



ISSN 2278 – 0211 (Online)

## The Impact of Human Factors and Environmental Challenges on Livestock Production in Zamfara State, Nigeria

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### **Abstract:**

*Different types of economic productions take place in different environment, and environment like human societies has been dynamic consequent to human and natural factors. Livestock production in Zamfara significantly relies on the rangeland to graze animals and raining season agricultural with small scale dry season farm production to produce animal feeds mainly sourced from agricultural residues. Therefore, human factor and the environment play vital roles in livestock production systems in the study area. Pastoralism constitute the major form of livestock production system in Zamfara, hence the critical role of the environment cannot be overemphasized. Livestock population in Zamfara is declining at an unprecedented rate, consequent to wide range of factors like the degradation of the environment and declining pasture resources and security challenges, which have compelled migration of the pastoralists out of the state. Livestock are not only important sources of meat protein and dairy products which provide high value protein food, but also supplies industrial raw materials like hides and skin, dried blood for poultry feeds, bones for glass and chalk processing, etc. In view of the foregoing, this paper examines the consequences of environmental challenges and human factor on livestock production in Zamfara.*

**Keywords:** Human challenges, environment, impact, livestock production

### **1. Introduction**

Human factor and the environment play an important role on the survival of different types of species. An environment is the surroundings or conditions in which a person, animal, or plants survive. An environment has also been defined as the natural world or a particular geographical area and human activities influence the environment on a very large scale.<sup>1</sup> Therefore, since pastoral rangelands are situated within space, man and the environment are therefore central to livestock production. Hence, the needs to reinvigorate research in historical trends in animal production to essentially address the domestic and global challenges in the livestock sector like the question of food security.<sup>2</sup>

Zamfara State is located in the northern part of Nigeria, it stretches from latitudes 10° 21' N to 13° 15' N and longitude 6° 20' E, covering a landmass of about 38, 418 square kilometres. It shares boundaries with Niger in the North, Katsina in the North - Eastern and Kebbi and Sokoto States in the West, Kaduna State in the south around Dansadau district.<sup>3</sup> The state also serves as a transit zone for pastoralists migrating from neighbouring states and from the Republic of Niger to central and south - western Nigeria through Zamfara in search of rich grazing land. The state's population according

<sup>1</sup>A.S. Hornby, et al , Oxford Advance Learners Dictionary, Oxford University Press, 2008, pp. 491.C. Park, A Dictionary of Environment and Conservation 1<sup>st</sup> edition, Oxford University Press, 2007, M.I. Yattoo, P. Kumar, U. Dimri and M.C. Sharma, Effects of Climate Change on Animal Health and Diseases, *International Journal of Livestock Research*, Vol. 2, No. 3, 2012, pp. 15 - 19 - 24

<sup>2</sup>O. Emmanuel Ojo & F. Peter Adebayo, 'Food Security in Nigeria: An Overview' *European Journal of Sustainable Development*, volume 1, No. 2, 2012, pp. 206 - 207, 211; O.T. Olukunle, Challenges and Prospect of Agriculture in Nigeria : The Way Forward, *Journal of Economics and Sustainable Development*, Vol.4, No.16, 2013, pp. 40 -43

<sup>3</sup>Zamfara State Ministry Of Information Youths Sports And Culture, *Laying The Foundation of Zamfara State*, Dadin Kowa Ventures, Jos, 2006, pp.8 – 10; GPS Coordinates of Zamfara, <http://latitude.to/map/ng/nigeria/regions/zamfara-state>, last accessed 10/11/2017

to 2006 census was 3, 278, 400. The state's population ranks 21 out of the 36 states of the federation; however, the projected population of the state in 2016 was 4,515,400.<sup>4</sup>

Livestock economy in Zamfara has provided a means for economic empowerment and poverty alleviation through the sales of cattle, goats, sheep, horses, donkeys, camels, dairy products, hides and skin, etc. The sector has also extended linkages with the transportation services; sales of animal feeds and other related services.<sup>5</sup> Increased attention to livestock-environment interactions is therefore of critical importance in sustaining pasture resources in the rangeland for sustainable livestock management systems.<sup>6</sup>

## 2. The Threats of Climate Change

Livestock production like any other economic activity has its general and peculiar constraints. Some of which are age long (e.g. drought, famine, erosion, desertification, etc.) while others are emerging challenges such as; cattle path encroachment, climate change, and security challenges. Extensive land-based livestock production system like the type in Zamfara has been severely affected by the factor of climate change.<sup>7</sup> Climate change refers to current climatic variations caused by radiation from the sun rays. It is caused by the destruction of the ozone layers due to emissions of the greenhouse gasses.<sup>8</sup> These climatic variations affect the level of rainfall and the density of moisture in the air, which affects crop cultivation, production of animal feeds from plants, development of pasture and water reserves for livestock management.<sup>9</sup>

Farmers and herders in the dry land areas like Zamfara have always existed in a precarious balance with the harsh and inhospitable environment, dominated by risk and uncertainty.<sup>10</sup> They have over the years found it very difficult to evolve some sustenance mechanisms to cope with these difficulties in adapting to changing environmental conditions in livestock production. Therefore, challenges such as the climate change have been very devastating<sup>11</sup> because it has resulted into a very high temperature, which in turn reduces moisture in the air, causing plants and the soil to dry up. The worst affected areas in Zamfara are: Magari, Kwashabawa, Shamushalle, Gabaken Gigiya, Madira, Gabaken Mesa, Bula, Kagara Falau, Tudun Wadar Rahazawa, Kamarawa, Gusami, Galadi, Tsibiri, Cigama, Tsabre, Billashe, etc. in the extreme northern parts of Zamfara, sharing common boundary with the Republic of Niger.<sup>12</sup>

Similarly, the production of livestock besides being affected by climate change, also on the other hand contributes to climate change, because livestock contributes about 18% of total greenhouse gas emissions.<sup>13</sup> These gas emissions from

<sup>4</sup> National Population Commission of Nigeria, 2016, National Bureau of Statistics, 2016, see <https://www.citypopulation.de/php/nigeria-admin.php?adm1id=NGA037>

<sup>5</sup> Abubakar Marafa, 85 years, Farmer, interviewed on 25/03/2017

<sup>6</sup> H. Steinfeld, *Introduction to the Study Livestock-Environment Interactions*, FAO, 2010, p. 6

<sup>7</sup> S.K. Singh, H.R. Meena, D.V. Kolekar, and Y.P. Singh, 'Climate Change Impacts on Livestock and Adaptation Strategies to Sustain Livestock Production', *Journal of Veterinary Advances*, Volume, 2 No. 7, 2012, pp. 407-412.

