



AN ASSESSMENT OF FULANI PASTORALISTS PERCEPTION OF CLIMATE CHANGE IN SOME SELECTED COMMUNITIES OF DUTSIN-MA LOCAL GOVERNMENT AREA KATSINA STATE, NIGERIA

***Sule, I.D., Yaro A. and Adamu G.K.**

Department of Geography and Regional Planning, Federal University, Dutsin-ma, Katsina State

*Corresponding Author: idanladi@fudutsinma.edu.ng (+234) 8035285126

Abstract

The study carried out an assessment of the of Fulani pastoralist perception of climate change in some selected communities of Dutsin-Ma LGA Katsina State, Nigeria: A total of 120 questionnaires were administered in (8) selected communities of the study area using accidental sampling method. The data for this study were generated using questionnaire administration and focus group discussion. The data generated was analyzed using descriptive statistics in form of percentage and in narrative statements. The study revealed that 33.30% of the respondents are of the view that the emergence of drier year was a major indicator of climate change. However about 33% of the respondents further confirmed that the disappearance of surface water as well as frequent dryness of surface water bodies were signs that the study area was hit by climate change. Furthermore 74% of the respondents admitted to have noticed reduction in flora and fauna species and attributed that to decline in rainfall, desert encroachment, and deforestation among others. The study recommended that cattle colonies should be provide particularly in area with fragile ecosystems, improve forage and fodder resources should be provided to tackle the conflict between herders and farmers, capacity building and enlightenment campaign should be organized to inform the herders on the menace of climate change.

Keywords: Assessment, Fulani Pastoralist, Perception, Climate Change

INTRODUCTION

Throughout history, livestock have been kept for variety of purpose, with almost exclusive focus on food use. But in many developing countries livestock are still a critical support to the livelihood of the Fulani pastoralist and it is important as source of manure. According to (Federal Ministry and Agriculture and Rural Development (FMA&RD) (2017) livestock are an irreplaceable source of livelihoods for the poor. It is the fastest growing and equally one of most important sector contributing to household economy in the dry lands areas of Nigeria.

In semi arid regions of Nigeria and Sub Saharan Africa there two main uses to which lands are subjected to include crop cultivation and pastoralism, while the former involves the use of the land to cultivate crops, the later involves movement of human beings (herders) and livestock from one part of the land to another in search of water and pasture to rear the animals (FMA&RD, 2017; Abdullahi, Daneyel and Aliyara, 2015). Notable among the pastoralists are Fulanis that inhabit much of western and central parts of Africa.

Fulani pastoralist are describes as a small that spoke the same Fulfulde language with dialectical

variations (Awogbode, 1982 in Abdullahi *et al.*, 2015). The Fulani pastoralists have a special life style that is clearly different from the wider community where they live. The Fulanis are generally known to be moving with livestock comprising of cows, sheep and goats. Their movement is dictated by the pattern and distribution of rainfall and foliage cover for the animals (Ingawa, *et al.*, 1989; Kwaga, *et al.*, 2017).

Fulani pastoralist practices transhumance, they sent out cattle during the drier season to the areas of greener pasture and return to back to the sedentary place called “*Mashakari*” during the set season. This shows that Fulanis are in periodic movement from one part of the country to another. This movement is part of their adaptive capacity to resources degradation such as water and pasture over time (Abdullahi *et al.*, 2015). Pastoralism is among the major economic activities connected to Agriculture in Dutsin-Ma LGA.

As such pastoralism has been an occupation of people in Dutsin-Ma in particular Fulani ethnic group (Rabe, 2018). It is observed that pastoralism is being seriously affected by climate change. Fulani pastoralists in the study area have a special

life style that is clearly different from the wider community and they are generally known to be moving with livestock comprising of cows, sheep and goats. Their movement is dictated and influenced by physical geographical features (Rabe, 2018). It is also observed that climate variability affect the availability of water and pasture across the area and in turn affect the means of pastoralist livelihood.

