

SOCIO-ECOLOGICAL INDICES OF FARMER-HERDER CONFLICTS: IMPLICATIONS FOR CONFLICTS PREVENTION IN NORTHERN SENATORIAL DISTRICT OF KADUNA STATE, NIGERIA

By

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Summary

The causes of farmer-herder conflicts have received increased attention in recent years, spurring debate on its international, national, regional and local dimensions. While a common ground has been reached on its causes, manifestation and management strategies, the implication of farmer-herder socio-ecological relations in conflicts prevention remain poorly understood. This study investigates the influence of socio-ecological variables on farmer-herder conflicts in the Northern Senatorial District, Kaduna State, Nigeria. Using a four-stage random sampling technique to select 225 respondents from the farmers and herders communities, data were collected with the aid of structured questionnaire and focus group discussion and subjected to relative importance index (RII) analysis and descriptive statistical procedures. Data analysis revealed that, changes in the family structure (RII= 4.50), the role of age in conflicts prevention (RII= 4.44), and lack of coordinated land use changes (RII= 4.41) are the most influential farmer and herder socio-ecological variables having the highest degree of influence in transforming farmer and herder relationship from what it used to be to what it is today. Furthermore, Neglecting the cultural norms of grazing by herders due to perceived marginalization (RII= 3.42), Herdsmen engaging in alternative occupation (RII= 2.98) and the need for domestic fuel energy by farmers (RII= 2.19) which causes the cutting down of farm land's and grazing area's barricade plants, were found to have the least degree of influence. The paper recommends for a more resolute and thoughtful policies and programmes to find realistic and practical solution to the farmer-herder conflicts which will involve committees at all levels, to be implemented precisely for prevention and resolution of the conflicts, through effective sensitization, awareness campaign and efficient land policy and tenure system.

Overview

Socio-ecological models (SEM) were first developed to promote the understanding of the dynamic interrelations amongst several personal and environmental factors. Its major concern is the social, institutional and cultural context of people-environment relations. It has the ultimate aim of halting conflict while at its buds before its eruption. It enables the understanding of sequence of the factors that exposes individual or group to the hazard of conflicts or safeguard them from experiencing or executing violence. This study was conducted using socio-ecological framework analysis of farmer herder relations and its implication on conflict prevention in North Senatorial District of Kaduna state Nigeria. Kubau local government area was selected for the purpose of this study, It has proximity to Falgore game reserve as well as a home for so many scattered herders' camp (ruga) and various low plain areas (Fadama) that are presently covered by dense and all year round sugarcane and rice plantation, but hitherto used to be a suitable grazing areas for cattle across the Sahel and Lake Chad. It also contained one of the largest livestock market at Anchau town which attracts pastoralist and livestock dealers from different parts of the country. It has an area of 2,505 KM and a population of 282,045¹.

Introduction

Farmers-Herders Conflicts

Conflicts related to natural resource use are common in rural areas of Africa². Conflicts between farmers and herders in Africa are in most cases viewed as being motivated by environmental scarcity³. West Africa, farmers and herders have over time had amicably associated, creating a relationship of interdependence. However, clashes between them are becoming more frequent⁴. Blockage of cattle routes and water points, encroachment of grazing land by farmers and consequent damage of crops by herders are the main causes of conflicts between farmers and pastoralist⁵. Among the major challenges facing traditional livestock breeding in Nigeria are

¹ 2006 census at the 2006 census

² Turner, M. D. (2004). Political ecology and the moral dimensions of "resource conflicts": the case of farmer-herder conflicts in the Sahel. *Political Geography*, 23(7), 863–889. <https://doi.org/https://doi.org/10.1016/j.polgeo.2004.05.009>

³ Benjaminsen, T. A., Maganga, F. P., & Abdallah, M. (2009). The Kilosa Killings : Political Ecology of a Farmer – Herder Conflict in Tanzania, *40*(3), 423–445.

⁴ Moritz, M., & Moritz, M. (2018). Understanding Herder-Farmer Conflicts in West Africa : Outline of a Processual Approach, *69*(2), 138–148.

⁵ Umar, U. F. (2009). The Pastoralists-agriculturalist Conflicts in Zamfara State, Nieria,

inadequacy of grazing lands, encroachment on migratory routes and resting points and conflicts between pastoralists and farmers (Baba 1987; Blecnch, 2004; Okaiyeto *et al.*, 2008).

Escalating conflicts between herders and farmers are among Nigeria's most pressing security challenges. This could potentially generate bloodshed on an even wider scale unless government and stakeholders makes ending this violence a national priority (ICG, 2017).

Causes of Farmer-Herder Conflicts

There are various reasons for the farmer herder conflict which include: destruction of crops, contamination of streams by cattle, over-grazing of land, disregard for local traditional authorities, female harassment, harassment of nomads by youths of host communities, indiscriminate bush burning, defecation of cattle on roads, cattle theft, and straying of cattle (Ofuoku & Isife, 2009). Clashes between pastoral and farming communities in northern Nigeria revolves around disputes over grazing land and water point, increasing insecurity, political and economic marginalization to mention but a few (Mkutu, 2001). Greatest number of researchers relating climate change to problems of uncertainty and conflict maintain that it may act as a 'threat multiplier' through accumulation pressure to those nations and societies who previously suffer from glitches of underdevelopment, suppression, or conflict (Buhaug *et al.*, 2008). The condition has been worsened by the spectacle of climate variation, whose changing aspects tend to have been exasperating natural resource conflicts globally (Chukwuma & Atelhe, 2014). As a results of population increased and new policies on agriculture and urbanization that does not encourage mobile livestock keeping as an effective way of living or production system, herders in Africa are usually the victims (Hesse & Macgregor, 2006). Natural resource control/use, access to resources, competition over identities as well as indigeneity are the motivators of conflicts in the Middle-Belt of Nigeria (Sayne, 2012 Mercy Corps, 2015). This also concur with the view of Adisa (2012), that farmer-herder conflict has continued to be the most protagonist resource use conflict in Nigeria.