<sup>8</sup> W.S. Broecker, *How to Build a Habitable Planet*, Ejdigio Press, New York, 1987, pp.12, Two major types of radiations were identified, namely : infrared (IR) and ultraviolet (UV)

<sup>9</sup> R. Tol, *Adaptation to Climate Change in the context of sustainable development and equity. Global Environmental Change*, Volume 8, No. , 1998, pp. 109-123, J.S. Oguntoyimbo, "Climatology" in Youdeowei, A. et al (eds.), *Introduction to Tropical Agriculture*, Longman , New York 1986. pp 24, 26

<sup>10</sup> B. Roger, *Conflict Between Pastoralists and Cultivators in Nigeria*, A Review Paper Prepared for Department of Funds for International Development, DFID Nigeria, August 2010, 1-3

<sup>11</sup> Ibid., Federal Ministry Of Environment Of Nigeria : National Action Programme to Combat Desertification in Nigeria Desertification, pp. 2, 10 - 11, J.A. Alokun, " Animal Production ; A Panacea to Food Security under the Prevailing Climate Change", F. Omotoso et al (eds.), *Governance and Policies in Nigeria*, Editions Sonou Afrique de Afrique , Beni Republic, 2010, pp.466, 469 471

<sup>12</sup> Dodo Hushi, 63 years, interviewed 30/1/2014; Hamza Ahmad Asha, 91 years, interviewed 21/3/14, T.O. Williams, "Livestock Development in Nigeria: A survey of the Policy Issues and Options", Network Paper No. 21, ILCA, Addis Ababa, Ethiopia, 1989, pp.1 - 2

<sup>13</sup> Food and Agriculture Organization (FAO), *Greenhouse Gas Emissions from the Dairy Sector - A Life Cycle Assessment (Food and Agriculture Organization, Rome)*, 2010. The need to contain and maintain food security in terms of the provision of animal protein is essential for the survival of human species. It is estimated that 860 million human species today over the world suffer from hunger and starvation and out of this figure 830 million constituting more than 90 % live in developing countries, see, A.J. Yusuf, "Climate Change: Implications on Food Security for Sustainable National Development" a paper delivered at an International Conference on Children in Science and Technology, Landmark International University, Omu Aran, Kwara State, Nigeria, 24 - 26 , May 2016, Pp.1 – 3, J.A. Alokun, "Animal Production ; A Panacea to Food Security under the Prevailing Climate Change", F. Omotoso et al (eds.), *Governance and Policies in Nigeria*, Editions Sonou Afrique de Afrique , Beni Republic, 2010, pp.466 - 470

livestock include; carbon dioxide and methane. Carbon dioxide discharge is also promoted through plants and bush burning by farmers and livestock raisers and this contributes to deterioration of plants.<sup>14</sup>

Climate change had caused shorter farming seasons, leading to reduced crop yields and a decline in the production of livestock feed resources in the rangelands for livestock management. The amount of sunlight that is reflected on the earth surface becomes too difficult to be absorbed by the soil and the vegetation. Reduction in the length of rainy season has led to poor pasture growth, thereby causing decline in fodder supplies from crop residues.<sup>15</sup> These constraints have also resulted to weight loss and increased deaths among stock, whereas longer hot periods have aggravated heat-related diseases; drop in milk production which has consequently affected the length of lactation in animals.<sup>16</sup>

Livestock management systems in Zamfara have been majorly under the traditional production systems<sup>17</sup> because raising of livestock especially cattle has remained transhumance by the migrant herdsman and the agro - pastoralist livestock raisers in Zamfara area. Livestock are sustained in rainy (usually a shorter period) and dry seasons period. In the dry season, pastoralists trek along with their herds to distant areas in southern Nigeria, sometimes animals trek out the West African sub - region. This long trek in search of pasture and water has resulted to loss of weight in animals which affect conception<sup>18</sup> during mating and there has been case of miscarriages in the months of pregnancy.<sup>19</sup> The problem of sustainable sources of water for livestock has been a very serious problem in the dry season in extreme northern parts of Nigeria where Zamfara is located.<sup>20</sup>

This age long livestock management system heavily depends on the environment and climatic variations, which have made rapid livestock multiplication too slow, these difficulties, have also affected milk production in lactating cattle. The decline in milk flow affects the calf's nutritional status (this is because in critical malnutrition, lactation ceases completely) and household consumption and sales of dairy products to supplement family expenses, under this condition, humans are often in tight competition with calves for the small amount of milk from cattle.<sup>21</sup>

Similarly, animal contagious diseases in the tropics spread rapidly during hot season and due to the cost of animal feed concentrates and other vital feeds, animals are often allowed to graze freely in all seasons. However, the outcome of this free grazing poses a serious environmental problem in terms of spread of contagious diseases like Pleuro - Neumonia, viral and parasitic infections, Foot and Mouth Infection, Anthrax, Skin and other fungal Infections, etc.<sup>22</sup>

<sup>14</sup> R.S Chris, *People and Environment*, London, Heinemann, Publications, 1992, p.11,19, see also H. Steinfeld & P. Gerber, Livestock production and the global environment: Consume less or produce better?, Proceedings of the National Academy of the United States of America, PNAS, vol. 107 no. 43, pp.2,3, P.J Gerber, H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J Dijkman, A. Falcucci, G. Tempio. Tackling Climate Change through Livestock: A Global Assessment of Emissions and Mitigation Opportunities. Rome: FAO; 2013, last accessed, August 28, 2014, <http://www.fao.org/docrep/018/i3437e/i3437e.pdf>.

<sup>15</sup> S.K. Singh, H.R Meena, D.V Kolekar, and Y.P Singh, Climate Change Impacts on Livestock and Adaptation Strategies to Sustain Livestock Production, *Journal of Veterinary Advances*, Vol. 2, No. 7, pp. 407-412

<sup>16</sup> S.K Singh, H.R Meena, D.V Kolekar and Y.P Singh, Climate Change Impacts on Livestock and Adaptation Strategies to Sustain Livestock Production, *Journal of Veterinary Advances*, Vol. 2 No. 7, 2002, pp.407 - 412.