Literature on adaptation to climate change by various land users is very extensive but concentrates largely on farmer's adaptation strategy. Perception of climate change and its associated impact is an important step to climate change adaptation (Debela *et al.*, 2015; Debela *et al.*, 2019). It helps to define climate change both as a problem and in term of decision making as well as complex interaction between societies and the environment. Perception to varying extents is shaped by various socioeconomic, cultural, political and environmental factors (Debala *et al.*, 2019; Pauw, 2013; Teka *et al.*, 2013).

More precisely, experienced impacts or anticipated risks of local climate change help to acknowledge climate change, vulnerability and associated adaptation deficit that trigger an adaptation need and decision to adapt (Debela *et al.*, 2019). Abubakar and Yamusa (2013) argued that climate change induced drought especially in the Sahel and Sudan ecological zones of Nigeria and in turn affects nomadic livestock herders; this result in to conflict on natural resources, migration, food insecurity, loss of biodiversity and socio-economic instability.

Adaptations to climate change can be planned or unplanned, local or regional and involve adjustments through a variety of processes, practices and structures to actual or anticipated changes in climate (Deressa *et al.*, 2009; Bryan *et al.*, 2009). Depending on the vision and degree of intervention adaptation can intervene in development. Adaptation responses may be structured around one of the following goals-resilience (stability, functional persistence or maintaining the status quo), transition (incremental change) and transformation (Pelling, 2009). However, some adaptive strategies may fail to bring the expected outcomes which result in insufficient adaptation that increases vulnerability of the target group or neighbouring communities (Barnett and O'neil, 2010). More attention has to

be paid to potential consequences of adaptation policies and practices with their implication for future adaptive capacity and long term adaptation.

On the other hand, there is little scientific information on the perception to change among pastoralist in across the study area. This paper seeks to contribute towards documenting how Fulani Pastoralists perceive changes in climate and adapt to its effects in Dutsin-Ma LGA, Katsina State. In particular, knowledge of what pastoralists know and the practice about climate change can improve understanding of the local environment within which they operate and also help to improve the decision-making processes.

Material and Methods

The Study Area

The study was conducted across eight settlements that are inhabited by Fulani pastoralist (Table 1). The area in which the settlements are located falls within the Guinea and Sudan vegetation zones of Nigeria and it is characterized by rainfall of about 700-800mm per annum. The year is divided in to wet and dry seasons, the dry season started from November to May while the wet season commences from June to October, the rainfall is concentrated from June to September, the temperatures ranges between 21-28⁰c in the harmattan period while in the summer the temperature range from 34-40⁰c (Olofin, Nabegu and Dambazau, 2008; Abdulazeez, Adamu and Ibrahim, 2018). Despite the nature of rainfall, the area supports high pasture development and has a Tse-tse fly free condition. These conditions promote intensive livestock grazing activities in the area as herders find enough pasture and water to cater for their livestock.

Location of the study area

The study area is located between latitude 12⁰09'18''N and 12⁰30'44''N and longitude 07⁰20'48''E to 07⁰37'18''E. The study covers eight selected communities in Dutsinma Local Government area. The study area has a land mass of 527 sq/km. The study area shares a boarder with Danmusa in South, Safana to the West, Charanchi to East and Kurfi to the North. The study area has a suitable land for farming and domestication of animals which permit cultivation of crops and rearing of animal as well as pastoralism.

