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Climate Change and Transhumance Pastoralism in North-Central Nigeria

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Abstract

The study investigated climate change and transhumance pastoralism in North Central Nigeria. Three research questions and one hypothesis guided the study. The population for the study was all the pastoralists in North Central Nigeria. Snowball sampling technique was used to select 210 respondents consisting of 30 respondents each from Kogi, Kwara, Nassarawa, Benue, Niger, Plateau and the Federal Capital Territory. A structured questionnaire validated by three experts from Department of Agricultural Education, University of Nigeria, Nsukka with a Cronbach Alpha reliability coefficient of 0.88 was used for data collection from the respondents. Data from the research questions were analyzed with the used of percentages, frequencies counts, mean while data from the hypothesis was tested using Chi-square statistics at 0.05 level of significance. It was found out a majority of pastoralists in the area are male, in the age range of 31 – 40, married and had no formal education. The findings also revealed that there were eight impacts of climate change and three measures adopted by the pastoralists to mitigate the effects. Furthermore, the findings revealed that there was no significant relationship between the socioeconomic characteristics and measures adopted by pastoralists to mitigate climate change. Based on the findings, the study recommended among others that; The government at all levels has to ensure movement of pastoralists in and out of any community has to be adequately monitored and conflict resolution agencies have to be established to serve as a mediator between pastoralists and the host community members

Keywords: *Climate change, Transhumance Pastoralism, North Central Nigeria*

Introduction

Climate is the atmospheric weather condition of a place over a long period of time. Climate change refers to the rise in average surface temperature on earth. According to National Research Council (2010), climate change is a change in the statistical distribution of weather patterns which lasts for an extended period of time (i.e., decades to millions of years). The author further posited that climate change may refer to a change in average weather conditions, or in the time variation of weather around longer-term average conditions (i.e., more or fewer extreme weather events). Climatic extremes and seasonal fluctuations are indicators of climate change. Climate change is attributable directly or indirectly to human activities that change the composition of the global atmosphere. Climate change emanates from differences in climate observed over a comparable time period (Intergovernmental Panel on Climate Change (IPCC), 1996 as cited by Ejiofor, Nwakile & Ali, 2017). It is obvious that climate change is an inherent attribute of climate, which is caused by both human activities (anthropogenic) and natural processes (bio-geographic).

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Climate change is a major threat to the sustainability of livestock systems globally.

Livestock refers to animals reared for meat, milk, hides and skin as well as being sources of income for farmers. Livestock play a major role in the agricultural sector in developing nations, and the livestock sector contributes 40% to the agricultural GDP (Food and Agricultural Organization (FAO), 2019). Global demand for foods of animal origin is growing and it is apparent that the livestock sector will need to expand. However, livestock are adversely affected by the detrimental effects of extreme weather. Climatic extremes and seasonal fluctuations in herbage quantity and quality will affect the well-being of livestock, and will lead to declines in production and reproduction efficiency (Sejian, 2013). Consequently, adaptation to, and mitigation of the detrimental effects of extreme climates is necessary in combating the climatic impact on livestock. The difficulty facing livestock is weather extremes, e.g. intense heat waves, floods and droughts. In addition to production losses, extreme events also result in livestock death (Gaughan & Cawsell-Smith, 2015). As a result, there is need adequate for livestock management.

Livestock management involves all the activities involved in the rearing of livestock from day old to maturity. Livestock and climate change have a close relationship (Iqubal, 2013). The spatial distribution and availability of pasture and water are highly dependent on the pattern and availability of rainfall (Adamu, Musa, Mesfin & Negash, 2013). Changes in the patterns of rainfall and ranges of temperature affect feed availability, grazing ranges, feed quality, weed, pest and disease incidence (Coffey, 2008). Thus, changes in climatic factors such as temperature, precipitation and the frequency and severity of extreme events like droughts directly affect livestock yields (Adams, Hurd, Lenhart & Leary, 2008). According to Coffey (2008), livestock production is doubly impacted by climate change. Similarly, Coffey also reported that livestock can be affected in two ways by climate change: the quality and amount of forage from grasslands may be affected and there may be direct effects on livestock due to higher temperatures. The harsh effect of climate change is expected to have maximum impact on vulnerable pastoral communities engaged in extensive livestock production systems in dry-lands (Saidu & Omedo, 2010). In line with this, Oromia National Regional State (ONRS) (2011) posited that climate change and variability in Africa poses particular risks to poor farmers and pastoralists who have an immediate daily dependence on climate sensitive livelihoods and natural resources. In addition to the physiological effects of higher temperatures on individual animals, loss of animals as a result of droughts and floods, or disease epidemics related to climate change may thus increase. Indirect effects may be felt via ecosystem changes that alter the distribution of animal diseases or the supply of feed. As reported by Afar National Regional State (ANRS) (2010), all pastoral regions in Africa are highly prone to the adverse impacts of climate change; while in Nigeria, the problem is more prevalent in the North East and North West regions.