<sup>17</sup> Some of the livestock production system in the area include; Pastoralism, Agro-Pastoralism, Cut and Carry Methods, Scavenging, Extensive Management System, etc. see also, U. Usman, S. Yelwa, S. Gulumbe & A. Danbaba, An Assessment of the Changing Climate in Northern Nigeria Using Cokriging, *American Journal of Applied Mathematics and Statistics*, Vol. 1 No. 5, 2013, pp. 90 - 98.

<sup>18</sup> D.A Ikumola, The Socio -Economic Implications of Climate Change , Desert Encroachment and Communal Conflict in Northern Nigeria, A *Seminar Paper* Presented at New Faces for African Development Conference, Dakar Senegal, 27 - 30 June, 2010, pp. 1 -3,10,11, see more in D.R Nawathe, P.K Sinha and A.S Abechi, Acute Bovine Trypanosomiasis in a Tsetse-free Zone of Nigeria, *Journal of Tropical Animal Health and Production*, 1988, Vol 20, pp. 141, 142

<sup>19</sup> K. Swindel, "Population and Agriculture in the Sokoto Rima Basin of North - West Nigeria: A Study of Political Adaptation and Change 1800 - 1980", in *Cashiers D'etudes Africaines*, Volume, 26, No.101 - 102, 1986, pp. 75,76,97; M.C Apleby et al *Long Distance Transport and Welfare of Farm Animals*, Cambridge, USA, 2008, p.21

<sup>20</sup> I. Hoffmann, "Access to Land and Water in Zamfara Reserve: A Case Study for the Management of Common Property Resources in Pastoral Areas of West Africa", *Journal of Human Ecology*, Vol. 32, No. 1, February 2004, pp. 87, 94

<sup>21</sup> Ibid, O.O Emmanuel et al, Food Security in Nigeria: An Overview.....op cit, pp. 201, 202, 205, A. McLeod, World Livestock 2011: Livestock in Food Security. Rome: FAO; 2011. Last accessed , September 25, 2014, <http://www.fao.org/docrep/014/i2373e/i2373e.pdf>, on the value chain of dairy products see, G. Lister, G. Tonsor, M. Brix, T. Schroeder, C. Yang. Food Values Applied to Livestock Products. 2014, last accessed, August 15, 2014, [http://www.agmanager.info/livestock/marketing/WorkingPapers/WP1\\_FoodValues-LivestockProducts.pdf](http://www.agmanager.info/livestock/marketing/WorkingPapers/WP1_FoodValues-LivestockProducts.pdf).

<sup>22</sup> T. Shaw, & G. Colville, *Nigerian Livestock Mission*, London Colonial Office, Mccorquole & Co. Ltd. 1950, pp.56,59, see also, H.M. Jinju, *African Traditional Medicine, : A Ccase Study of Hausa Medicinal Plants and Therapy*, Zaria, Gaskiya Corporation Limited, 2000, pp.2-9; L.V Crowder, *Agricultural Science*, U.K Longman Group, 1982, p. 16; R.M Gatlen by, *Sheep Production in the Tropics*, Longman Publishers, London & New York, 1986

This trend of experiences therefore, explains centuries of adjustments to the conditions imposed by the limits of the climate.<sup>23</sup>The climate change-induced migration by pastoralists from the far north to the north-central and southern parts of Nigeria in search of grazing fields have resulted to several deaths in thousands from clashes between predominantly Fulani herdsmen and local farmers over cattle routes and grazing land.<sup>24</sup>

Conflicts over land resources because of the diminishing environmental resource base has been common in areas that provide seasonally critical resources for livestock production like rich pasture (water and grass), e.g. the villages of Tubukke, Dansadau, Bindin, Bingi, Duhuwa, Boziya, Nahuche, Bilbis, Kucheri, Yankuzo, Zurmi, Shinkafi in Fadama (wet land areas), and Bakura/Mafara wet land areas in Zamfara. These critically limited resources have competitive uses amongst farmers, herders, and hunters, especially in the seasons when rainfall becomes very low.<sup>25</sup>Consequently the free and peaceful access to communal grazing land<sup>26</sup>which is essential for livestock production has been eroded by bloody history of conflicts between pastoral groups and farmers.<sup>27</sup>

Another fundamental challenge that resulted to environmental challenge has been the growth in human population, the use of tractors, herbicides, fungicides, insecticides, and genetically modified seeds, organic and inorganic fertilizers, enhanced veterinary services, have prompted farmers to extend cultivation into marginal or borderline areas used for grazing and routes for cattle passages.<sup>28</sup>Practical examples of areas in Zamfara where marginal lands have been cultivated and the locations have been affected by natural disasters like erosion and desertification were Banga, Kogi, Dayau, Kaya, Kadamutsa, Gabake, Kamarawa, northern parts of Shinkafi, Tubali, Mada, Magari, Shamushalle, Morai, Madira, e.tc.<sup>29</sup>

This development have also led to overcrowding and straining of reserve's resources because of the low carrying capacity of the rangeland.<sup>30</sup>Farmers following this development encroached into cattle routes and grazing reserves,<sup>31</sup> an act which have on many occasions resulted to conflicts between farmers and herdsmen.<sup>32</sup>This is because expanding human population requires additional land for settlement and these had resulted to conversion of farmlands and grazing land into residential areas<sup>33</sup> and therefore farmers had to move inwards to cultivate new additional farm land, this practice of residential and farmland expansion has affected free grazing land and stock path.<sup>34</sup> The pastoralists, most especially the agro - pastoral groups, who usually settle closed to town and villages in Zamfara, had no alternative than to graze their animals along road sides and farmlands.<sup>35</sup>

<sup>23</sup> Sani Maikiwo, 55 years, *drover Interviewed on, 6/2/14*, O. Osaeze, How Climate Change Fuels Pastoralists / Farmers Crisis, *The Economy*, May, 2016, P.41, I. Hoffmann, "Access to Land and Water in the Zamfara Reserve", A Case Study for the Management of Common Property Resources in Pastoral Areas of West Africa, *Journal of Human Ecology*, Vol. 32, No. 1, February 2004, pp. 85, 87, 92 - 94, see also, R. O. Onah 'Environmental Problems related to Livestock Production in Tropical Africa', *Journal of Environmental Sciences*, 1998, Volume 19, Issue 2, pp. 137 - 139