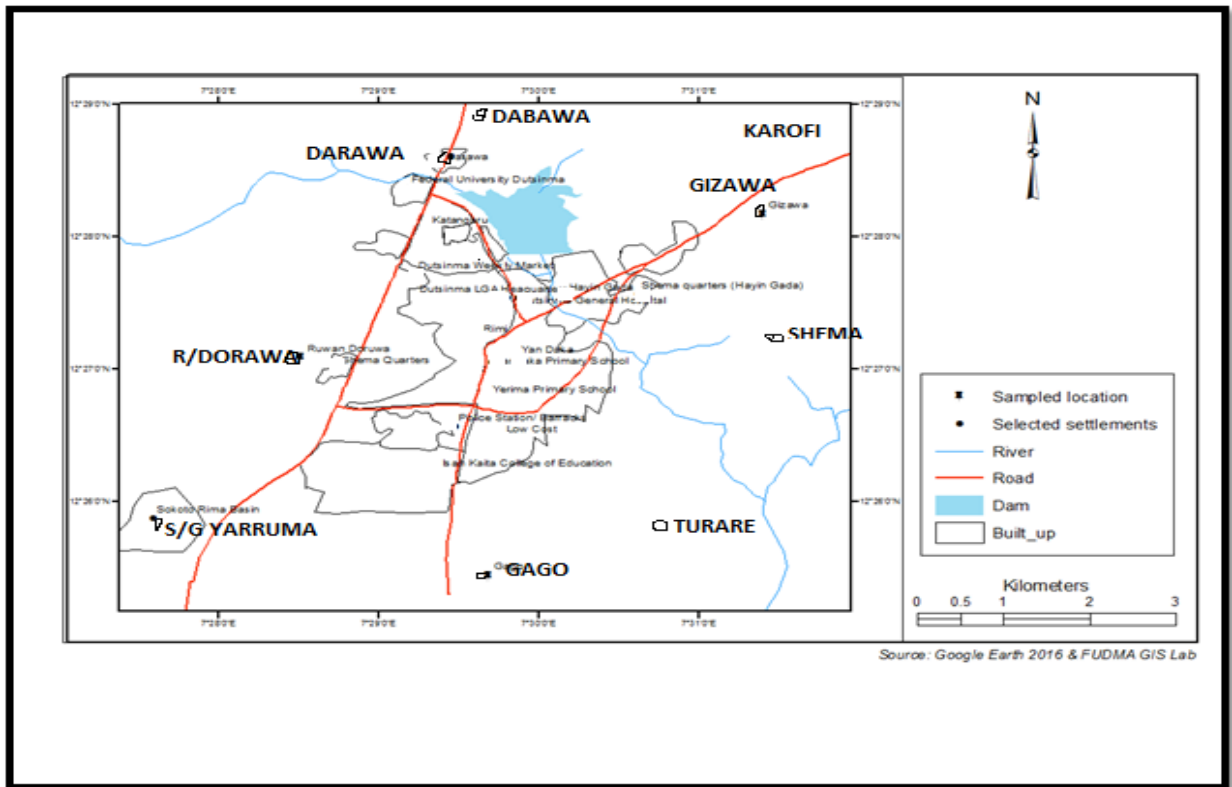


Figure 1: The map of study area showing the selected communities

Data collection processes

The survey purposively sampled 15 Fulani households in each of the selected settlements across the study area. The overall sample size for the study was 120 Fulani households. At the beginning of the study, a reconnaissance survey was conducted across each of the eight settlements

predominantly where it is inhabited by Fulani herdsmen during which familiarity was developed with every settlement and appropriate permissions were sought for interactions with residents for the purpose of conducting the study. The result of the study was presented in Tables, percentages and plates as well as the narrative statements and incorporated in the result where necessary.

Table 1: List of sampled communities and sample size

S/N	Selected Settlements	No. of Questionnaires administered
1	Dabawa	15
2	Sabon-GarinYar'ruma	15
3	Darawa	15
4	Gago	15
5	Gizawa	15
6	Karofi	15
7	Shema	15
8	Turare	15
Total		120

Source: Field work (2018)

In every settlement, the households were selected using convenience/accidental sampling until the target number was reached. Data for the study was collected using interview conducted with each head of household or an adult person from the household. A semi-structured questionnaire was prepared and used for the interview. The questionnaire comprised of questions on households knowledge of climate change, its impacts and how they adjust to it. Focus group discussion (FGD) sessions were also held in each of the eight settlements which made up of leadership of the Fulani heard men that were carefully selected based on their knowledge and willingness to participate in the interview. The FGD sessions were used to obtain more details on general and specific issues observed during the interview related to climate change and adaptation by herders in the study area.