Thus, there is no doubt about the negative impacts of climate change on livestock management. According to Zelalem, Aynalem and Emmanuelle (2009), the four major effects of climate change on livestock production include feed shortage, water shortage, reduced productivity, and decreased mature weight and/or longer time to reach mature weight. Again, he revealed that heavy infestation of invasive species due to climate change has reduced the availability of herbaceous species and hence resulted in a critical shortage of feed. In the same way, Stark, Terasawa and Ejigu (2011) reported that in some regions, invasive species linked by pastoralists to both restrictions on bush burning and climate change are severely reducing or eliminating viable grazing areas. Trends indicative of climate change, such as increasingly recurrent drought, floods, erratic rainfall patterns, and high temperatures are adding significantly to these stresses. In response to these challenges, these regions which are home to pastoral and agro-pastoral people who largely depend on livestock production for their livelihood constantly in transition in a process called transhumance pastoralism.

Transhumance pastoralism is the movement of individuals from one place to the other primarily to feed their livestock. According to Sahel and West Africa Club (SWAC) and Organization of Economic Co-operation and Development (OECD) (2008), transhumance pastoralism can be defined as "a system of animal production characterized by seasonal and cyclical migration of varying degrees between complementary ecological areas and supervised by a few people, with most of the group remaining sedentary". Transhumant herds usually move from areas that are difficult, unbalanced and changeable, such as the Sahel and agro-ecologically vulnerable zones. Contextually, transhumance pastoralism is the movement of pastoralists from the North East and North West regions of the country to the North central region of the country.

The North-Central zone of Nigeria which is also called the middle belt is one of the six geopolitical zones in Nigeria. It consists of Kogi, Benue, Nassarawa, Niger, Kwara, Plateau and the FCT. It is common to see Fulani herdsmen from the core northern regions with their cattle grazing. However, the movement of Fulani herdsmen from their state of origin to the North-central region for grazing has led to some crisis. For instance, it has led to resource conflict between herders and sedentary communities**.** The resource conflict between herders and sedentary communities is apparently an economic one. On one hand, herders are riding over the commons, making good income and many of them sending their children to private schools. On the other, sedentary communities are struggling hard even to earn their subsistence. The indigenes feel that herders are benefiting from their resource base at their own expense. (Banjade & Paudel, 2008). In Kogi and Benue state, the level of violence has spiked dramatically over the past few years and is witnessing a transformation of "normal" conflicts between pastoralists and farmers into generalized rural banditry (Ibrahim, 2014). Due to climate change, there has been a dramatic increase in the volume of transhumance between the North and the Middle Belt. The result is that in too many places, the nomadic herders find their routes to green pasture and water blocks and the result is crop damage and conflicts in a context in which traditional conflict resolution mechanisms have broken down. Furthermore, transhumance pastoralismleads to forest and land degradation (Adamu, et. Al, 2013: Ayoade, 2014). Many reports show that high altitude forests are degrading fast so that these forests have been converted to shrub land and denuded hills (Adamu et al., 2013). They report that pasture lands are being treated as open access leading to increased land and forest degradation. It is against this background that the study sought to ascertain climate change and transhumance pastoralism in North Central Nigeria.

Purpose of the study

The general purpose of the study was to ascertain impact of climate change o transhumance pastoralism in North Central Nigeria. Specifically, the study sought to ascertain the;

1. Socioeconomic characteristics of the pastoralists in North Central Nigeria
2. Impact of climate change on transhumance pastoralists in North Central Nigeria
3. Measures adopted by pastoralists to mitigate climate change effects

Research questions

The following research questions will guide the study;

1. What are the socioeconomic characteristics of the pastoralists in North Central Nigeria?
2. What are the impacts of climate change on transhumance pastoralists in North Central Nigeria?
3. What are the measures adopted by pastoralists in mitigating climate change effects?