<sup>24</sup> E. Odemwingie, "The Grazing Routes to Ethnic Bloodshed" *The Nigerian Leadership Newspaper of Nigeria* Nov 28, 2014 pp. 3, 11

<sup>25</sup> M.J., Mortimore, *Adapting to Drought: Farmers, Famine and Desertification in West Africa*, Cambridge University Press. 1989, pp. 9, 12, See, G.J Van Apeldoorn, Drought in Nigeria, Lessons of the 1972 - 1974 Disaster, Report No. 2, Centre for Social and Economic Research, A.B.U. Zaria, Nov. 1978, pp.6,7 & 52

<sup>26</sup> P.H. Bamaiyi, Factors Militating against Animal Production in Nigeria, *International Journal of Livestock Research*, Volume 3, No. 2, 2013 pp. 54,56, 59,61

<sup>27</sup> M. Kirk, "The Context for Livestock and Crop-Livestock Development in Africa: the Evolving Role of the State in influencing Property Rights over Grazing Resources in Sub-Saharan Africa" In N. McCarthy, B. Swallow, M. Kirk and P. Hazell (eds.) *Property Rights, Risk, and Livestock Development in Africa*, ILRI, 1999

<sup>28</sup> Nabanga Muhammad, Pastoralist, 74 Years, *Interviewed on 14/11/2017*

<sup>29</sup> Ibid

<sup>30</sup> I. Hoffmann, 'Access to land and water in the Zamfara Reserve. A Case Study for the Management of Common Property Resources in Pastoral areas of West Africa', in *Journal of Human Ecology*, Vol. 32, No.1, 2004, pp. 90, 93 - 99

<sup>31</sup> I. Hoffmann, 'Access to land and water in the Zamfara ...op cit, N.C. Breaty & R.R. Well, *The Nature and Properties of Soil*, Pearson Education Publications, India, 2002, pp. 16, 18, 27, 40, 70, 71, Between 1950 and 2006, the Nigerian livestock population grew from 6 to 66 million, an eleven fold increase. The forage needs of livestock exceed the carrying capacity of its grasslands

<sup>32</sup> Ibid, A. Hof, et al, "Degradation of Natural Resources or Necessary Intensification of Land Use to Sustain a Growing Number of Users? - The Case of the Zamfara Reserve, Southwest Nigeria", *Conference on International Agricultural Research for Development, Deutscher Tropentag Gottingen, October 8 - 10, 2003*, pp.1,3. Z.A. Bonat, "Agriculture" *Nigeria Since Independence: The First Twenty-Five Years, The Economy*, (eds.), M.O. Kayode & Y.B. Usman, Heinemann Educational Books, Nigeria Limited, 1989, pp.70,71

<sup>33</sup> Ibid

<sup>34</sup> Urban expansion had resulted to conversion of farms located close to towns and cities into residential lay outs, this has been very common in Nigeria

<sup>35</sup> Human population by 2050 is estimated to reach 9.15 billion, and Nigeria's population projected at 200 Million, *UNPD Reports 2008*, most of the increase is projected to take place in developing countries. East Asia will shift to negative population



### 3. Livestock Production and Biodiversity Loss

Livestock production has equally contributed to biodiversity loss. Biodiversity refers to the destruction of life species that promotes the nutritional composition of the soil. Specifically, the scientist argued that; healthy ecosystems comprises of a complex system of uninterrupted survival of millions of inter - related species that improves the soil and the environment with various benefits for microbial species abundant in the soils.<sup>36</sup>Insects, bats, and birds pollinate flowers and feed on pests. These creatures maintain balance and recycle nutrients so that life can regenerate, convert atmospheric nitrogen to soil nitrogen compounds vital for plant growth, and live in association with plant roots to facilitate the uptake of water and nutrients.<sup>37</sup>

Greater parts of Zamfara like Kalale, Ajja, Dunburum, Dagwarwa, Ginjime, Gamagiwa, Duhuwa, Gidan Dawa, Dangulbi, Bindin, Dansadau, Kuyambana, etc. hosted a large number of medicinal species of plants and animals that were important to humankind, but which have been threatened and others destroyed. These important animal species such as the sitodunga antelope, cheetah, giraffe, lion and elephants in the area have become endangered and indigenous plant species especially those with medicinal values e.g. *Giyaya* - *Mitrogina* spp, are presently very difficult to locate in the farm land and jungles.<sup>38</sup>*Madaci* - senegalistis an indigenous medicinal plant species use to cure various ailments has been endangered.<sup>39</sup>

### 4. Desertification, Drought and Land Degradation

The environmental challenges had been further worsened by the menace of desertification and drought, which had accumulatively reduced productivity in the livestock industry in Zamfara.<sup>40</sup>Nigeria is one of the countries south of the Sahara faced with a rapid desert encroachment, with severe effects on the northern parts of the country. Zamfara is one of the frontline states located in the north - western Nigeria which has been affected by these twin natural disasters.<sup>41</sup>Drought has been defined as a naturally occurring phenomenon that exist over a particular period in an area where precipitation is significantly below normal recorded levels, causing deterioration of land productivity and low agricultural outputs.<sup>42</sup>

Drought has been one of the natural disasters that have on a large scale affected livestock production because of decline in the production of animal feeds.<sup>43</sup> The annual average recorded precipitation in Zamfara area was 600 - 800.<sup>44</sup>The drought disaster resulted to reduction in the natural potential of land, the depletion of the soil surface and reduction in the flow of groundwater which have negative repercussions on the living conditions and the economic development of the people and livestock development.<sup>45</sup>This therefore, establishes a relationship between droughts, desertification and food security,

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growth by the late 2040s, see *FAO 2010*, In contrast, population in sub-Saharan Africa (SSA) will still be growing at 1.2 per cent per year. Rapid population growth could continue to be an important impediment to achieving improvements in food security, I. Hoffmann, "Access to Land and Water....."op cit.