Results and Discussions**Pastoralist Perception on Rainfall Regime Changes**

Fulani herders were asked about whether they perceive any variations in the rainfall patterns and duration across the eight study settlements of the study area, it was discovered that mixed responses constitutes the opinion of the respondents that

changes in the rainfall regime have been persistently occurring every year in the last 10 years in the study area. The result of the study in Table 2 revealed that three major rainfall variability events were the dominant indicators or yardstick of climate change according to the respondents interviewed, these are the emergence of drier year (33.03%), late onsets of rainfall (25%) as well as early cessation of rainfall (18.30%). This implies that these indicators were perceived by the Fulani pastoralist as a sign of climate change.

This condition according to them seriously affects availability of pasture for animals and subsistence crop production which in turn affect the livelihood of the pastoralist. This situation was perceived to have resulted in crop failure and animals mortality across the study area resulting into early movement of animals to the humid areas in the south. Annual movements of animals southward usually commence in November, but with perceived shortening of rainy days, movements usually commence in late September in recent years.

Movements are forced on herders not only due to lack of available pasture for their livestock, sometimes drought force early southward movements in pursuit of pasture and much

available fodder. This situation prompts the need for capacity building and adaptation strategies in short and long terms to enable the pastoralist cope with the condition. Abdullahi *et al.* (2015) argued

that this led to the clashes and conflict between the arable farmers and the clashes have already started taking socio-political and economic dimensions.

Table 2: Pastoralist Perception on Rainfall Regime Changes

Perception on Rainfall Pattern	Number of Respondents	Percentage
Wetter year	17	14.17
Dryer year	40	33.30
Late onset	30	25.00
Early onset	08	6.70
Early cessation	22	18.30
Late cessation	03	2.50
Total	120	100

Source: Field Survey 2018

Pastoralist Perception on Changes in Surface Water Sources

Beside grasses, surface water sources such as ponds and rivers constitute one of most important resource for the Fulani herdsmen. Any small change in the number and amount of surface water is easily perceived by the Fulani herdsmen particularly in the semi-arid regions. The result indicated that the disappearance of surface water bodies was the dominant with 33.30%, 29.17% perceived quick drying up of surface water bodies while 25% of the herders reported slowly drying up of the surface water bodies particularly at the end of harmattan period (*Hunturu*) to the onset of rainy season (Table 3).

This is attributed to the windy condition, and high rate of evaporation especially in *Bazara* which is responsible for the quick drying up of some shallow water bodies across the study area. Harmattan winds that usually start in late October, in recent years, was perceived to have been arriving the area much earlier in mid to late September. This is only responsible for shallow and ground water shortages in the area; this

situation is also perceived to be responsible for the early drying up and disappearance of some native pasture grasses and opening up of animal's tracks setting the pace for southward movements. This implies that frequent dryness of water sources could be a yardstick for prediction of climate change locally.

Chadi, Abdulhamid, Rilwanu and Sule (2019) argued that frequent dryness of water was among the major problem of indigenous water management which are climate induced. Other factors identified that are responsible for the change in surface water bodies include siltation and high rate of evaporation. It is observed that due to the desert encroachment nowadays surface water bodies are becoming vulnerable to siltation which affects their ability to provide water for livestock drinking. This shows the need for desilting of such water bodies as well as providing alternative water sources particularly from solar and wind powered boreholes. Sule (2018) argued that solar powered boreholes installed in grazing reserves by National Livestock Development Project to provided water at ease to Fulani pastoralist in Northern Bauchi State.