Conflicts for land uses and other natural resources are characteristically connected with conflicting interests over the category of land use, restricted access and usage rights, indistinct possession and assets rights and the demarcation of land margins (Omar, *et. al.*, 2015). Similarly, Gefu and Kolawole (2000) opined that farmlands that are usually left to follow for the soil to regain its fertility naturally which also provides dry season grazing areas are presently occupied by dry season farming and major public projects which most often prevents dry season grazing which results to fierce conflict among users (Gefu, 2002). Audu, (2015) also observed that lack of formal education, in adequate grazing reserves, lack of access to water, pollution of water points,

<http://www.conference.ifas.ufl.edu/ifas/posters/umar.doc>. accessed 2018.

indiscriminate bush burning, cattle rustling, land tenure system and climate change were the causes of farmer-herder conflicts in Katsina State.

The Effects of Farmer Herder Conflicts

Conflicts over access to land and its resources between pastoralists and other land users, particularly the farming populations is already leading to so much bloodletting in Nigeria (Momale, 2005). The splintered rapport between herders and farmers a part from having a direct effect on their lives and livelihoods, it has also distressed the sustainability of food and livestock production in the Nigeria (Akinyemi, 2018). Moritz (2018) also observed that the Nigerian government in 2014 declared a state of emergency in one of its states due to farmer-herder conflicts almost culminating into communal killings. A large number of people became refugees, where over 20,000 fled to a neighboring country to save their lives. There has been a progressive worsening in the emblematic relationship and conflict between the farmers and herders in Nigeria (FACU, 1999). With a projected death toll of approximately 2,500 people in 2016, these clashes are becoming hypothetically treacherous as the Boko Haram insurgency in the north east International Crisis Group (ICG) (2017). The same report also indicated that, over the past five years, thousands have been killed; precise tallies are unavailable, but a survey of open source reports suggests fatalities may have reached an annual average of more than 2,000 from 2011 to 2016, for some years exceeding the toll from the Boko Haram insurgency.

These conflicts have engulfed communities in different states of Nigeria like Benue, Nasarawa, Plateau, Taraba, Kaduna, Adamawa, Zamfara, Oyo, Imo, Cross-River and Enugu.(Ubelejit, 2016). These farmer-herder conflicts threaten the socioeconomic development of the region.(R. Solagberu, Adisa & Adekunle, 2010). A report by UNICEF Regional Office in West and Central Africa observed that, the actual situation on the ground is that humanitarian and human rights laws are deliberately ignored by revelries to conflicts... women and girls remain the subject of sexual and gender-based violence and other human right violations (Sherrill, *et.al.*, 2005). The report also stated that, the region has been branded by a culture of impunity, the spread of HIV/AIDS, the continued weakening of the security sector, mass refugee movements and other forced displacement, inequitable and illicit exploitation of natural resources and violations of human rights, including the rights of women.

Land Tenure System and Grazing Reserves in Northern Nigeria

Barau (2010) observed that, various formed of communal land tenure system existed for quite a long time in most parts of northern Nigeria. Even though such systems were loose, characteristically tribal based and less institutionalized. Land use establishments which in many ways institutionalized land use planning and environmental protection system were established with the advent of Islam. Joma (1991), noted that, the provisions for individuals and public right through guided use of *hima* (reserve areas), *harim* (inviolable lands), *ihya* (land development and reclamation), *waqf* (charitable endowments) and *hisbah* (supervising public office) was provided by Islamic Shariah system. Many Muslims societies were helped by these institutions to prevent conflicts between multiple uses and users. For example, *harim* is used to establish buffer zones to

safeguard public goods like rivers, streams and lakes against pollution and over exploitation. According to Zahraden (1990), the Islamic land tenure system made provisions for public pasture grounds (*hima*) according to Islamic rules of land management in pre-colonial Northern Nigeria (which cover the study area) and particularly in the Sokoto Caliphate. Strict delineation and protection of pasture grounds as public commons was part of the Islamic provisions. The need to recognize and separate the basic differences and need of pastoralists and settled populations of cities and villages was outlined by the leaders of the Sokoto Caliphate. This is due to the realization of the fact that the needs for land resources of settled people and pastoralists are not the same. Even though, it's remarkable to note that the leaders of the Sokoto Caliphate were more disposed to sedentarisation.

Iro (2010) observed that, the idea of resettling Fulani pastoralists in Northern Nigeria through the establishment of settlements schemes was drifted by British colonial government. In the early 1950s, under this government, the initiative which started in Kano collapsed at its take-off due to poor management and financing. However, seeing the failure grazing reserves were created for pastoralists by the colonial government in 1954. This ingenuities was satisfactory and was expanded to many provinces in Northern Nigeria. About 6.4 million hectares of forest reserves were gazette by 1964 and most of them were in the savanna areas. Sokoto, Katsina, Bauchi, Kabba, Ilorin and Zaria (which covered the study area) were the province where the reserves were located.

Lands were mostly under the control of the traditional rulers in precolonial times and immediate post-independence Nigeria, who understand the dynamics and complex interrelationship among the different land resource users (Maina, 1998; Kallah, 1999). Having the local knowledge as well as low population densities, they were able to satisfy the land use need of the diverse communal groups. However, with the enactment of the 1978 Land use Act, which transform the control of land to the local and state governments, makes it difficult for herders to access land (Gefu, 1996).