<sup>36</sup> National Wild Life Federation, *What is Biodiversity?*, 1999, p.1, *What is Biodiversity?*, American Museum of Natural History, center for Biodiversity and conservation, available on, BIODIVERSITY, acnh/What%20is%20Biodiversity\_.mht,2015, p.1-2, see also the contributions of F. A.S. Dairo, "Food Security and Agricultural Policy for National Development", F. Omotoso et al (eds.), *Governance and Policies in Nigeria*, Editions Sonou Afrique de Afrique, Beni Republic, 2010, pp. 478,480

<sup>37</sup> Ibid.

<sup>38</sup> Even though these animals have on the other hand constituted a threat in some areas to the pastoralist who engaged in total nomadism, see, *Federal Ministry of Environment Reports on combating drought and desertification, 1997* pp.15,16

<sup>39</sup>However, in Zamfara area the benefits derived from livestock production far outweigh the propositions for the protection of this system and the contrary arguments in support for the protection of biodiversity is that, the earth's ecosystems are delicate and complex, and scientists have warned that such a drastic reduction in biodiversity could be catastrophic, especially when compounded by climate change. Stressing further that biodiversity improves crop cultivation, see, B. Gene, " How the Livestock Industry Endangers Biodiversity, and Why It Matters" An *unpublished Paper*, 2015, pp.1 - 4

<sup>40</sup> See, S.M.K. David, " Perspectives of The Political Economy Of Drought, Desertification and Famine in Arid Zone Of Nigeria", *The Challenges For Nigeria At 50 :Essays In Honour of Professor Abdullahi Mahdi*, Gombe State University, Pyla – Mark Publishers, Kaduna, pp. 277-279, 281

<sup>41</sup> I.B Abaje, O.F Ati, E.O Iguisi, & G.G Jidauna, "Droughts in the Sudano-Sahelian Ecological Zone of Nigeria: Implications for Agriculture and Water Resources Development" *Global Journal of human Science , Geography, Geo-Sciences and Environment, Volume 13 Issue 2 Version, 2013*, pp. 1, 2,3,5-7 Vol. 13 Issue 2 Version 1.0 Year 2013, pp.1, 2

<sup>42</sup> J.Y. Yoyock, "Drought Desertification and the Future of Agricultural Development in Nigeria" *A Production for the Sokoto State Chamber of Commerce and Industry*, Ibadan, Mackay Nigeria Limited, 1990, pp. 33,35 Federal Ministry of Environment of Nigeria, " National Action Programme to Combat Desertification", 1979,pp.8,9

<sup>43</sup>S.S. Jagtap, "Characteristics of Moist Savanna Zones of Africa", *Proceedings of an International Workshop*, 19 -23 September, 1994, Cotonou, Republic of Benin, pp. 9, 11,30

<sup>44</sup> Ministry of Agriculture and Natural Resources, *Sokoto Livestock Development Corporation*, (SLDC), 1978,P.3

<sup>45</sup> Ibid, pp. 11, 12, J.Y Yoyock, "Drought Desertification and the Future of Agricultural Development in Nigeria" A Publication for the Sokoto State Chamber of Commerce and Industry, Ibadan, Mackay Nigeria Limited, 1990, pp. 33,35, 40,41

because, the deterioration of environment has resulted to decreased soil quality which ultimately reduced agricultural productivity - a key determinant of food security and by extension livestock management.<sup>46</sup>

Herdsmen were engraved with chains of difficulties during drought, for example, 'grains were exchanged for livestock in good times, while livestock were exchanged for grains in bad times'; like the drought period. Markets usually become unable to cope with the large increases in animals supplied for sales, because as the period of drought lengthens, the purchasing power of herders became increasingly weak. Pastoralists as a matter of necessity sold their productive stock, comprising of buck, doe (matured goats), stag and steer (castrated male cattle of varying ages), in - kids and in - calf (Premature and Pregnant cattle).<sup>47</sup> Many farmers in Zamfara recorded a decline of more than 50% of their farm produce during severe droughts. Only few privileged farmers could survive feeding from grains from their own food reserves, more than 60% were dependent on the market. Falling prices of livestock, rising food prices and food crisis were further exacerbated by the scarcity of money in circulation during the 1974 and 1984 drought period.<sup>48</sup>

Deforestation has been one principal cause of desertification; it is the conversion of forested areas to non-forested land through destruction or felling down of trees on a large scale to meet various human needs e.g., expansion of agricultural croplands, urbanization, fuel wood collection, mining and resources extraction, while hunting and bush burning practices have been identified as the key drivers of deforestation.<sup>49</sup> In Zamfara areas of Gurbin Bore, Dagwarwa, Mashema, Walo, Kyasgyera, Disko, Mailido, Madira, Gabake, Kuturu, Dansadau, Wanke, Magami, Gidan Dawa, Galadi, Tubali, Cigama, Rijiyar Ladan, Yanbuki, Magami, Bindin, Dansadau, Danmarke, etc. are villages across the state that are prone to deforestation activities.<sup>50</sup> In Zamfara, more than 85% of its population depend on fuel wood for cooking and other economic activities like blacksmithing, pottery works, tanning, bakery works, meat roasting, charcoal production, etc.<sup>51</sup>

Traditional rulers have played a negative role in the deterioration of the forests resources and grazing reserves in Zamfara by contravening the rules governing the preservation of the forest resources<sup>52</sup> All the previously enacted land acts in the colonial and post independent period<sup>53</sup> had not deterred village, districts and emirates authorities from granting informal ownership of land to privileged and influential people in Zamfara, especially during civilian regimes where party loyalists and politicians were allocated free land as compensation for supporting election campaigns.<sup>54</sup>

Changing environmental conditions have drastically affected pasture resources<sup>55</sup> in the grazing reserves in Zamfara, such as the Maradun forest, Dunburum - Shamushalle - Tsabre - Ajja, Maradun, Gulbin Ka and parts of Dansadau (Maru) forest

<sup>46</sup> O.O. Emmanuel & F.P Adebayo, "Food Security in Nigeria: An Overview" *European Journal of Sustainable Development*, volume 1, No. 2, 2012, Pp.201 -203

<sup>47</sup> Janwuro Garba, 72 years, *Interviewed* 12/7/15, see also, E.O Oladipo, *A Comprehensive Approach to Drought and Desertification in Northern Nigeria*, 1993, pp.16,19