Table 3: Perception to Changes in Water Sources

Perception on changes in surface water sources	Number of Respondents	Percentage
Disappearance of sources	40	33.30
Quickly drying up	35	29.17
Slowly drying up	30	25.00
Others	15	12.00
Total	120	100

Source: Field Survey 2018



Plate1: Fulani herdsmen providing water for their cattle in a hand dug well

Pastoralist Perception on Diversity of Plant Species Reduction

Derner *et al.*, (2008) pointed out that worldwide forages are the most for resources for livestock particularly the ruminant animals. Shiawoya and Tsado (2011) are of the view that about 97% of the Nigeria ruminant animals are dependent on forage and fodder crops which are widely spread across all the ecological zones and mostly in some places their production is limited by the availability of rainfall. Fulani herdsmen had perceived the disappearance and/or migrating of

some plant species which comprised of trees, grasses, shrubs and leaves towards the more humid south zone. About 80% of the Fulani herdsmen further admitted that they have discovered some plant species in the humid south which were predominant in the semi-arid area while on the move. These plant species include *Echinochloa pyramidalis (Roba)*, *Pennisetum pedicellatum (Kansuwa)* and *Veti verianigrita (Jema)* among others. Among the tree species that were noticed to have migrated include *Kirya (Prosopis Africana)*, *Rimi (Ceiba pentendra)* and *Kurna (Ziziphus spinachrist)* among others. One

other change that was perceived by the Fulani herdsmen in the study area was the change in the arrival time of some birds such as *Shamuwa*. The arrival of these birds used to be a sign for the return home from the humid south with the animals. These particular birds engage in long distance annual migration from the Sahara Desert through the study area towards the humid areas in the south.

The *Shamuwa* birds usually arrives the study area in April during the summer (*Bazara*) close to the rainy season. In recent years, these birds were perceived by Fulani herders to arrive the study area in late June indicating a delay in the rainy season. Whenever Fulani herdsmen begin to notice these birds, they start to move northwards to avoid heavy rains of the humid areas. Transhumance pastoralism involves sending herds

south in the dry season and return back to north in early days of rainy season, it is a clear indication of insufficient grazing reserves and decline of pastures and avoidance of conflicts between farmers and pastoralist.

It is however reported by the pastoralist that, they notice decline of natural pastures due to climate change in the course of their movement up and down. Table 4 shows different diversities of plant that have gone extinct and those that are reducing in their diversity. The studies indicated that 65% of the species are reducing in diversity while 35% of the species are on extinction. Majority of the respondents are of the view that provision of cattle colonies, restoration of encroached grazing and forest reserves will definitely help the pastoralist and in turn will reduce the rate of clash between the herders and farmers in the study area.



Plate 2: Fulani herdsmen with their cattle in marginal land near to the farms in the study area

Fulani herders reported a perceived change in the ripening of some local tree such as Kanya (*Diaspyros mespiliformis*) Zuwo (*Celtis zenkeri*) and Dorawa (*parkiabglibosa*) while on the move. In the last few decades, Fulani herders (74%) reported a change in the grazing stock from grasses and shrubs to standing trees and woodlands in the study area. Some tree species and woodlands have now become a formidable source of fodder for the livestock especially in the dry season. Such trees included Neem

(*Azadirachta indica*), Maje (*Daniellia oliverii*), Dinya (*Vintex doniana*) among others. In the past, livestock survived purely on grasses and shrubs, but due to early drying up of land, herders (62%) had to cut some tree species to compliment the available forage for the livestock during the harmattan season. Rabe (2018) argued that the annual rainfall and its distribution in the area generally affect the nature of the vegetation and in turn affect the availability of the fodder animal to graze.