Problem Statement

Several works by many researchers have linked natural resources and farmer-herder conflicts. However, the focus of some of these studies are on: natural resource and conflicts escalation (Nillesen and Bulte 2014, Lujala,2008); politics and natural resources conflicts (Adogi, 2013); natural resources scarcity and abundance (Mildner, Lauster and Wodni, 2011, Lee-Billion, 2003); climate changed triggered conflicts (ICG 2017, Buhaug *et al.*, 2008, Chukwuma & Atehle 2014); natural resources conflicts and GDP (Wen, 2011, Peace Corps 2016); Livelihoods and access to resources (Ellis and Edward, 2004, Lee and Neves, 2011). The study conducted by Milder et.al, (2011) and Le Billion, (2003) using Eco-centric modelling and resource curse model together indicates that security of natural resources strains peace and fuel conflicts.

Researches covering resources and farmer-herder conflicts in Northern Nigeria includes: Dimelu, Salifu, & Igbokwe (2016) which focused on conflicts management strategies in Nasarawa and Kogi States; Chukwuma and Atehle, (2014) and Adogi, (2013) works on farmer-herder conflicts

in Nasarawa state which focused on ecological and political perspectives and that of Jajere, (2014). In north western Nigeria, the works of Umar (2009) and Abdu (2015), identified illiteracy, and inadequate grazing reserves as major factors responsible for farmer-herder conflicts.

Momale (2014) research on dynamic and complex relations and practices that define mobility and access to land resources by pastoralists in northern western Nigeria, had made meaningful contribution towards highlighting the primary indicators of farmer-herder conflicts in north western Nigeria. However, these researches do not adequately analyzed the socio-ecological dimensions of the issues and how it influences and affects relationships and conflicts among farming and pastoral communities. Some of these issues are associated with the multidimensional causes such as politicization of farmer-herder disputes in the north-western and north-central regions of Nigeria, as well as the “common perceptions” about the role of “foreign herdsman” (implying the influx of pastoralists from other West African countries, particularly Niger Republic), (Blench, 2010; Krause, 2011; Abass, 2012; Audu, 2013; McGregor, 2014.). There are unsubstantiated statistics and reports indicating that about 6,000 persons have lost their lives and more than 62,000 people were displaced in the Middle Belt states of Benue, Kaduna, Nasarawa, and Plateau alone. There are inadequate assessments to document these conflicts, notwithstanding the escalating and expanding violence (Chris et. al., 2018).

This research adopted the socio-ecological framework of analysis to understand the nature and dynamics of farmer-herder relations and how it affects and influence conflicts. The outcome of the analysis is expected to contribute to the search for viable options and strategies for prevention and effective management of the conflicts, thereby contributing to food security and sustainable regional development.

Objectives

- i. To determine the personal and occupational characteristics of farmers and herders in the study area.
- ii. To identify the various socio-ecological drivers as they relates to farmer herder relations.
- iii. To analyze the socio-ecological variables that influence farmer-herder conflicts prevention in the study area.

Methodology

To select respondents for this study, a four-stage random sampling technique was used. First, Kaduna North Senatorial District was randomly selected out of the three senatorial district of Kaduna state. Then Kubau local government area was also randomly selected out of the eight local government of the senatorial district. It is an area where farmer-herder conflicts occur frequently due to the presence of so many low-lying plains (Fadama) which was hitherto used to be areas for cattle grazing but presently occupied by sugarcane and rice cultivation. Three farming villages were subsequently randomly selected from the list of villages that are very close to the fadamas

and grazing areas. The selected villages were Kanwa, Nasari and Wagaho. Cluster random sampling was used to select 50 crops farming households from each village. Thus, fifty (50) respondents (households) were selected from each village given a total sample size of 150 respondents from farming communities. With the help of an informant, one pastoralist camp (Ruga) was located and two more others were located using snowball sampling. The three pastoralist camps identified for the study include Rugar Hayi, Rugar Fanyo, and Rugar Ardo respectively. From each of these camps, twenty five respondents were randomly selected and interviewed, making the total respondents to be 225. However, only 214 questionnaire were returned and analyzed. Structured questionnaire was used to collect primary data on personal and occupational characteristics of the respondents as well as socio-ecological indicators that influence farmer-herder conflicts.

Three focus group discussion (FGD) were also conducted with farming community and herders separately at Nasari and Rugar Fanyo and with both farmers and herders jointly at Anchau market on the market day (Tuesday). The focus group discussion followed predetermine checklists of open ended questions which were framed in a flexible way that permit both expected and unexpected themes to be explored. The composition of the FGD includes adult men, women and youths of different ages ranging from 18 to 65 years. However, much of the responses came from the elderly and more experienced respondents with the youths amongst them shading more lights and clarifications were the need arises or were they were the once directly affected by certain actions.

Table 1: The places and composition of focus group discussion

Sn	Place	Male	Female	Total
1	Nasari	16	4	20
2	Rugar Fanyo	13	2	15
3	Anchau Market	20	5	25
Total		49	11	60

Source Field 2019

Use of Socio-Ecological Analysis

It is progressively acknowledged that there is a connection between Ecology, Conflict and Peace. At each stage of the social ecological (at individual, family, society, relationship etc) interrelates to influence and offer the basis for nonviolent living or conflicts. As such it provides a basis for appreciating dimensions and trends of conflicts or even programmes for prevention activities. For one to plan, promote for polices, avert or resolve conflicts, it is vital to device programmes and policies that can decrease risk factors and upturn protective factors at each of the various stages of the ecosystem. When social groups with differing forms of appropriation of territories confer different meanings and claims, of a space or resource, conflicts attain an ecological dimension. It initiates when a group that has used a particular territory is threatened by a detrimental impact

resulting from the activities and practices of other groups or other people from the same group. Other conflicts may also erupts when persons do not have long-term rights to a territory.

