for controlling livestock by these groups of rural producers predisposes them to the use of arms during conflicts. These investigations validate the allusion of the majority of the key informants interviewed who maintained that the conflict involves assault with the use of arms. For instance, one of the officials of the Miyyeti-Allah remarked that, "They make use of arms such as riffles, machetes, cutlasses, bows and arrows etc." These results are in line with those of previous studies (Abubakar, 2012, Idoma *et al.* 2018) which found out that farmers/herders' conflicts in Nigeria have been brutal involving the use of sophisticated weapons.

Table 6: Nature of Farmers/Pastoralists' Conflicts in Zamfara state (n=260/67: Farmers/Pastoralists)

Nature of Conflicts	Farmers		Pastoralists	
	No.	**%**	**No.**	**%**
Verbal Attack	63	24	10	15
Attack involving the use arms	185	71	49	73
Riot	5	2	6	9
Protest	7	3	2	3

Source: Fieldwork, 2019.

Persons Involved in Farmers/Pastoralists' Conflicts in Zamfara States

Information in Table 7 examines the people involved in the conflict. As can be seen from Table 7, a significant proportion (more than half) of those involved in the conflict are youths, who are nomads and farmers. A possible explanation for this is that youths are more impulsive and can hardly control their feelings due to their nature or exuberance**.** An interviewee corroborated the preceding investigations that:

'*Youths are the ones that trigger and fuel conflicts under the guise of protecting their farms, often times attack nomads to steal cattle. They do this believing a magical concoction as a form of protection from injuries and death'*. These results support

previous research into this brain area which links youths and conflicts. For instance, Youth World Report (2003) maintained that youths are often a targeted group during conflicts owing to the dearth of opportunities in most of their communities, which often leads them to gravitate towards violent conflicts and acts of terrorism. Similarly, Adedokun and Oluwagbohun (2014) in their study of challenges facing youth in Nigerian society, revealed that myriads of challenges fronting the Nigerian youths predispose them to various criminal activities, drug abuse, prostitution and violence of one kind or the other.

Table 7: Persons involved in farmers/Pastoralists' conflicts in Zamfara State (n=260/67(Farmers/Pastoralists)