Table 4: Perception on Diversity of Indigenous Plant Species Reduction

S/No	Indigenous plant species	Local name	Uses to pastoralist	Status of plant species
1.	<i>Parkia biglobosa</i>	Dorawa	Fodder	Reduction in diversity
2.	<i>Vintex doniana</i>	Dinya	Fodder	Reduction in diversity
3.	<i>Ziziphus spinachrist</i>	Kurna	Fodder and edible fruits	On extinction
4.	<i>Prosipis Africana</i>	Kirya	Fodder and Medicine	On extinction
5.	<i>Mitrigyna inermis</i>	Giyayya	Fodder	On extinction
6.	<i>Veti verianigrita</i>	Jema	Fodder	Reduction in diversity
7.	<i>Echinochloa pyramidalis</i>	Roba	Fodder	Reduction in diversity
8.	<i>Pennisetum pedicellatum</i>	Kansuwa	Fodder	Reduction in diversity
9.	<i>Faiderherbia albida</i>	Gawo	Fodder	Reduction in diversity
10.	<i>Annogeisus leocarpus</i>	Marke	Fodder	On extinction
11.	<i>Terminalia</i>	Baushe	Fodder	On extinction
12.	<i>Daniellia oliverii</i>	Maje	Fodder	Reduction in diversity
13.	<i>Daterium microcarpum</i>	Taura	Fodder and edible fruit	Reduction in diversity
14.	<i>Borassus aethiopum</i>	Giginya	Edible fruit	Reduction in diversity
15.	<i>Balanite aegytiaca</i>	Aduwa	Fodder and edible fruit	Reduction in diversity
16.	<i>Tamarindus indus</i>	Tsamiya	Fodder and edible fruit	Reduction in diversity
17.	<i>Ceiba petendra</i>	Rimi	Fodder and edible fruit	On extinction
18.	<i>Celtis zenkeri</i>	Zuwo	Fodder	On extinction
19.	<i>Ficus syringaefolia</i>	Durumi	Fodder	On extinction
20.	<i>Hyphaneathabaica</i>	Goriba	Edible fruits	Reduction in diversity
21.	<i>Diaspyros mespiliformis</i>	Kanya	Edible fruits	Reduction in diversity
22.	<i>Ximenia Americana</i>	Tsada	Fodder and edible fruits	Reduction in diversity
23.	<i>Adansonia digitata</i>	Kuka	Edible fruits	Reduction in diversity

Conclusion

It is concluded that Fulani herds men perceived the adverse effect of climate change through observation and indigenous knowledge particularly in the fragile ecological zones where rainfall is a limiting factor as well varied temporally. The effect were manifested through

the decrease in the amount of rainfall, frequent dryness of surface water bodies, disappearance of some plants species like *Ziziphus spinachrist* (*Kurna*), *Mitrigyna inermis* (*Giyayya*) *Diaspyros mespiliformis* (*Kanya*), *Borassus aethiopum* (*Giginya*) etc. This is a clear evidence of climate change manifestation which needs to be properly

monitored, mitigated and addressed. It is important to note that this research can serve as a background for further researches.

Recommendations

The study recommended that

- Cattle colonies should be provided particularly in areas with fragile transitional savannah vegetation zones.
- Encroached forest and grazing reserves should be restored to tackle the conflict between herders and farmers.
- Capacity building and enlightenment