Hypothesis

The following null hypothesis was tested at 0.05 level of significance

1. There is no significant relationship between the socioeconomic characteristics and measures adopted by pastoralists in mitigating climate change.

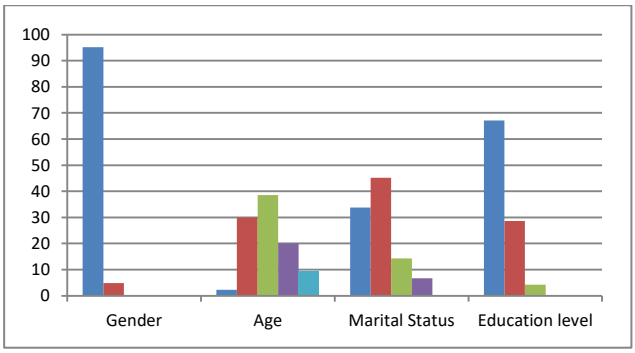
Methodology

Descriptive survey research design was adopted for this study. Descriptive survey research design in the view of Olaitan, Ali, Eyo and Nwoke (2000) is a plan and a strategy that the investigator wants to adopt in order to obtain solution to research problem using questionnaire in collecting, analyzing and interpreting the data. The design is appropriate for this study because it provided the researcher the opportunity of eliciting opinions from the respondents in the areas of the study using questionnaire. The study was conducted in North Central zones of Nigeria. The states in this zone include Kogi, Benue, Nassarawa, Niger, Kwara, Plateau and the FCT. The area was considered suitable for the study because of the high level of immigration of nomadic pastoralists due to climate change from the North East and North West zones into the area. The target population includes all the nomadic pastoralists in the area. The sample of the study was determined using snowball sampling technique which yielded 210 respondents, comprised of 30 pastoralists from each of the states and the FCT. A four-point response options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with values 4, 3, 2, and 1 respectively developed from literature reviewed was used for data collection. The questionnaire was validated by three experts in the Department of Agricultural Education, University of Nigeria, Nsukka. Cronbach Alpha was used to test the reliability which yielded 0.88. Data was collected with the aid of 3 research assistants who were fluent in Hausa and Fulani which is the local language of a majority of the pastoralist. This was done to ensure that data can still be collected from respondents who do not understand English.

Data were analyzed with the used of percentages, frequencies counts, mean and Chi-square statistics. Data from the research question 1 was analyzed using percentages and frequency counts while data from research question 2 and 3 were analyzed using mean statistics. For research question two and three, any item with mean of 2.50 or above was accepted while items with mean less than 2.50 were rejected. The null hypothesis was tested using chi-square at 0.05 level of significance. The null hypothesis was accepted if p value equal or greater than 0.05 but if p value less than 0.05, the null hypothesis will be rejected.

Results

Research Question One: What are the socioeconomic characteristics of the pastoralists in North Central Nigeria?



N = 210 (100%)

Fig 1: Socioeconomic Characteristics of Pastoralists in North Central Nigeria

In figure 1, males form 95.2% (200) of the population while females are 4.8% (10) of the population of 210 pastoralists. Data collected for age shows that 2.3% (5) of the respondents are 20 years or less, 30% (63) are in the range of 21 – 30, 38.6% (81) are in the range of 31 – 40, 20.0% (42) are in the range of 41 – 50 while 9.1% (19) are 51 and above. It means that a majority of the respondents (38.6%) are in the age range of 31 – 40 2 while the minority of the population is 20 or less (2.3%). Data collected for marital status showed that 33.8% (71) are single, 45.2% (95) are married, 14.3% (30) are widowed while 6.7% (14) are divorced. It means that the majority (45.2%) are married while the minority (6.7%) is divorced. Data collected for educational level showed that 67.1% (141) of the respondents have no formal education, 28.6% (60) had primary education, 4.3% (9) had secondary education while 0% (0) had tertiary education. It means a majority (67.1%) had no formal education while a minority (4.3%) had secondary education.

Research Question Two: What are the impacts of climate change on transhumance pastoralism in North Central Nigeria?