<sup>48</sup> M.J Mortimore, *Adapting to Drought: Farmers, Famines and Desertification in West Africa* (Cambridge: Cambridge University Press, 1989 cited in M.S. Abdulkadir, *Structuring, Struggling And Surviving Economic Depression in Northern Nigeria: The 1930s As Preview of the Present*, Professorial Inaugural Lecture, Department of History, Bayero University, Kano, Nigeria, Saturday, July 31st, 2004, pp.11,12

G.J. Van Apeldoorn, *Drought in Nigeria: Context and Characteristics*, Centre for Social and Economic Research, Report No. 1, A.B.U. Zaria, 1978, pp. 5,6

<sup>49</sup> G. Tian, "Potentials & Constraints to Crop Production", *Proceedings of an International Workshop*, 19 -23 September, 1994, Cotonou, Republic of Benin, pp. 107, 109, 111-112

<sup>50</sup> Generally, Nigeria is considered the world's highest deforested country and has lost about 55.7% of its primary forest. The situation appears alarming that the FAO states that the forest in Nigeria will disappear by 2020 if the current rate of forest depletion continued unchecked and the implication will make the land becomes less productive, Federal Ministry of Environment of Nigeria National Action Programme to Combat Desertification, Federal Office of Statistics 1998, pp.8-9, 11, 13, 26 - 27,

<sup>51</sup> G.J. Van Apeldoorn, *Drought in Nigeria*..... Op cit, P.7, see also, JFK Akinbami, AT Salami and W.O. Siyanbola, "An Integrated Strategy for Sustainable Forest Energy Environment Interactions in Nigeria", *Journal of Environmental Management*, Vol.69 NO. 2, 2003, pp. 115, 117, 128.

<sup>52</sup> U.M. Farouk, "The Pastoral-Agricultural Conflicts in Zamfara State, Nigeria", "A Seminar Paper, North Central Regional Centre for Rural Development Iowa State University, Ames, 2010, pp.1,4-5,6

<sup>53</sup> A. H./WP/A16-2/1/A6: White Paper on Statement of Forest Policy for Northern Nigeria, 1963, Laws of the Federation, Land Use Act of 1978

<sup>54</sup> Abdurashid Abubakar, 59 years, *Interviewed* 10/10/2016. He is the current Range management Officer of Daki Takwas Range Management Centre, Bawa Dila Gusau, 72 years, *Interviewed* 19/11/15, I. Hoffmann, "Access to land and water in the Zamfara Reserve: A Case Study for the Management of Common Property Resources in Pastoral areas of West Africa", *Journal of Human Ecology*, Vol. 32, No.1, 2004, pp. 77 - 78, 104,105, see, *FAO, The Roles of Small-Scale Livestock Keepers in the Development, use and Conservation of Livestock Resources*, 2009, pp.14,18, 19

<sup>55</sup> M. Ahindra, *Agricultural Biotechnology*, PHI Learning Private Limited, New Delhi, 2008, 190,196, 224 - 227, 237, 244,

have deteriorated,<sup>56</sup> the rangeland and parts of the reserves are substantially becoming sandy and a sandy soil have low nitrogen, phosphorus and organic matter content and low water holding capacity, this condition sustains livestock management at a subsistence level.<sup>57</sup>

Sequel to drought disasters in the region livestock production has witnessed stagnation over the years. The drought disaster resulted to famine in the wider northern Nigeria (the study area inclusive) prior to the Sahelian drought of 1974 and after, see table 1 for some of the recorded drought and their magnitude.<sup>58</sup>

S/No	Name	Year	The Gravity of the disaster in Zamfara Area
1	Kumumuwa/Yardakala	1913 - 1914	Mild
2	Sakatariya/Yarbuhu	1921	Not felt
3	Karahunu/ Gara Hannu	1924	Not widespread
4	Dan Salau/Mai Buhu	1927	Severe
5	Sude Mu Gusa	1930 – 1931	Severe but not widespread
6	Yar Gusau/Yar Balange	1942	Severe
7	Yar Dikko	1944	Mild
8	Shago	1947	Severe
9	Garin Jere	1951	Mild not wide spread
10	Muda	1953	Mild
11	Uwar Sani/Sololo	1954	Severe
12	Bani Mayafina	1958	Severe
13	Launa Tafi Dan Uwa	1960	Mild /Not widespread
14	Mai Rakuma	1961	Not spread
15	Mai Zobe	1966	Mild
16	Da Garin su yar Musa	1972 – 1974	Severe & wide spread in Zamfara area
17	Shakasuma/Yarta Ralle	1975	Severe & widespread
18	Yar Buhari	1985	Severe
19	Shafa/Murza	1997	Mild

Table 1: Dates of Major Drought/Famine Period in Northern Parts of Nigeria from 1913 - 1997

Sources: Field work 2014/15, G.J. Van Apeldoorn *Drought in Nigeria: Context and Characteristics*, Centre for Social and Economic Research, Report No. 1, A.B.U. Zaria, 1978, pp. Yoyock J.Y. "Drought Desertification and the Future of Agricultural Development in Nigeria" A Publication for the Sokoto State Chamber of Commerce and Industry, Ibadan, Mackay Nigeria Limited, 1990, Pp.40, 41

Ascertaining the exact number of livestock loss during the drought period has been very difficult to establish, because there were emergency and unrecorded natural deaths. There was also mass arrival of other livestock escaping from Niger republic en route Zamfara area to the southern parts of Nigeria in search of a buffer zone.<sup>59</sup> Death rates in times of drought are usually high, particularly among certain species and classes of stock cattle. Horses and donkeys were less resistant than sheep, goats and camels. Young animals, elderly stock, in – calves, in - Kids and Mares were the most vulnerable within any particular species. Death rates increased as the period of drought lengthens.<sup>60</sup> However, oral sources and available tax records were employed to establish extent of losses by some selected resident herdsmen in Zamfara area.<sup>61</sup> This has been indicated in the table below.