Takwa and Chukuemeka⁶ provides a framework for socio-ecological system analysis, in which individual, community, relationship and society were identified as the major indicators⁷.

Table 2: Framework for socio-ecological system analysis

Individual	Relationship	Community	Society
Characteristics and Behaviors of individuals in the Case Study – How does it sustain the conflict or contribute to the mitigation? What is the age and gender issues affecting the conflict positively and negatively?	How is the past and current interactions of people in the case study? What informs the basis of their interactions and how does it sustain or contribute to the prevention of the conflict? Who are the key allies and spoilers?	How is the community structured? What facilities and structures exist to prevent or mitigate the conflicts under discussion? What are the gaps and strengths of the facilities and structures?	What are the underling policies, constitutions, cultures and norms that moderate behaviors and how does it contribute to prevention and mitigation of conflicts? What are the social facilities in governance mechanism in place for the prevention of the conflict under study?

Source: Takwa and Chukuemeka (2019)

Hence, the variables measured on the Likert-type scale for the purpose of this study are structured in line with above socio-ecological indicators (table 2).

Measurement of variables

The independent variables measured are: gender, age of respondents in years, level of education, occupation and their ethnicity. Other variables measured are the socio-ecological indicators some of which their dynamics over time in one way or the other, led to the gradual deterioration of relationship between farmers and herders leading to escalation of conflicts. These indicators include: **A-** The influence of living with extended family as it relates to tolerance, **B-** Educational and legal system, **C-** The role of grazing by children, **D-** Herdsmen and alternative occupation, **E-** The role of age in conflicts management and prevention, **F-** Suspicion and Mistrust by herders, **G-** Suspicion and Mistrust by farmers, **H-** Fear of crops destruction, **I-** Socialization, law enforcement agents and the legal systems, **J-** Neglect of the cultural norms of grazing by herders due to marginalization, **K-** The need to expand one’s farm land, **L-** The temporal dimension of crops destruction, **M-** The role of science, **N-** Land use changes, **O-** Government policies and **P-** The need for domestic fuel energy. They were stated in simple sentences to suit the understanding of the respondents on a Likert scale format questionnaire. Data collected were coded into statistical package for social sciences (SPSS Version 20). Processing of data was through the use of quantitative method of analyses.

⁶Takwa Chukuemeka (2019) Socio-ecological framework

Methods of Data Analysis

The 16 attributes of socio-ecological farmer-herder relations were derived from literature and authors self-developed through pilot survey and were pre-tested before the research. The data collected was analyzed using descriptive statistics such as cross tabulation frequency count, percentages and relative importance index (RII). The respondents were asked to rate the importance attached to each socio-ecological attributes of conflict prevention using five point Likert scale from 1- strongly disagree, 2- disagree, 3-neither agree nor disagree, 4- agree and 5 strongly agree. The computation of RII is expressed as follows:

Computation of RII values for the variables influencing socio-ecological farmer-herder relation in table 4

Column 1: Socio-ecological Variables (indicators)

Column 2: Number of individual respondents rating each of the indicators with 1 (Strongly disagree)

Column 3: Number of individual respondents rating each of the indicators with 2 (Disagree)

Column 4: Number of individual respondents rating each of the indicators with 3 (Neither agree nor disagree)

Column 5: Number of individual respondents rating each of the indicators with 4 (Agree)

Column 6: Number of individual respondents rating each of the indicators with 5 (Strongly Agree)

Column 7: Addition of product of individual respondents rating a particular indicator and their respective weight values. For instance, SWV for “A” = $(0 \times 1) + (3 \times 2) + (5 \times 3) + (89 \times 4) + (117 \times 5) = 962$1

Column 8: Relative Importance Index equals summation of weight value (SWV) divided by additional of individual respondents rating each indicator. For instance, RII for “A” = $962 / (0 + 3 + 5 + 89 + 117) = \frac{962}{214} = 4.49$ 2

Column 9: The deviation equals to mean of RII for all the 16 identified indicators subtracted from RII value for each indicator e.g. $\frac{60.64}{16} = 3.79$, Deviation $(RII - \overline{RII}) = (4.49 - 3.79) = 0.7 \dots 3$

Column 10: Square of values in column 9 e.g. $(RII - \overline{RII})^2, (0.01)^2 = 0.000 \dots \dots 4$

Findings

Table one (3) presented the summary of the personal characteristics of respondents. Even though, 225 respondents were involved in the research, only 214 were used in data analysis as the remaining 11 were either poorly completed or not return, giving response rate of 95%.