REFERENCE

- Abubakar, I.U. and Yamusa, M.A. (2013). Recurrence of Drought in Nigeria: Causes, Effects and Mitigation: *International Journal of Agriculture and Food Science Technology*, ISSN 2249-3050, Vol. 4, No.3 pp, 169-180
- Abdulazeez, A., Adamu, G.K and Ibrahim, A. (2018). Geography, Historical Settlement and Physico-Environment Nature of Dutsin-Ma, in Adejo and Rabi (eds) *Dutsin-Ma its Rise Growth and Development*, Gwatex Publishers pp 12-25
- Abdullahi, U.S., Daneyel, H.N. and Aliyara, Y.H. (2015). Grazing Reserves and Pastoralism in Nigeria: A Review: *Vom Journal of Veterinary Science* Vol. 10, 2015: 137 - 142
- Barnett, J. and O'Neill, S. (2010) Mal-adaptation. *Global Environmental Change*, 20, 211-213. <https://doi.org/10.1016/j.gloenvcha.2009.11.004>
- Bryan, E., Deressa, T., Gbetibouo, A. and Ringler, C. (2009). Adaptation to Climate Change in Ethiopia and South Africa: Options and Constraints. *Environmental Science and Policy*, 12, 413-426. <https://doi.org/10.1016/j.envsci.2008.11.002>
- Chadi, A.A., Abdulhamid, A., Rilwanu, T.Y. and Sule, I.D. (2019). Constraint to indigenous Water Management Practices in Jama'are Local Government Bauchi State, Nigeria: *FUDMA International Journal of Social Sciences (FUDIJOSS) Volume 1, No.2*
- Debela, N., Mohammed, C., Bridle, K., Corkrey, K. and McNeil, D. (2015). Perception of Climate Change and Its Impact by Smallholders in Pastoral/Agro-pastoral Systems of Borana, South Ethiopia. *Springer Plus*, 4, 1-12. <https://doi.org/10.1186/s40064-015-1012-9>
- Debela, N., McNeil, D., Bridle, K. and Mohammed, C. (2019) Adaptation to Climate Change in the Pastoral and Agro-pastoral Systems of Borana, South Ethiopia: Options and Barriers: *American Journal of Climate Change*, 2019, 8, 40-60 <http://www.scirp.org/journal/ajcc>: ISSN Online: 2167-9509 ISSN Print: 2167-9495
- Derner, J.D, Hart, R.H., Smith, M.A. & Waggoner Jr, J.W. (2008) Long Term Cattle Gain Responses to Stocking Rate and Grazing Systems in Northern Mixed Grass Prairie: *Livestock Science* 117:60-69
- Deressa, T., Hassan, M. and Ringler, C. (2009) Perception of Adaptation to Climate Change by Farmers in the Nile Basin of Ethiopia. *Journal of Agricultural Science*, 149, 23-31.

<https://doi.org/10.1017/S0021859610000687>

- Deressa, T., Hassan, R., Ringler, C., Alemu, T. and Yesuf, M. (2009) Determinants of Farmers' Choice of Adaptation Methods to Climate Change in the Nile Basin of Ethiopia. *Global Environmental Change*, 19, 248-255.
<https://doi.org/10.1016/j.gloenvcha.2009.01.002>
- Federal Ministry of Agriculture and Rural development (FMA&RD) (2017). Third National Fadama Development Project Additional Financing (Fadama III-AF II) on North East Food Security and Livelihood Emergency Support Project:
- Olofin, E.A., Nabegu, A.B. and Dambazau, A.M (2008) Wudil Within Kano Region: A Geographical Synthesis: Adamu Joji Publishers Kano, Nigeria.
- Pauw, P. (2013). The Role of Perception in Subsistence Farmer Adaptation in Africa Enriching the Climate Finance Debate. *International Journal of Climate Change Strategies and Management*, 5, 267-284.
<https://doi.org/10.1108/IJCCSM-03-2012-0014>
- Rabe, N (2018). Study of Geography and Historical Origin of Dutsin-Ma Town in Adejo and Rabi (eds) Dutsin-Ma its Rise Growth and Development, Gwatex Publishers pp 26-47
- Shiawoya, E.L. & Tsado, D.N. (2011) Forage and Fodder production in Nigeria: Problems and Prospect: *World Journal of life sciences and Medical Research*; 1 (4):88-93
- Sule, I.D. (2017) Spatial Distribution of Solar Powered Boreholes among the Rural Communities of Northern Bauchi State, Nigeria: *Techno Science Africana Journal: ISSN 2006-2273: Volume 14, No.2*
- Teka, O., Houessou, G.L., Oumorou, M., Vogt, J. and Sinsin, B. (2013) An Assessment of Climate Variation Risks on Agricultural Production: Perceptions and Adaptation Options in Benin. *International Journal of Climate Change Strategies and Management*, 5, 166-180.
- Ingawa, S.A., Tarawali, G. and von Kaufmann, R. (1989). Grazing Reserves in Nigeria: Problems, Prospect and policy implications: International Livestock centre for Africa, sub-humid research site Kaduna, Nigeria
- Kwaga, B.T., Gwallameji, L.B., Ali, A. and Khobe, D. (2017) Assessment of food and feeding habit of Girraffe in Sumu wildlife park of Ganjuwa L.G.A, Bauchi State, Nigeria: An Unpublished Material