Table 1: Mean and Standard Deviation of Respondents on the Impacts of Climate Change on Transhumance Pastoralists

		N = 210		
S/N	**ITEMS**	**MEAN (X)**	**DECISION**	**RANK**
1	Difficulty in finding water for livestock	3.7	Accepted	1st
2	Increases the need for transhumance movements to find pasture foe livestock	3.3	Accepted	4th
3	Reduction in meat productivity of livestock	2.9	Accepted	6th
4	Death of animals as a result of drought	2.7	Accepted	8th
5	Feed shortage for livestock	3.2	Accepted	5th
6	New types of diseases are noticed	2.3	Rejected	9th
7	Reduction in milk produced by cows	3.5	Accepted	2nd
8	Increase in diseases contracted by pastoralists	2.2	Rejected	10th
9	Reduction in income of pastoralists	3.4	Accepted	3rd
10	Increase in conflict with indigenes of the towns migrated to	2.8	Accepted	7th
	GRAND MEAN	**3.0**	**Accepted**	

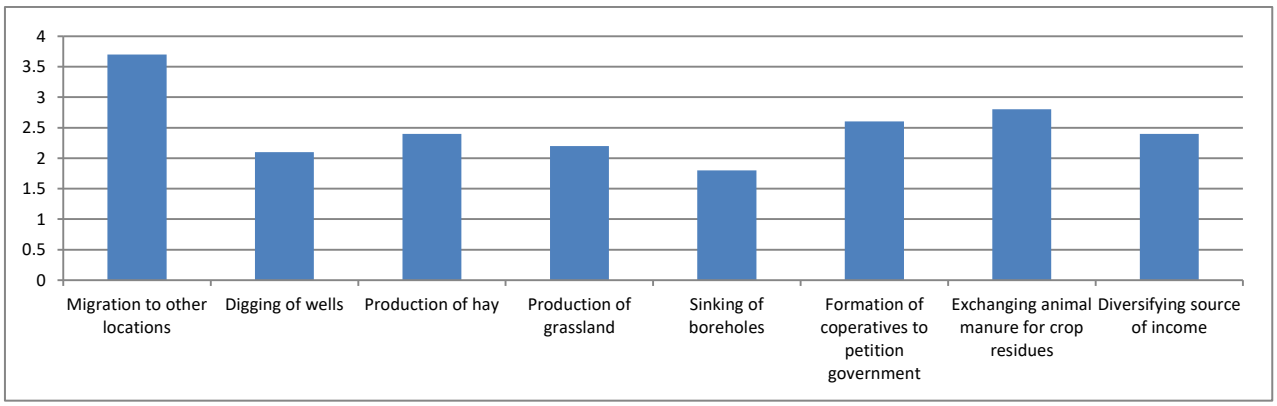


Fig 2: Mean of the Respondents on the Measures adopted by Pastoralists in Mitigating Climate Change Effects

Table 2: Chi-Square Relationships between the Socio-Economic Characteristics of the Pastoralists and Measures Adopted to Mitigate Climate Change

				(N = 210)	
S/N	Variable	Value	DF	Sig (2 tailed)	Decision
1.	Gender	4.410[a]	1	0.387	Not Significant
2	Age	3.278[a]	4	0.952	Not Significant
3	Marital Status	5.444[a]	3	0.794	Not Significant
4	Educational level	9.876[a]	3	0.361	Not Significant

Data in Table 1 revealed that the mean value of 8 items (items 1, 2, 3, 4, 5, 7. 9 and 10) had mean values ranged from 2.7 – 3.7. All the items were above 2.50 indicating that they were accepted as the impacts of climate change on pastoralists. It was also revealed that the biggest impact was difficulty in finding water for livestock which was ranked 1st while death of animal as a result of drought which was ranked 8th was the least challenge they faced. However, items 6 and 8 with mean values of 2.3 and 2.2 respectively were below the mean cut off points of 2.50. Hence, they were rejected and are not considered impacts of climate change among transhumance pastoralists in North Central Nigeria. The Grand mean of 3.0 was above 2,50 indicating that climate change affects transhumance pastoralists in the area.

Research Question Three: What are the measures adopted by pastoralists in mitigating climate change effects

Data in fig 2 revealed that the measures adopted by pastoralists in mitigating climate change effects include migration to other locations, formation of cooperatives to petition government and exchanging animal manure for crop residues. These were accepted because they have mean values above 2. 50. However, the other items are

not regarded as coping strategies utilized by pastoralists in North Central Nigeria because they have mean values less than 2.50

Ho 1: There is no significant relationship between the socioeconomic characteristics and measures adopted by pastoralists to mitigate climate change.