Table 3: Personal and occupational characteristics of respondents

Gender	Name of Community						Total
	Kanwa	Rugar Hayi	Nasari	Rugar Fanyo	Wagaho	Rugar Ardo	
Female	7 3.3%	3 1.4%	7 3.3%	2 0.9%	7 3.3%	4 1.9%	30 14.0%
Male	43 20.1%	22 10.3%	40 18.7%	20 9.3%	41 19.2%	18 8.4%	184 86.0%
Total	50 23.4%	25 11.7%	47 22.0%	22 10.3%	48 22.4%	22 10.3%	214 100.0%
Age Group							
26-35	0 0.0%	1 0.5%	0 0.0%	0 0.0%	2 0.9%	0 0.0%	3 1.4%
36-45	10 4.7%	9 4.2%	12 5.6%	3 1.4%	10 4.7%	2 0.9%	46 21.5%
46-55	18 8.4%	13 6.1%	30 14.0%	15 7.0%	26 12.1%	16 7.5%	118 55.1%
55 And Above	22 10.3%	2 0.9%	5 2.3%	4 1.9%	10 4.7%	4 1.9%	47 22.0%
Total	50 23.4%	25 11.7%	47 22.0%	22 10.3%	48 22.4%	22 10.3%	214 100.0%
Level of Education							
No formal Education	8 3.7%	22 10.3%	2 0.9%	20 9.3%	19 8.9%	20 9.3%	91 42.5%
Adult Education	16 7.5%	2 0.9%	11 5.1%	1 0.5%	7 3.3%	0 0.0%	37 17.3%
Primary Education	22 10.3%	1 0.5%	20 9.3%	1 0.5%	19 8.9%	2 0.9%	65 30.4%
Secondary and Above	4 1.9%	0 0.0%	14 6.5%	0 0.0%	3 1.4%	0 0.0%	21 9.8%
Total	50 23.4%	25 11.7%	47 22.0%	22 10.3%	48 22.4%	22 10.3%	214 100.0%
Occupation							
Farming	46 21.5%	0 0.0%	43 20.1%	0 0.0%	44 20.6%	1 0.5%	134 62.6%
Pastoralism	0 0.0%	23 10.7%	0 0.0%	22 10.3%	0 0.0%	21 9.8%	66 30.8%
Agro-Pastoralism	4 1.9%	2 0.9%	4 1.9%	0 0.0%	4 1.9%	0 0.0%	14 6.5%
Total	50 23.4%	25 11.7%	47 22.0%	22 10.3%	48 22.4%	22 10.3%	214 100.0%
Ethnicity							
Fulani	1 0.5%	25 11.7%	0 0.0%	22 10.3%	0 0.0%	21 9.8%	68 31.8%
Hausa	43 20.1%	0 0.0%	38 17.8%	0 0.0%	46 21.5%	1 0.5%	128 59.8%
Others	6 2.8%	0 0.0%	9 4.2%	0 0.0%	2 0.9%	0 0.0%	17 7.9%
Total	50 23.4%	25 11.7%	47 22.0%	22 10.3%	48 22.4%	22 10.3%	214 100.0%

Source: Field study, 2019

Table 3 above shows that, based on the finding of gender of the respondents, 14% were female while 84% were male. It also indicates that, the highest percentage of farmers were those within the range of 46-55 years (55.1%) while 26-35 form the lowest accounting to just (1.4%). It was also noted that there wasn't respondents between the age of 18 – 25, probably due to the fact that the study was conducted towards the end of farming season when most of the youths left to neighboring cities (Kano, Kaduna, Zaria, Abuja etc) after the intensive and rigorous farming activities, a practice common to the youth in most rural areas of the region. Similarly, most of the pastoralist's youth were also with the cattle at the remote temporary sites, away from their settled camps (ruga) before their return at the end of cropping season. But, youth of both group were present at the FGD held at Anchau market. Moreover, the finding also reveals that level of education is very low among the respondents as those without formal education constitute the highest percentage of 42%. However, even among the respondents, the farming communities' level of education is relatively higher than that of the herders. As no single respondent from the pastoralist community is having secondary or post-secondary education. Generally the table indicates that only 9.8% of the respondents have secondary or post-secondary education. This confirmed the finding of Adisa and Adekunle⁸.

The table further reveals that majority of the respondents are farmers with 62.6%, followed by pastoralist with 30.8%, while the list are the agro-pastoralist with only 6.5% (Table 3). As discernible from table 3, the data on the respondents' ethnicity indicates that Hausa formed the majority with highest percentage of 59.8%, followed by Fulani with 31% while others constituted the list with 7.9% (Table3).

Table 4: RII of influence of socio-ecological farmer and herder relations

Socio-Ecological Variables	Ranking					SWV	RII	$(RII - \bar{RII})$	$(RII - \bar{RII})^2$	Rank
	SD	D	NAND	A	SA					
A	0	3	5	89	117	962	4.50	0.71	0.5041	1 st
E	2	8	11	137	56	950	4.44	0.65	0.4225	2 nd
N	6	25	28	132	23	943	4.41	0.62	0.3844	3 rd
O	16	79	24	84	11	905	4.23	0.44	0.1936	4 th
L	0	2	5	104	103	897	4.19	0.40	0.16	5 th
B	4	43	19	120	28	879	4.11	0.32	0.1024	6 th
K	3	44	32	116	19	846	3.95	0.16	0.0256	7 th
H	5	30	11	107	61	831	3.88	0.09	0.0081	8 th
M	7	29	18	119	41	831	3.88	0.09	0.0081	9 th

⁸ Adisa, R. Solagberu, & Adekunle, O. A. (2010). Farmer-Herdsman Conflicts: A Factor Analysis of Socio-economic Conflict Variables among Arable Crop Farmers in North Central Nigeria. *Journal of Human Ecology*, 30(1), 1–9. <https://doi.org/10.1080/09709274.2010.11906266>

I	8	47	23	120	16	800	3.74	-0.05	0.25	10 th
C	3	12	23	130	46	783	3.66	-0.13	0.0169	11 th
F	4	20	18	61	111	767	3.58	-0.21	0.0441	12 th
G	1	18	15	151	29	746	3.49	-0.30	0.09	13 th
J	0	3	5	108	98	731	3.42	-0.37	0.1369	14 th
D	1	12	6	113	82	637	2.98	-0.81	0.6561	15 th
P	0	34	126	34	20	468	2.19	-1.60	2.56	16 th
Total	60	409	369	1725	1861	12976	60.64		5.5547	