<sup>56</sup> On the historical evolution and development of the grazing reserves see, NAK (National Archives Kaduna, Ministry of Animal Health and Forest Resources (MAHFR) 22/1919 Vol. I-II: Forest Reserve of Northern Nigeria, pp. 497, 498, 502, 503 M.O. Awogbade, "Grazing Reserves in Nigeria", *Commission on Nomadic Peoples Number 23*, 1987, pp. 19 -23

<sup>57</sup> A. Hof, L. Addy and B. Rischkowsky, "Degradation of Natural Resources or Necessary Intensification of Land Use to Sustain a Growing Number of Users? - The case of the Zamfara Reserve, Northwest Nigeria" Conference on Agricultural Research for Development, Deutscher Tropentag, Göttingen, Germany, October, 8 -10, 2003, pp. 3 -6, see also, *FAO, The Roles of Small-Scale Livestock Keepers in the Development, Use and Conservation of Livestock Resources*, 2009, pp.14, 16,18, 19, see also, FDLPCS (Federal Livestock and Pest Control Services), *Livestock in Sokoto State; in Nigerian Livestock Resources*, Volume 3, State Reports, p. 26, I.B Abaje, O.F Ati, E.O Iguisi, & G.G. Jidauna, "Droughts in the Sudano-Sahelian Ecological Zone of Nigeria: Implications for Agriculture and Water Resources Development" *Journal of .....op cit*, Volume 13 Issue 2 Version 1.0 Year 2013, Pp.3,5

<sup>58</sup> G.J. Van Apeldoorn, *Drought in Nigeria : Context and Characteristics*, Centre for Social and Economic Research , Report No. 1, A.B.U. Zaria, 1978, Pp. 31, 33

<sup>59</sup> G.J. Van Apeldoorn, *Drought in Nigeria.....op cit*, p. 56

<sup>60</sup> Mumuni Bafillace, 86 years Agro-Pastoralist, interviewed 26/02/2014, J.Y. Yoyock "Drought Desertification and the Future of Agricultural Development in Nigeria" .....pp. 35, 36, 38

<sup>61</sup> WJHCB/KND/DNB/61/Vol. 1 - Drought Affected Areas Relief, pp. 11,12

S/no	Location	Goats	Sheep	Cattle	Donkeys	Camels	Total
1	Kwashabawa	679	871	461	12	1	2,024
2	Gabake	209	29	21	06	-	265
3	Mada	73	43	12	03	2	133
4	Wonaka	17	372	117	43	-	549
5	Jangebe	47	29	27	19	1	123
6	Gora	123	17	63	04	3	210
7	Magami & Gidan Dawa	84	12	163	09	1	269
8	Total number per specie	1,232	1,373	864	96	7	3,572

Table2: Stock Losses during the 1974 Drought in some parts of Zamfara from two selected towns in the major livestock production zone  
Field work, 2015/2016

The Federal Livestock Department and National Livestock and Meat Agency put the total national herd loss at 25% of the existing livestock population in Nigeria. For example, a total loss of more than six million herds was recorded in the Sokoto Rima Valley.<sup>62</sup>

In most pastoral systems, grains provide an important, though seasonally variable part of the diet.<sup>63</sup> Therefore, drought has multiplying effects on food production for human consumption and the production of animal feed for livestock development. This further supports the conclusion that crop and animal production have an integrated relationship, the prosperity and decline in either of the two affects the other.<sup>64</sup>

Another survival strategy adopted during natural disasters like famine, drought and other difficult moments by the pastoralists who own largest stock was herd-split, by sending a proportion of the herds to safer zones and returning them back when normalcy returns. Under these arrangements, certain numbers of herds were shared to family relations and trustees for upkeep over some times, until natural conditions improve. Herd-splitting therefore becomes an important survival strategy in such trying moments.<sup>65</sup>

Accordingly, in the late 1980s and early 1990s the federal government of Nigeria and the European Economic Community (EEC) financed the establishment of shelter Belts as parts of its remediation programmes to reduce desert encroachment in critical locations in Zamfara. These projects included the establishment of shelter belts and woodlots with the assistance of development partners such as the World Bank and the European Union (E.U.). Shelter belts in Zamfara were established, for example, in Maguru, Barkeji, Kanwa, Zurmi, Shinkafi, Jangeru, Badarawa, Maguru, Dole, Dunfawa, Kasuwar Daji, Birnin Yero, Awala, etc. at 30 - 50 meters range. Even though these programmes took place gradually over time in the post drought period.<sup>66</sup> The Rima Basin Development Authorities, (RBDAs) were also involved in the improvement of community water supplies, drainages and sanitation,<sup>67</sup> like the Sokoto-Rima River Basin Development Authority.<sup>68</sup>

Afforestation Programmes were executed by the Arid Zone Afforestation Project (AZAP) instituted by the Federal Government in 1976 to tackle the problems of desertification through the establishment of woodlots, improvement of forest resources and construction of windbreaks. The agency was actively involved in development of water resources particularly for irrigation and supply of water to livestock rangeland and range management centres. These efforts included damming and diversion of rivers, and in some areas exploiting underground water.<sup>69</sup>

<sup>62</sup> G.J. Van Apeldoorn, *Drought in Nigeria*..... op cit, p. 56, 67, 81, M. Ajiya, 'Reports on the Effects of Drought on Livestock Production in North - Western State' Proceedings of the First National Annual Conference of the Nigerian Society for Animal Production, June, 1974, pp. 17, 19 - 24

<sup>63</sup> D.A Ikumola, "The Socio -Economic Implications of Climate Change , Desert Encroachment and Communal Conflict in Northern Nigeria", *A Seminar Paper Presented at New Faces for African Development Conference, Dakar Senegal, 27 - 30 June, 2010*, pp. 1 -3,10,11

<sup>64</sup> Ibid, G.J Van Apeldoorn, *Drought in Nigeria*..... op cit

<sup>65</sup> Ibid, J.Y. Yoyock "Drought Desertification and the Future of Agricultural Development in Nigeria", .....op cit p.33

<sup>66</sup> Ibid, Waziri Junaidu History & Culture Bureau Sokoto, Nigeria - WJHCB/KND/DNB/61/Vol. 1 - Drought Affected Areas Relief, pp. 11,12