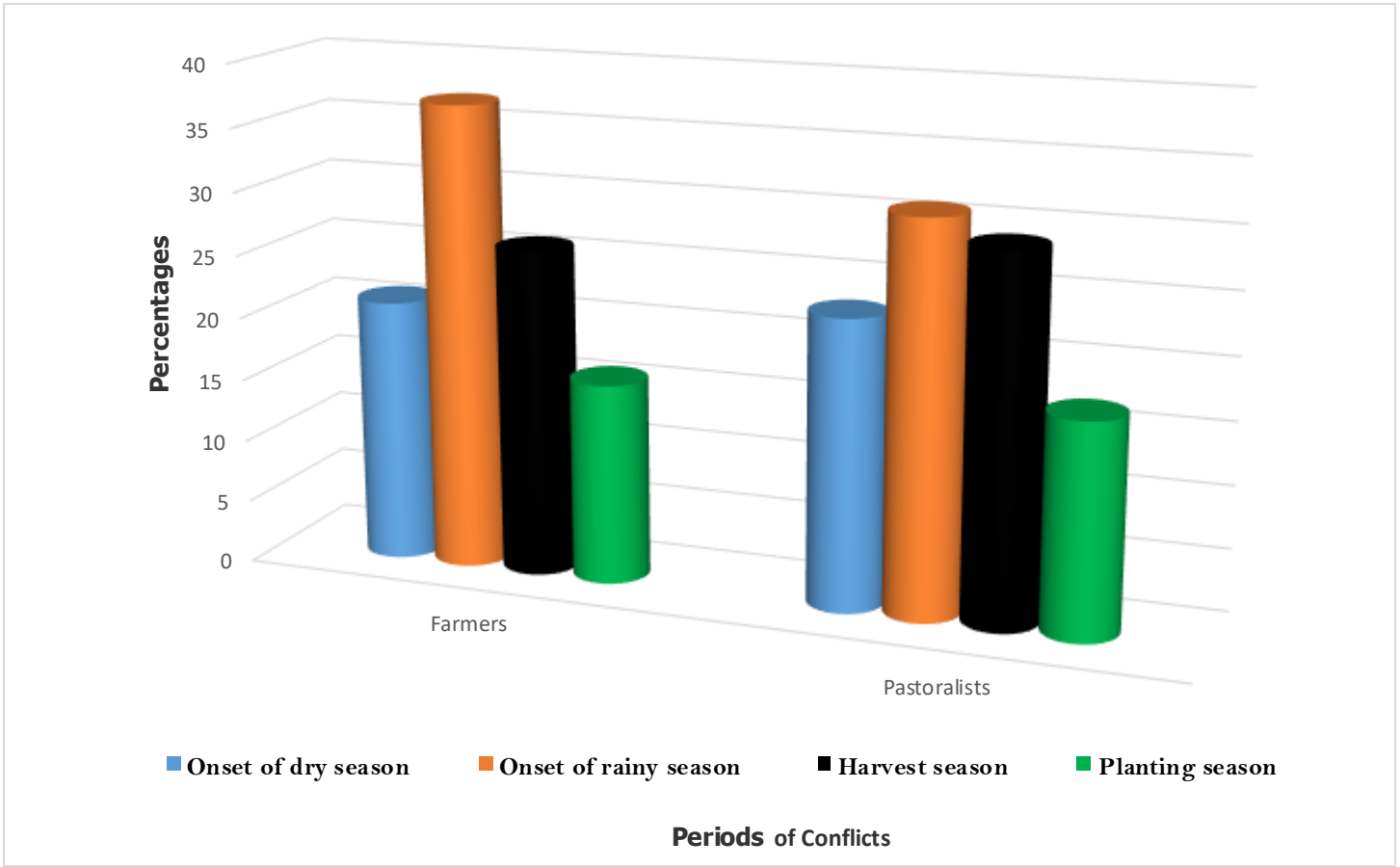
Persons involved in Conflicts	**Farmers**		**Pastoralists**	
	No.	**%**	**No.**	**%**
Pastoralists versus Farmers (Youths)	209	80	37	55
Pastoralists versus Farmers (Elders)	11	5	11	17
Pastoralists versus Farmers (Women)	8	3	2	3
Pastoralists versus Farmers (Mercenaries)	32	12	17	25

Source: Fieldwork, 2019.

Period of Farmers/Pastoralists' Conflicts in Zamfara State

Based on the period of occurrence of the conflict, it can be seen from the data in Figure 4 that the over whelming majority (two-fifth) of the respondents affirmed that the conflict occurs during harvest and the planting seasons. It was found that the harvesting season coincides with the period of the movement of the nomads from the south to the north. Findings from interviews also validated the investigation depicted in figure 4. For instance, one informant reported that; *'the conflicts mostly arise at harvest period before the farmers take their agricultural produce back home. During this time, the Fulanis trespass on farmers land and allow their cattle to eat up the crops on the farm and this leads to conflict'.*

Figure 4: Period of Farmers/ Pastoralists' Conflicts in Zamfara State



3.7 Frequency of Farmers/ Pastoralists' Conflicts in Zamfara State

Data in Figure 5 illustrates the rate of recurrence of farmers /herders' conflict in the study area.

As can be seen from the Figure 5, a greater percentage of the respondents (35%) agreed that the conflict occurs six-monthly. This implies that the rate of occurrence of conflicts is relatively lower because conflicts occur during the harvest period as the nomads move in groups and in batches to the South and during planting period when they are moving back to the North.

