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FARMERS RESPONSES TO THE UNINTENDED CONSEQUENCES OF OPEN GRAZING AND UNREGULATED ACCESS TO FARMLANDS ON AGRICULTURAL PRODUCTIVITY AND SUSTAINABILITY IN LOKOJA, KOGI STATE, NIGERIA

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ABSTRACT

Open grazing is a practice by herdsmen whereby they wander about with their cattle of cows and herds of sheep in fields, bushes and in recent times, in farmlands in search of grasses. Whereas undue access to land by heavy duty trucks in the name of illegal quarrying or supply of building materials have caused more wreckages to the farmlands. The materials used to execute this study include a well-structured questionnaire in which 120 were distributed to farmers and stakeholders around the farming communities in Lokoja. The processing of the acquired data was carried out to check for sampling adequacy with Principal Component Analysis (PCA). The Likert scale method was used to analyze the responses to the various questions in the questionnaires. The result established that; Movement of heavy duty trucks and cattle trampling make tillage of the soil for irrigation farming very difficult. It is recommended that the stakeholders strive hard to protect the farmlands from unnecessary access by herders and trucks that enter for quarrying activities. More so, ranching should be legislated in order to have sustainable production of food.

Keywords: Open grazing, Cattle trampling, Farmlands, Heavy duty-trucks, Sustainable agriculture

INTRODUCTION

There is an urgent need to secure the agricultural sector of our economy by making sure that, the slightest organic content of the soil is intact. It is necessary that the farmers and stakeholders understand that cassava or millet can be used to produce bread and extra food products that are consumed (Parikh and James, 2012). Therefore, regenerating the soil used for farming is vital for food production. Soil as a biological and living organism, is capable of healing itself so far it is put to the right use. However, if the soil is not preserved, people would only be seen destroying more lands that could produce food (Gosnell, 2022).

Open grazing is a practice by herdsmen whereby they wander about with their cattle of cows and herds of sheep in fields, bushes and in recent times, in farmlands in search of grasses (Muoneke and Okoli, 2020). Whereas undue access to land by heavy duty trucks in the name of illegal quarrying or supply of building materials have caused more wreckages to the farmlands. These two aforementioned practices are contributing greatly to the infertility of the land (Guma et al, 2024).

The dangers of not preserving the land could lead to erosion. Soil erosion reduces the fertility of the soil which if not taking care of, may negatively impact the yields of crops. Erosions in the soil or land could transfer water downstream thereby creating heavy strata of layers of sediment which impedes the smooth flow of rivers or streams. Once erosion occurs on a land, it is very certain that it would keep expanding (Sulaeman and Westhoff, 2020). Its products can be of great need in decision making in almost every professional sphere not limited to the built environment alone (Sadeghi-Niaraka and Choi, 2020).

This study emphasizes the critical role of micronutrients in soil for optimal plant growth and development, which has a direct impact on human health through the consumption of nutrient-rich food. According to Gusa and Tijah (2021), micronutrients play a vital role in plant growth, contributing to the immune system of humans. Plants require a range of essential mineral nutrients, up to 14, to attain optimal growth and development, facilitating the production of crucial macromolecules such as amino acids and nucleic acids, which are fundamental to plant metabolism (Marchner, 2012). However, the deficiency of these micronutrients in the soil can severely limit plant growth and biosynthesis, ultimately affecting crop yields and quality (Malakouti, 2008). In the context of Lokoja, Kogi State, the situation is further complicated by land degradation resulting from erosion and open grazing practices. This not only threatens the fertility of the land but also poses a significant challenge to agricultural productivity in the region (Guma et al, 2024). Given the potential impact on food production and security, this study aims to investigate the unintended consequences of open grazing and unregulated access to farmlands on agricultural productivity and sustainability in Lokoja, Kogi State, Nigeria. Specifically, it seeks to explore the negative impacts of these practices and identify potential mitigation strategies that can be implemented in farming communities across Lokoja. By understanding the dynamics of land degradation and its impact on agricultural productivity, this research endeavors to contribute to the development of sustainable farming practices that can enhance food security and support the livelihoods of farming communities in the region.

As bad as open grazing is to the economy, Muoneke, and Okoli (2020) agreed that some policies enacted to curb it seem to be bringing result. The policies are now regulating the negative activities and at the same time, positively impacting on agricultural produce and food prices in Anambra state. The cluster sampling method such as group and face to face interview and the Karl Marx Conflict theory were used to gather data about their findings. Their discoveries displayed that there were significant negative effect of open grazing on farm produce such that food prices are on the increase in Nigeria.

Open grazing has been a source of crisis in Nigeria in recent times. Lives have been lost in different parts of the country and more so, the depletion of the soil due to consistent

trampling of the land by cattle has been the order of the day too. It has been further revealed that the impact of open grazing are so threatening such that, the ecosystem and their environmental assets such as clean water, forests, fertile land and macronutrients are near going into extinction. The author used sociological research to come up with the aforementioned environmental impact conclusions associated with open grazing (Nnoruga, 2022).

Prior to open grazing prohibition and ranches establishment laws in Benue State, there has been series of clashes between the farming community and herders that has led to loss of lives of farmers, farmlands, social lives and properties. The resultant effect of this is hunger and inflation (Aligba et al, 2017). About ten farmers were interviewed in order to come up with the impacts of open grazing in Anambra South Senatorial zone and discoveries such as violence, poverty, terrorism, migration and insurgency between Herders and farming community was said to be existing (Udeagbala, 2020).