Data in Table 2 revealed that relationship between gender, age, marital status and educational level is 0.387, 0.952, 0.794 and 0.361 respectively. All the significant levels are above 0.05. Hence, the null hypothesis is rejected showing that the relationship between the socioeconomic characteristics and the measures adopted is not significant.

Discussion of the Findings

The findings revealed that a majority of pastoralists in the area are male, in the age range of 31 – 40, married and had no formal education. Males could be the majority because it is assumed that livestock rearing travelling through bushes and thick forests is tedious and a risky job and males traditionally undertake more risky jobs. Majority of the respondents had no formal education and this could be as a result of high level of out of school children in the North. The findings are in line with Ayanda, Oyeyinka, Salau and Ojo (2013) who found out that majority of pastoralists in Ogun are males and uneducated.

The findings also revealed that the impacts of climate change on pastoralists arranged from the most severe to the least severe are as follows; Difficulty in finding water for livestock, reduction in milk produced by cows, reduction in income of pastoralists, increases the need for transhumance movements to find pasture foe livestock, feed shortage for livestock, reduction in meat productivity of livestock, increase in conflict with indigenes of the towns migrated to and death of animals as a result of drought. Difficulty in finding water for livestock seems the most acute impact of climate change because climate change leads to extended climate variation and difficulty predicting rainy season. The findings are supported by Coffey (2008) who posited that changes in the patterns of rainfall and ranges of temperature affect feed availability, grazing ranges, feed quality, weed, pest and disease incidence. The findings are also in cognizance with Adams, Hurd, Lenhart and Leary (2008) that changes in climatic factors such as temperature, precipitation and the frequency and severity of extreme events like droughts directly affect livestock yields.

The findings also revealed that the measures adopted by pastoralists in mitigating climate change effects include migration to other locations, formation of cooperatives to petition government and exchanging animal manure for crop residues. The findings are in line with Ibrahim (2014) who found out that a major coping strategy adopted by pastoralists is migration to other locations with adequate water and grassland. The findings also revealed that there is no significant relationship between the socioeconomic characteristics and measures adopted by pastoralists in mitigating climate change. The findings disagree with that of Ayanda, Oyeyinka, Salau and Ojo (2013) who found out that there is a significant relationship between socioeconomic characteristics and coping strategies adopted by pastoralists in Ogun. The hypothesis of no significance could be attributed to pastoralists in the area having relatively the same background and culture.

Conclusion

Livestock plays a major role in the agricultural sector in developing nations like Nigeria. Livestock performance is dependent on climatic extremes and seasonal fluctuations. Seasonal fluctuations are very common as a result of climate change. Climate change is a major threat to the sustainability of livestock systems globally. Climate change has affected livestock management system adopted by pastoralists. Consequently, there has been need for adaptation and mitigation measures since the ones adopted by the pastoralists such as constant movement to new environments in search of pasture seems inadequate. Hence, recommendations were suggested based on the findings of the study

Recommendations

1. The government at all levels has to ensure movement of pastoralists in and out of any community has to be adequately monitored. This is to ensure mitigate crisis between the pastoralists and the indigenes.
2. Conflict resolution agencies have to be established to serve as a mediator between pastoralists and the host community members
3. Pastoralists should be encouraged, through extension services, to participate in crop and other enterprises as alternative ways of enhancing the dwindling income from livestock rearing.
4. The grazing reserves in various states should be properly developed to encourage the pastoralists to adopt a sedentary way of life. This will enable their children to access education, urban values and mitigate the adverse effects of climate change on their herds.

References

[1]. Adams R, Hurd B, Lenhart S and Leary N (2008). Effects of global climate change on agriculture: an interpretative review. *Inter-Research. 11*, 19–30.

[2]. Adamu A., Musa W., Mesfin K &Negash T. (2013). *Climate change impacts on Pastoral Women in Nigeria: Some evidences from the Northern lowlands*. PHE Nigeria Consortium.