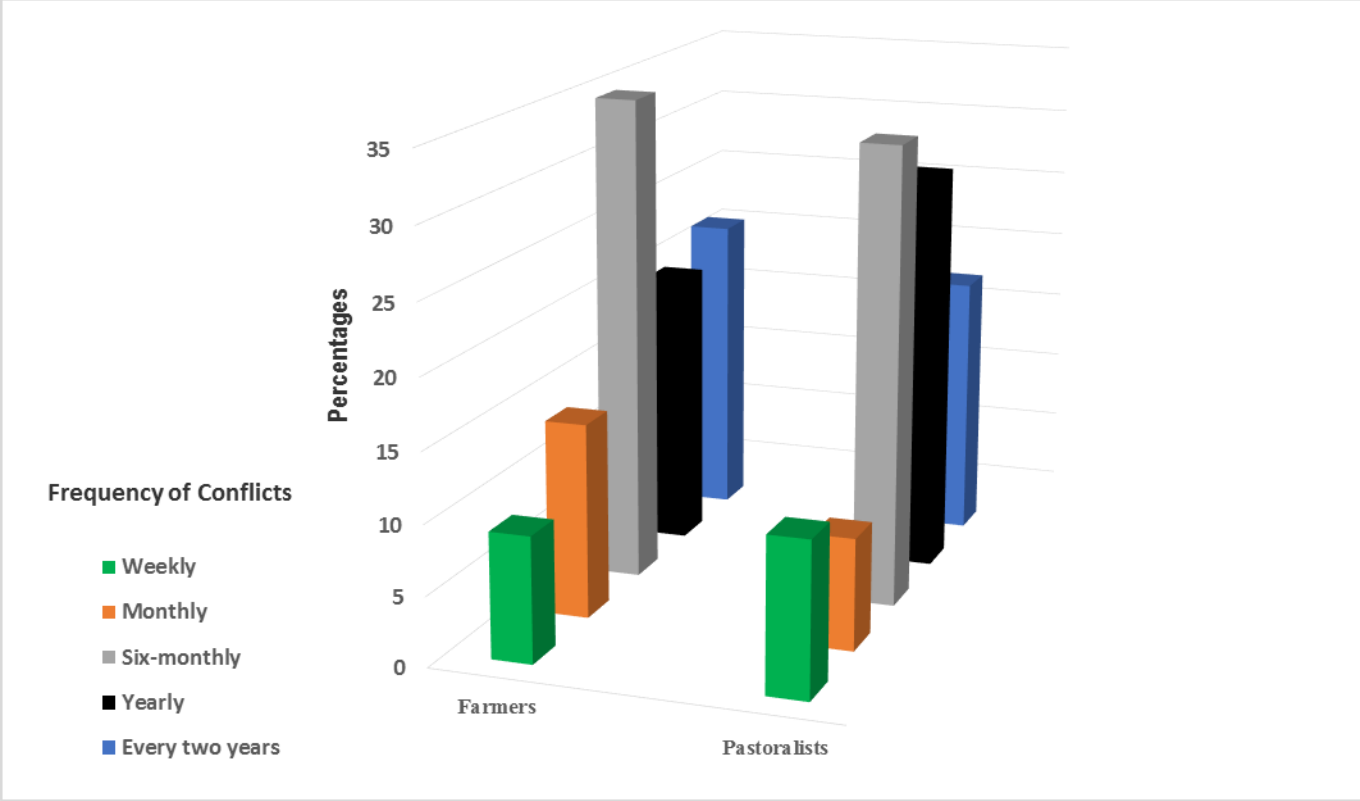


Figure 5: Frequency of Farmers/ Pastoralists' Conflicts in Zamfara State

Duration of Farmers/ Pastoralists' Conflicts in Zamfara State

Information on the interval or length of the conflict is shown in Table 8. The data reveal that a greater proportion (37% and 46%) of the farmers and pastoralists affirmed that the conflicts usually persisted for an interval of five days. This implies that the conflicts is short lasting. This may be because of the efforts of the law enforcement agents in managing the conflict. It can also be because of the activities of the farmers and pastoralists in relation to their farming and grazing operation**.**

Table 8: Duration farmers/pastoralists'conflicts in Benue and Zamfara States (n=260/67(Farmers/Pastoralists)

Duration of Conflicts	**Farmers**		**Pastoralists**	
	No.	**%**	**No.**	**%**
One to two days	41	16	17	25
One to five days	96	37	31	46

One week	64	25	12	18
One month and above	59	22	7	11

Source: Fieldwork, 2019.