Source: Field study, 2019

Findings as presented in table 4 established that the respondents applaud 9 out of the 16 socio-ecological indicators as having strong influence on farmer-herder conflicts prevention and management having all of their ranking above the mean 3.79 as indicated above. Living with extended family (A): which implies that, in some years back when farmers and herders live mutually, majority of them lived in a large extended family and they also cultivate a common large family farm. Whenever there is any dispute between them and any cattle herder, usually those elderly members present would ensure that the resolution process is not harmful to both party and is reached amenable which was one of the major reason for their peaceful relation in the past. But, now a days the reverse is the case as confirmed by the farming community during the FGD. Hence, it is the first indicator considered as having the highest influence with RII = 4.5, followed by the role of age in conflict prevention and management (E), land use changes (N) and government policies (O) with RII= 4.44, 4.41 and 4.23 respectively. E: Implied that, whenever there is dispute between farmers and herders, maturity plays a key role in the settlement process. Young farmers that usually own small and fragmented farms mostly acquired from inheritance as discovered from FGD, tend to be harsh and vicious in approach leading to conflicts then aged farmers. The incidence that happened at Unguwar Kwasau in the study area is an example. *It is a case in which two young farmers met some cattle in a farmland closed to their farm, with the herder (a young boy) sleeping not far from them. One of them decided to use his hoe and hit the young herder which instantly resulted to his loss of life. He threw the corpse into a nearby stream and yet followed the cattle to their owner and collected the sum of 8000 naira as a compensation of the crops damaged, while pretending that the boy had ran away. However, the corpse was discovered later and security agents made some arrest of suspects in which the real actor was discovered.* The influence of land tenure and land use changes (N), on farmer-herder conflict cannot be over emphasized. During one of the FGD with crop farmers, one farmer (a chairman of a Community Development Association in one of the study area) observed that, *“It’s true that large amount of grazing land is converted to farming areas, but this is necessary due to population increased. For the past 15 years there have been rapid increase of this conversion since there is no formal land tenure system in operation here which also results in many conflicts of varying magnitude. I knew of a large grazing area which was sold to a farmer at the cost of 6,000,000*

naira only 2 years ago. Right now there is another one for sale at the cost of 10,000,000, if you can afford. There are some few small ones at a relatively lower cost. The herders are definitely under pressure and are helpless under this land tenure which seems not in favour of their course he concluded". The herders too, complained bitterly about the way they are cheaply losing grazing lands to crop farmers. During one of the FGD, a herder has this to say, "For the past 15 years all these places are grazing land, there is only one farmland to the north of our camp. Our cattle can move in all directions for at least 5 km without coming in contact with cultivated land. But now during wet season, any herder with more than 30 cows must move them down south usually to Rijana, Yanta, and Likarbo to avoid conflict with farmers due to transformation of the land use from grazing to cultivation areas. There are no available routes to link us to the water points. Last year, we went to Falgore, but we can't stay long due to insecurity. Sometimes security agents can easily confiscated your cattle and leveled you as cattle rustler".

Despite the enactment of Land use Act of 1978, the administration of rural lands virtually remains at the jurisdiction of traditional leaders as observed by an elderly traditional leader during one of the FGD. The leader revealed that, "what is obtainable in most part of the rural areas of Northern Nigeria including the study area is that, farmers had acquired their portion of lands either through inheritance, private purchased from those that have acquired and used them previously or through clearance of usually remote virgin land adjoining cultivated lands or that is not too remote from the existing cultivated lands. The virgin lands are under the custody of the traditional leaders including the designated pastoral reserves (hima) whom are also answerable to the local government council. Since the pastoralist lack any legal documents to presents to support their claim for ownership of the pastoral reserves and the rest of the virgin lands, usually prospective user identified and delineated a desirable portion of land and begin to clear it for cultivation. He may or may not approach the traditional ruler depending upon the size and location of the land. Accessible, large portion of land areas attract attention of the local traditional leaders easily than small and remote lands. A portion of virgin land or pastoral reserved land (hima) may be allocated temporarily to a prospective farmer or pastoralist by a traditional leader after some settlements. Where a prospective user is a farmer, he continued to cultivate the land until after his death, which subsequently be transferred to his heirs or he may decide to sale it to another user. Sometimes these category of users that maintained farming areas at the fringe of the existing virgin lands or pastoral reserves continued to expands their farmlands through encroachments with or without the consent of the traditional ruler which often triggered conflicts. Where a pastoralist acquired and occupied certain virgin land or pastoral reserve through same process, he too may in some cases begins to cultivate some portion of it, which over time as the size of his family increases the portion of land under cultivation also expanded. This subsequently attracts the attentions of other prospective farmers who would begin to traveled from few to several kilometers to joined him in cultivating the adjoining land closed to him, or their farm lands may over time merged with his due to the expansion of both cultivated portions of lands from all directions at the expense of the reserved land at the point of which the pastoralist would begin to complain and frequent conflicts manifested. When this climax of invention of succession of pastoral reserve by farming activities was attained, the pastoralist would ultimately loose the battle lacking the requisite legal evidence to lay claim of the needed adequate land to meet his demand. While the farmers continued to dominates the remaining land since at this level the pastoralist have only two options of either sending his herds to another virgin or pastoralist reserve in a more remote location temporarily especially during rainy season or relocates the cattle permanently with the help of his children who are bound to undergo a similar experiences at their new abode over time. It's however, interesting to know that during dry seasons, the pastoralists are free to

graze their cattle everywhere (both on the virgin land, pastoral reserve and unirrigated farmlands) in as much as a land area is not under cultivation. At this season the pastoralist encounters little problems that leads to conflicts. Most often it's the pastoralists that destroys farmers accumulated farm residues (which they normally keep for their domestic animals or for sales) and sometimes tramps over irrigated land areas which also results in farmers-herder conflicts. Information on the factors and forces responsible and process of grazing reserves encroachment are beyond the scope of this study. However, the researcher is keenly interested on investigating into the pogrom of pastoral reserves encroachment in due course.