<sup>67</sup> Federal Ministry of Environment .....op cit

<sup>68</sup> M.J. Mortimore, *Adapting to Drought: Farmers, Famines and Desertification in West Africa*, Cambridge University Press, 1989, p.12, see also, I. L. Bashir, 'Food Crisis and Government Response in Nigeria: A Critique of the River Basin Development Authorities'. *Working Paper No. 115*, African Studies Centre, Boston 1986, University of Boston, pp. 2,3, J.Y. Yoyock "Drought Desertification and the Future of Agricultural Development in Nigeria" ...op cit pp.37 - 39

<sup>69</sup> WJHCB/KND/DNB/61/Vol. 1 - Drought Affected Areas Relief,.....op cit, Stebbing, E. P. "The Encroaching Sahara: The Threat to West African Colonies", *The Geographical Journal*, 85,1935, pp.24,25



## 5. The Forests Turned into Criminal Hideouts

The grazing and forest reserves which were established by law to serve as buffer zones for livestock production especially during the dry season period when sources of fodder become scarce for livestock management, has been turned into a hide out for rural bandits and cattle rustlers in Zamfara.<sup>70</sup> These criminals include kidnappers, cattle rustlers, armed robbers, cultists, and terrorists. These forests have been turned into deadly zones from where bandits carry out attacks that have led to the loss of many lives. In Zamfara the famous Jaja forest share common boundary with Runka forest in Katsina and the Republic of Niger, Dansadau forest also share boundary with Birnin Gwari in neighbouring Kaduna State and some parts of Kebbi State.<sup>71</sup> The district of Dansadau harbours notorious gangs of armed bandits and cattle rustlers who move around in the forest rustling cattle from the pastoralists and other producers. Kuyambana, Burwaye, Ajja Maradun and Damri forests have become death traps. Gidan Jaja forest share boundary with the Republic of Niger, another porous border form which criminals infiltrate into Zamfara area. The Kamuku Forest, which borders Kaduna with other states like Zamfara through Birnin Gwari Local Government Area (L.G.A.), has been one of the deadliest criminal hideouts. Birnin Gwari forest borders four states, namely: Katsina, Niger, Zamfara and Kebbi.<sup>72</sup>

Thousands of herds of cattle had disappeared in this forest and were never recovered, while people abducted were detained in the forests until ransoms were paid. Abductees who could not pay ransom were forced to remain in captivity and later initiated into the criminal syndicates. Kidnapped women were raped and various heinous acts took place in these forests, especially in Dansadau district of Maru LGA of the state, with the highest casualty recorded in April 2014 at Yar'galadima, a village situated 20 Km north of Dansadau town where more than 100 residents were killed (according to official reports) in a single attack.<sup>73</sup>

Other dangerous forests include: Kuyambana, Burwaye, Sububu / Rudunu and Ajja forests, which have become hiding places for criminals with Kuyambana used as a major base.

It harbours notorious motorcycle-riding gangs of armed bandits and cattle rustlers who move around unchallenged.<sup>74</sup> In Birnin Magaji and Zurmi LGAs of the state for example, also lies the expansive and dangerous forest which extends to Batsari and Safana LGAs in the neighbouring Katsina State, from where armed bandits have carried out several deadly attacks on herding and farming communities. The bandits had issued several warnings to farmers not to cultivate their farmland.<sup>75</sup>

## 6. Conclusive Remarks

This paper has assessed some of the major human factors and environmental challenges affecting livestock production in Zamfara over the years. The paper argues that Government attention besides the establishment of few number of grazing reserves and enclosed cattle ranches, has not been focussed towards the improvement of livestock feed resources in the wider pastoral economy. While in industrialised livestock production systems, modern science and technology have transformed livestock production, where multipurpose and disease resistant breeds have replaced less productive varieties and the environmental effects caused by animal production have been addressed, through increasing public awareness campaigns and grass root based environmental protection programs.<sup>76</sup>

The livestock sector in Zamfara is rapidly being affected by several factors, one of the major ones like urbanization; a trend that is anticipated to continue with the expansion in human and livestock population and decline of feed resources. Therefore, more practical efforts have to be made towards improving the production of animal feeds from crop residues by enhancing crop cultivation, conservation of the environment, irrigation agriculture, routine livestock vaccination, and production of supplementary feeds concentrates.

## 7. Acknowledgements

The authors wish to acknowledge the support of the Nigerian Tertiary Education Trust Fund (Tetfund) for sponsoring this research work. We are also indebted to the management of the Federal University Gusau for facilitating this research

<sup>70</sup>Shehu Abubakar, Yusha'u A. Ibrahim, Andrew Agbese & Christiana T. Alabi, *Inside Nigeria's forests of death* : Terrorists, Kidnappers, Cattle rustlers, Robbers take over Forests, Daily Trust, 27/08/2016

<sup>71</sup> Zamfara state has quite a large number of forests that provide shield for armed bandits and cattle rustlers to carry out their activities with ease, consequent to institutional failure

<sup>72</sup>Salihu Na Yar Gudale, Farmer, 88 years, interviewed on 2/12.2016

<sup>73</sup>Informal reports maintain that the figures were far above 200 people

<sup>74</sup>Salihu Muhammad Gidan Fulani, 74 years, Pastoralist, interviewed on 11/9/2017, Suspected cattle rustlers killed 36 miners in Zamfara 09/11/2016

<sup>75</sup>Shehu Umar Gusau, *Cattle rustling: Zamfara farmers want Animal Traction Replaced*, Daily Trust News Paper, Monday, 13/11/17, pp. 1-2, Cattle rustlers killed 27 vigilantes in Zamfara, Daily Trust, 26/02/2014, Muhammadu Arzika, 67 years, Farmer, interviewed on 24/04/2017

<sup>76</sup> A.K. Edward, H.B. Robert, & J.C. John, *Natural Hazards - Earth Processes as Hazards, Disasters, and Catastrophes*, New Jersey, U.S.A. Pearson Prentice Hall, 2006, pp. 26, 47, see also, Science Daily Reports, 'Harmful Environmental Effects of Livestock Production On The Planet 'Increasingly Serious', available on <https://www.sciencedaily.com/releases/2007/02/070220145244.htm>, last assessed, 4/1/17

work. The authors also wish to appreciate the editorial contributions of Professor Ibrahim Muhammed Jumare, the Head of Department of History and International Studies, Federal University Gusau, Zamfara State, Nigeria, and Professor Muhammad Tukur Usman, Head of History Department, Usmanu Danfodiyo University, Sokoto, Nigeria.

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