CONCLUSION

The study has revealed that farmers and pastoralists are undergoing changes in climate. This has led to the competition-driven conflicts between farmers and pastoralists. Without doubt, irregular rainfall pattern influence the availability of water and pasture which is crucial to crop and animal productivity. This implies that livestock move longer distance in search of water and pasture e.g. from the north to the more southerly areas of the country during the dry seasons. While farmers expand farmlands as adaptation strategy and encroach into grazing routes. Therefore, decrease in rainfall and its inter-annual variability in the study area requires adaptation by these rural producers and environmentally induced conflicts specifically by the cattle rustlers as well as farmers owing to space contestation.

The inconsistency of pastoralists' perception of climate variability and recorded climatic data in the study area demonstrates poor scientific knowledge of climate variability and change among the farmers and pastoralists. This could pose a challenge to acceptance of innovations and adaptation strategies by farmers and pastoralists in the study area.

Extreme heat impedes livestock production and reproduction by decreasing animal weight gain and dairy production as well as income. Consequently, the increasing warming trend in the study area poses a threat to animal performance. In addition, the study has shown that farmers/herders' conflicts have been brutal involving the use of sophisticated weapons and perpetrated by youths because of the shortage of opportunities in most of their localities. Furthermore, the rate of occurrence of the farmers/herders conflict is comparatively low and short lasting in the study area owing to the good effort of the law enforcement agents in managing the conflict.

RECOMMENDATIONS

Based on the findings of the research, it will be essential for government and other development actors to:

i. improve pastoralists and farmers' awareness of possible climate induced hazards through local awareness campaign, mainstreaming climate change issues into other trainings and conducting awareness meetings.
ii. strengthen policy intervention in the study area on reducing rural producers' high dependence on natural resources, enhancement of income, improving education and employment alternatives/opportunities.
iii. initiate policies on transforming nomadic subsistence livestock production into sedentary and more commercially oriented system by establishing ranches.
iv. encourage pastoralists and farmers to invest on non-farm activities to reduce the pressure on natural environment.
v. simplify access to credit by pastoralists and farmers through encouraging micro finance institutions to widen their coverage of credit delivery to smallholder farmers and relax some of the requirements for granting loans.

REFERENCES

Adedokun, M.O. and Oluwagbohunmi, M.F. (2014) An Overview of the Challenges Facing Youths in Nigerian Society. *International Journal of Humanities and Social Science*, 4 (6); 154 – 161.

Adelakun, O. E., Adurogbangba, B. and Akinbile, L. (2015). Socioeconomic Effects of Farmer-Pastoralist Conflict on Agricultural Extension Service Delivery in Oyo State, Nigeria. Journal of Agricultural Extension, 19 (2):59-70

Adigun, O. W. (2019). A Critical Analysis of the Relationship Between Climate Change, Land Disputes, and the Patterns of Farmers/Herdsmen's Conflicts in Nigeria. *Canadian Social Science*, 76-89.

Abubakar. (2010). *Adaptive Strategies developed by local farmers to cope with Climate Change:A case study of Jibia Local Government,Katsina State.* Ahmadu Bello University,Zaria.: Unpublished Undergraduate Project.

Abubakar, M. B. (2012). *Sociological Assessment of Nomadic Pastoralist and Sedentary Farmers Conflicts in Katsina State. .* Zaria: An unpublished M.Sc. Thesis submitted to Sociology Department, Ahmadu Bello University,.

Ayantunde, A.A., Asse, R., Said, M.Y. and Fall, A. (2014). Transhumant pastoralism, sustainable management of natural resources and endemic ruminant livestock in the sub-humid zone of West Africa. Environment Development and Sustainability. DOI: https://dx.doi.org/10.1007/s10668-014-9515-z

Barfield, J.T. (2011). Nomadic pastoralism. The Oxford Handbook of World History. DOI: 10.1093/oxfordhb/9780199235810.013.0010

Federal Ministry of Environment (FME). (2003.). *Nigeria's First National Communication under the United Nations Framework Convention on Climate Change. Abuja, Nigeria.*

Fosu-Mensah, B. Y., Vlek, P. L., & Manschadi, A. M. (2010). Farmers' perception and adaptation to climate change: a case study of Sekyedumase district in Ghana. *Tropentag*, September 14-16, Zurich.