This confirmed the finding of Dohrn (2008) that insecure land tenure impedes fair resources management which could lead to conflict. While, **O** with the ranking of (RII= 4.23), **L** (RII= 4.19) and **B** (RII= 4.11) were also noticeable having a strong ranking above the mean. **O**, which stands for government policy was perceived by the respondents to have a strong ranking as observed from table 3 above. Most government policies are targeting crop farmers than cattle herders. Some years back, according to one pastoralist leader (Ardo), during the FGD with the pastoralists, *“There used to be an annual cattle vaccination programme (jaga-hore)⁹ during which a census of all cattle heads in the country is conducted and they are also vaccinated against some prevalent (foot and mouth diseases, lungs and heart diseases), while in return the herders pay cattle tax (jangali) to the government. In addition, each cow's ear lobe is punctured annually until it has a maximum of three marks of punctured which is used to identify Nigerian cattle for security and quarantine purposes. But the government had now neglected us just as it had done in the areas of land acquisition and utilization policy, sighting the massive cultivation of Fadama lands and cattle routes as examples of one major causes of farmer-herder conflict.* **L-** Influence also has a strong ranking according to the findings, it implies the temporal dimension of crops damage by cattle. Many farmers and security agents are ignorant of these sensitive periods within which herdsmen allow their cattle to destroy farmlands. An elderly farmer in a sympathetic mood while recalling the huge lost he incurred as a result of his farmland's destruction by cattle, *“You hardly meet them on site with the animals on your farm, they either had charm or had master our movement”*. However, the finding of this study suggested that, the temporal dimension of crops destruction by cattle are 4: very early in the morning, late evening, when it's raining and at the timing of Juma'at prayers. Knowledge of these timings is crucial to the prevention of farmer-herder conflicts.

As discernible from table 4, **B** with (RII = 4.11), implies the ranking of educational and legal system influence on farmer-herder conflicts. As suggested by the finding of this study that both farmers and herders have low level of education (table 3), but the fact that farming communities lived in permanent settlements in the study area, give them more access to educational facilities than herdsmen. The implication is that they also stand the chance of winning court cases as they can give better explanation due to their knowledge and exposure than the herdsmen. This in most cases, contributes to the reasons why the herders do not usually seek redress in courts but rather

⁹ “Jaga hore” meaning hold the head, in Fulfulde language a phrase which is often been repeated as instruction to fellow herder to hold a caw's head, during the exercise to enable it been vaccinated and also to punch the ear.

resolved to conflicts. This corroborates with the finding of Mc Caffery (2005), that peace and conflict resolution at community level could be facilitated through education.

Findings on **K**, **H** and **M** established that majority of the respondents had acknowledge the strong influence of: the need to expand one's farm land, **K** (RII= 3.95), Fear of crops destruction **H**, and the Role of science **M** with (RII= 3.88) each, as the least three indicators with the low ranking just above the mean. The need to expand one's farmland among the crops farmers is considered as having strong influence on farmer-herder relation, than the other two indicators. During the joint FGD, both groups agreed that expansion of farmlands at the expense of grazing areas and stock routes in recent years, is one of the contingent issue that very often triggered disputes between farmers and herders in the study area. Hence, any effort at conflict prevention process must consider this indicator and its influence on farmer-herder conflict and its prevention.

Moreover, the study established during the joint FGD with both farmers and herders at Auchan livestock market that, it's due to fear of crops destruction by cattle (**H**) that the farmers are no longer ready to welcome herders around their settlements not for fear of reclaim of the encroached grazing areas or cattle routes (as examined in **G**, were KII= 3.49 below the mean). Whereas the herders maintained that the reverse is the case. It was a hot debate during this FGD, with each party advancing supportive evidences to ground his claim which glaringly emphasised the degree of influence of this indicator in the socio-ecological relations of the groups. The role of science (**M**) with the ranking of (RII= 3.88) as **H** above, implies the application of a new skill aided by science to easily cultivate large amount of land that are not accessible by tractors such as water-logged terrain and grazing areas with dense vegetation were a tractor may find it difficult to operate. Strong herbicides chemicals are applied on pastoral lands that within short period of time, the land can be cultivated. This is the fate of must fadamas and grazing land around the study area. One herder has this to say during one of the FGD. *"Long before they started using chemicals, they hardly grow crops at the marshy lands, river side and amidst dense vegetation with eased, even if they do, it will be small and gradual. But with the used of these chemicals they were able to clear large hectares of land overnight. Most often, we are constantly afraid of not allowing our cattle to feed on such areas immediately after they sprayed. How do you expect us to leave peacefully with them now?"* This is how scientific development help to transformed the hitherto symbiotic relationship in to a suspicious one given it relevance in any farmer- herder conflict prevention discussion.

I- Socialization, law enforcement agents and the legal systems, **C**-the role of grazing by children, **F**- Suspicion and Mistrust by herders, were ranked RII= 3.74, RII= 3.66 and RII=3.58 just below the mean (3.79) respectively. However, this does not mean that they lack significance in the discussion of farmer-herder deteriorating relationship leading to tensions and conflicts. Socialization can be explained within the context of literacy, participation in active politics and contacts and interactions with immediate and outside environment. In all these social process, the farming community have age over the herdsmen in most instances. This sometimes makes it easier for them to collaborate with the corrupt security personals and judges to exploits the herdsmen in the legal

processes. Unlike in the olden days when most disputes are settled amongst elders and traditional rulers as claimed by a herder during a separate FGD.