[3]. Afar National Regional State (2010). *Programme of Plan on Adaptation to Climate Change*.Addis Ababa: Finfinne

[4]. Ayanda, I. F., Oyeyinka, R. A., Salau, S. A. &Ojo. F. (2013). Perceived effects of climate change on transhumance

pastoralists in Ogun State, Nigeria. *Journal of Agricultural Science; 5* (4), 190 – 198.

[5]. Ayoade, J.O (2004). *Climate Change*. Ibadan: Vantage Publishers.

[6]. Banjade, M.R. & Paudel, N.S. (2008). Mobile Pastoralism in Crisis: challenges, conflicts and Status of Pasture Tenure in Nepal Mountains. *Journal of Forest and Livelihood 7*(1), 49-57.

[7]. Coffey S (2008). A Systems Approach to Climate Change Impacts on Livestock Production. *Paper prepared for presentation at the "Agriculture in A Changing Climate: The New International Research Frontier" conference conducted by the Crawford Fund for International Agricultural Research* (pp. 39-48). Canberra, Australia: Parliament House.

[8]. Ejiofor, T.E., Nwakile, T.C& Ali, C.C (2017). Skills required by Youths for Employment in Green Jobs in the Agricultural Sector (Grassland Management and Agritourism) in Anambra State, Nigeria. *International Journal of Multidisciplinary and Current Research, 5*, (July/ August, 2017 issue). Available at http://ijmcr.com/category/ ijmcr/vol-5-july-aug-2017/

[9]. Food and Agricultural Organization (2019). *The state of food and agriculture*. Rome, Italy. Retrieved from http://www.fao.org/docrep/012/i0680e/i0980e.pdf

[10]. Gaughan, J. B and Cawsell-Smith, A. J. (2015). Impact of climate change on livestock production and reproduction. In: Climate change Impact on livestock: adaptation and mitigation. In Sejian, V., Gaughan, J., Baumgard, L., Prasad, C.S (Eds.),*Climate change Impact on livestock: adaptation and mitigation*, (pp. 51-60). New Delhi, India: Springer-Verlag GMbH Publisher.

[11]. Ibrahim, J. (2014, March 24,). Pastoralist Transhumance, and Rural Banditry. *Premium times*. Retrieved on 25/10/2016 from http://www.premiumtimesng.com/ opinion/157305-pastoralist-transhumance-rural-banditry-jibrin-ibrahim.html.

[12]. Iqubal A (2013). Livestock husbandry - A sustainable livelihood in Ethiopia. *International Journal of Economy, Management and Social Sciences. 2*(8), 603-607.

[13]. National Research Council (2010). *Advancing the science of climate change*. Washington Dc: National Academy press

[14]. Olaitan, S. O.; Ali, A, Eyoh, E. O & Nwoke, K. G. (2000). *Research skills in education and social sciences. Onitsha:* Cape Publishers International Limited

[15]. Oromia National Regional State (2011). *Program of Plan on Adaptation to Climate Change*. Addis Ababa: Finfinne

[16]. Sahel and West Africa Club & Organization of Economic Co-operation and Development (2008). *The future of livestock in the Sahel and West Africa: Potentials and challenges for strengthening the regional market*. Retrieved from www.oecd.org/sah

[17]. Saidu, O &Omedo, B (2010). Climate change, genetics of adaptation and livestock production in low input systems. *2nd International Conference: Climate, Sustainability and Development in Semi-arid Regions* (pp. 1-12). August 16 - 20, 2010. Brazil: Fortaleza – Ceará.

[18]. Sejian, V. (2013). Climate change: Impact on production and reproduction, adaptation mechanisms and mitigation strategies in small ruminants: A review. *The Indian Journal of Small Ruminants, 19*(1), 1-21.

[19]. Stark, J., Terasawa K &Ejigu M (2011). *Climate change and conflict in pastoralist regions of Ethiopia: Mounting challenges, emerging responses*. CMM Discussion Paper No. 4. October 2011. Pp.1-54. United Nations Development Project.

[20]. Zelalem, Y., Aynalem, H & Emmanuelle G (2009). Effect of climate change on livestock production and livelihood of pastoralists in selected pastoral areas of Zaria, Nigeria. In Zelalem Y &Aynalem Haile (Eds.), *Climate change, livestock and people: Challenges, opportunities, and the way forward*. (pp.3-21). Proceedings of the 17th annual conference of the Nigerian Society of Animal Production held in Zaria, Nigeria, September 24 to 26, 2009.