Global Terrorism Index (GTI). (2016, September 20). *Measuring and Understanding the Impact of Terrorism. Institute for Economics and Peace*. Retrieved from http://visionofhumanity.org/sites/default/files/Globaland20Terrorismand20Indexand202016_

Global Terrorist Index (GTI). (2018, September 20). *Measuring the Impact of Terrorism. Institute for Economics and Peace.* Retrieved from https://www.gcsp.ch/News-Knowledge/.../Launch-of-the-2018-Global

Hassan, B. (2017) The Impact of Cattle Rustling and Banditry on Livelihoods of Pastoral communities in Katsina State, Nigeria.

Idoma, K., Abdurashid, A. and Abdullahi, J. (2018) Climate Variability: Driving Force of Crop Farmers-Pastoralists' Conflicts and a Threat to the Sustainability of Pastoralism in Benue State, Nigeria. *Journal of Disaster and Risk Reduction: Centre for Disaster Risk Management and Development Studies (CDRMDS)* 1(1): 1-9.

International Panel on Climate Change (IPCC). (2007). Summary for policy-makers. In M. L. Parry, *Climate change 2007: Impacts, adaptation and vulnerability: Contribution of workinggroup II to the fourth assessment report of the intergovernmental panel on climate change (SAR)* (pp. 7–22). Cambridge, New York: Cambridge University Press.

Luke , A. A., Good , H. I., and Uche, U. (2019). Understanding Rural Violence in North-Central Nigeria:Experience from NomadicHerdsmen and Rural Farmers' Conflict. *Journals of International Politics, 1* (1), 53-74.

Madu , I. A., and Nwankwo, C. F. (2020). Spatial pattern of climate change and farmer–herder conflict vulnerabilities in Nigeria. *GeoJournal*, Springer BV 1-17.

Merriam-Webster. (2018). https://www.merriam-webster.com/dictionary/pastoralism

Mertz, O., Mbow, C., & Reenberg, A. (2009). Farmers' perceptions of climate change and agricultural adaptation strategies in rural Sahel. . *Environmental Management.* , 43: 804-816. .

Mikailu, N. (2016, September 20). *Making sense of Nigeria's Fulani-farmer conflict* . Retrieved from BBC News: ht tps :/ / www .bbc.com/news/world-africa-36139388

Mobjörk, M., Gustafsson, M.-T., Sonnsjö, H., Van Balen, S., Dellmuth, L., and Bremberg, N. (2016). Climate-Related Security Risks: Towards an Integrated Approach. . *International Peace Research Institute. Stockholm.*

Odjugo, P.A.O (2010) General overview of climate change Impacts in Nigeria. Journal of Human Ecology 29 (1): 47-55.

Okunlola, O. O. (2016). Fulani herdsmen's pastoral activities, conflict and conflict management strategies in Ibarapa East Local Government Area of Oyo State, Nigeria. *Nigerian Journal of Animal Science*, 18 (1);190 - 197.

Olaleye, R., Odutola, J., Ojo, M., Umar, I., & Ndanitsa, M. (2010). Perceived effectiveness of conflict resolution methods for improved Farmer-Pastoralist relationship in Chikun Local Government Area of Kaduna State, Nigeria. . *The Nigerian Journal of Rural Extension and Development* , 3:54-58. . pastoralists who settled in a place to farm and move within the community

Patrick, S. (2012). An Assessment of Forest Resource Utilization and Management. A Study of Katsina Fuelwood Plantation Number 2 forest reserve in Katsina Local Government Area of Katsina State.

Rosenzweig, C., Tubiello, F. and Goldberg, R. M. (2002). Increased Crop Damage in the U.S. from Excess Precipitation under Climate Change–Global Environ. Change: . *Human Dimensions and Policy* , 12 (3): 197-202.

Tsegaye, D., & Moe, S. R. (2013). Pastoralists and livelihoods: A case study from northern Afar, Ethiopia. *Journal of Arid Environments*, 138-146.

United Nations Framework Convention on Climate Change , 2011. *Fact sheet: Climate change science - the status of climate change science today.* [Online] Available at: http://www.ipcc.ch/publications_and_data/ar4/wg3/en/spmsspmd.html
[Accessed 15 August 2020].