While the role of grazing by children raised more dust from the farmers side during the separate FGD. A farmer has this to say *“There was a season I spent more than 250,000 naira on my farm, remains few days to the harvest but some migratory pastoralist youth came and destroy everything. There was guinea corn, soya beans and cowpeas on the farm, but nothing was left for me. I can’t forget this and I can’t forgive them. This has forced me to change my thinking of all the herdsmen around and I can hardly trust them”*. This have complemented the incidence mentioned in **E** above in which a young herder lost his life which in turn, affect the mutual relationship which existed long ago between the two competing resource users. In a pastoralist’s community, the youth shoulders the responsibility of driving the herds to a temporarily remote pastoral reserves or virgin land during farming seasons where the grazing land at their settled camp (ruga) is insufficient for the grazing of their cattle without conflicts. As such they tend to be aggressive and volatile while on transits as they were not in company of their elders, women and small children that affect their decision in confronting rival resource users as observed by a youth pastoralist during the FGD. Suspicion and mistrust by herders **F** (RII=3.58), can be a complement of indicators explained above such as the Role of science and the Suspicion and mistrust by farmers **G** (RII= 3.49). They may either separately or jointly arguments the fragile socio-ecological farmer and herder relations leading to conflicts as affirmed by some respondents during the FGDs.

With respect to **G** - Suspicion and mistrust by farmers, (RII= 3.49) one youth farmer narrated his experienced *“After the demised of my farther, a pastoralist whose camp is very closed to our farm, brought five (5) cattle and told us that they all belongs to our late father. According to him, our dad bought one cow from him some years back and it gave birth to four more cows. We don’t know of this before, all we knew was that our dad used to surrender all our farm residues to him at the end of each harvesting season. That was how cordial they used to be, but now one can hardly trust them. They were no longer what they used to be”*.

Neglect of the cultural norms of grazing by herders due to marginalization (**J**), Herdsmen alternative occupation (**D**) and the need for domestic fuel energy (**P**), with the ranking of (RII= 3.42), (RII= 2.98) and (RII= 2.19) below the mean respectively. The finding in relation to the **J**, implies that, there used to be some traditional norms adopted by herdsmen to complement the efforts of herders to protect crops from been destroyed by cattle when the relationship between the two were reciprocal. These norms include the application of fresh cow excretes on the leaves of crops using their stick to prevent them from been consumed by animals especially were the farmer had already planted plants barrier at the boarder of his farm but still some gaps are found were his crops are exposed. The same measures are employed by herders where it becomes necessary to access a water point through a narrow route amidst crops plantation. Alternatively, in some cases, muzzles are tied to the leading cow/cows as the case may be where it involved moving for a relatively longer distance along a narrow corridor between crops. The leading cow/cows been unable to graze would keep on moving and would be followed by the rest of herd with minimum

or no crops destruction as explain by an elderly herder during the separate FGD. Unfortunately, however, most herders are presently too reluctant to employ these measures either due to lack of experience, changes in the socio-ecological relations due to feeling of been marginalized or both. This makes it integral in the debate of farmer-herder conflicts prevention. Herdsmen and alternative occupation (**D**), is second to the last in the ranking, it implies that in recent years herders have learnt to abandon their herds to young children and engaged in other business which was not in their character before now. During the FGD with herders, most of them confessed that, apart from cattle rearing they still do one or two things to ease their livelihood. Some youth among them engaged in trees felling for timber or for sale as source for fuel-energy, others engaged in small farming and patronizing the rotational markets around them. This income earning alternative occupations is partly responsible for leaving small children with cattle which has its own consequences as established in this study earlier own. This makes alternative occupation an important subject worth considered in the socio-ecological farmer and herder relation and conflicts prevention. (**P**), with the ranking of (RII= 2.19) below the mean stands for the need for domestic fuel energy as a reason for cutting down the vegetation that are used as a fortification at the boundaries between farmlands and grazing areas or routes. However, as observed from the finding of this study, those cutting down those plants are only doing that base on some alterative motives but not due to demand for firewood.

Conclusion

The research focused on socio-ecological relations and their influence on farmer-herder co-existence in North Senatorial District, Kaduna state, Nigeria. Apart from describing the demographic characteristics of respondents, the paper also uses socio-ecological framework of analysis and relative importance index, to investigate socio-ecological variables that sustained the long time association between farmers and herders but whose transformation is leading to tension and conflicts. Convincingly, the research established that changes in the family structure, the role of age in conflicts prevention, and lack of coordinated land use changes that are the most influential farmer and herder socio-ecological variables having the highest degree of transforming farmer and herder relationship from what it used to be to what it is today. Furthermore, neglecting the cultural norms of grazing by herders due to marginalization, herdsmen engaging in alternative occupations and the need for domestic fuel energy by farmers which causes the cutting down of barrier plants were found to have the least degree of influence.

The following recommendations are here by proffered

- Farmer-herder conflict is not only persistent, but existing statistics show that it is also on the increase, due to many factors that include deterioration of their relationship at socio-ecological level. There is need for more resolute and thoughtful policies and programmes to find realistic and practical solution to this ill development.

- There is need for multi-stage constitutional conflict management framework to involve committees at community, local and state levels that would also incorporate local leaders, to be implemented precisely for prevention and resolution of farmer and herder conflicts.
- An effective sensitization and awareness campaign through education and enlightenment methods using extension workers, pastoralist heads and traditional leaders to educate both group of the need for reviving the lost glory of communalism for their peaceful co-existence and social and economic development.
- As a matter of utmost importance, state government should enact an effective and efficient land policy and tenure system that would address and guide the land acquisition and land use changes process while considering the demand of each groups.

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