Livestock grazing has been a main cause of land degradation in almost all of Saudi Arabia. Creating barriers to prevent grazers has been a major management practice that has been engaged to restore biodiversity, macronutrients and vegetation. After investigation, the impact of fencing livestock to avoid grazing was discovered to have produce increases in vegetation covers, shrubs and trees species richness and general increase in perennial trees (Al-Rowaily, 2015).

Al-Rowaily (2015) established that, fencing in of livestock could enhance the abundance of crop production and in a concluded study, it was summarized that, 66.7% of lost species were restored out of the 34.5% of the earlier grazed site. It was further established that livestock fencing or what in Nigeria is referred to as *ruga* is very useful sustainable management technique for restoring of vegetation and conservation of diversity in plants (Al-Rowaily, 2015).

Muoneke and Okoli (2020) recommend establishing peace negotiations between Fulani herdsmen and farmers to mitigate the impacts of open grazing and undue passage of heavy-duty trucks. This approach aims to resolve conflicts and promote peaceful coexistence, reducing the negative effects on farmlands and fostering a more harmonious relationship between the two groups. By engaging in dialogue and finding mutually beneficial solutions, they can work towards sustainable land use and improved agricultural productivity. Peaceful negotiations can help address the root causes of conflicts and promote a more stable and productive agricultural environment.

To further curb the menace caused by open grazing and undue access to farmlands, the Benue State Government established the Open Grazing Prohibition and Ranches Establishment Law, 2017 to check the incessant clatters between herders and farmers and more so, the law was to avoid the incessant destruction of farm produce, environmental issues and spread of diseases occasioned by open grazing and rearing. More so, there is a need also for the presence of armed security personnel who should execute the Law against these herders who are at all times armed (Gusa and Tijah, 2021). The formal training of herdsmen to inculcate the knowledge that cattle rearing is a business and should be seen as that. With this knowledge, the herders would know that it is no more a culture to carry cattle about but business as civilization has overwhelmed all of that. This would help a lot in eliminating the killings and crisis being experienced today between farmers and herders (Abba, 2024; Gusa and Tijah, 2021).

MATERIALS AND METHODS

Study area

The study area is Lokoja in Lokoja Government Area of Kogi State. It covers longitude $6^0 43' 00"$ E to $6^0 51' 30" E$ and latitude $7^0\ 45'\ 0''$ to $07°\ 53'30''$N (Alabi, 2009). National Population Commission (NPC) in (2006) estimated the population of Lokoja to be 195, 261 people. Ali (2008) wrote that, Lokoja is inhabited mainly by Nupes, Ebira, Bassa-nges, Bassa-kwomus, Oworo and in some cases Hausa, Igalas, Ibo, Kakandas, Kupas and Okuns migrants; their main occupations are crop farming, animal husbandry, fishing and petty trading. The major rivers include the River Niger and Osara River; most of the existing smaller rivers dry up during the dry season. The elevation of most of the areas around Lokoja ranges from 45-205m, the hills are steep sided and very rough with the highest mountain there being mount Patti which is 1500m above mean sea level.

Lokoja lies within the basement complex made up of mainly gneisis, schists and granite and in the topography, it is explained further that the terrain of Lokoja is connected with granite and limestone complexes (Ayuba et al, 2015). Lokoja is within the Savanna zone which is always linked with low humidity, high temperatures, and sunshiny sky for most part of any year. The climate condition is tropical and fit in to the Koppen's Aw classification which is constantly undergoing two different seasons (rainy and dry seasons) respectively. The temperature in Lokoja is always high with monthly maxima and minima of about 35^0C and 21^0C respectively. This is due to the latitudinal location of the region within the tropics, though some mild modifications are traceable to influences by sea breeze from the Atlantic Ocean and Northern trade wind known as harmattan (Audu, 2009).

The soil types of Lokoja as whole which ranged from sandy to loamy with the sand fraction varying from 68.3 – 95.3%. The percentage sand content generally decreased with depth at any particular sampling point. The percentage silt content varied from 2.3 – 20.7% while the clay content varies from 2.3 – 20.0%. The soils varied in moisture content from dry through moist to wet types. The wet soils were encountered on the riverbanks. The colour of the soils varied from bleached whitish soils of the riverbanks/flood plains. In some areas the brown to reddish brown laterite form the topmost soil; it is hard, stiff, and ferruginous in outlook and silky in texture. The soils are acidic to slightly alkaline (pH 3.8 – 7.6). There was no distinct trend in pH values for the wet and dry seasons. The electrical conductivity values were low (15.3 – 270us/cm) indicating that the study area is within the fresh water zone. The phosphorus concentrations ranged from 0.2 – 62.ppm and most of the values fall within the accepted range of 7.0-20.00ppm for agricultural purposes. The concentrations of other anions were low to moderate and composed mainly of nitrates (0.001-0.46ppm) (Alabi, 2012b). The total content of the basic captions like Ca, Mg and K, available in Lokoja also give the extent of leaching of the soil. The effective caution exchange capacity (ECEC) of the soils ranged from 0.50 to 9.61meq/100g soil. The exchangeable acidity (H+ - Al3z) values were relatively low to high compared to that of ECEC and this accounted for the observed low to high base saturation values (15.1 – 99.9%). Most of the values (>80%) were above the critical level of 50% base saturation. The soils contain adequate concentrations of microelements or heavy metals for the healthy growth of plants. There was no indication of accumulation of microelements as a result of past/present farming practices. The study area is currently being affected with the overgrazing by Herdsmen (Musa et al, 2020).

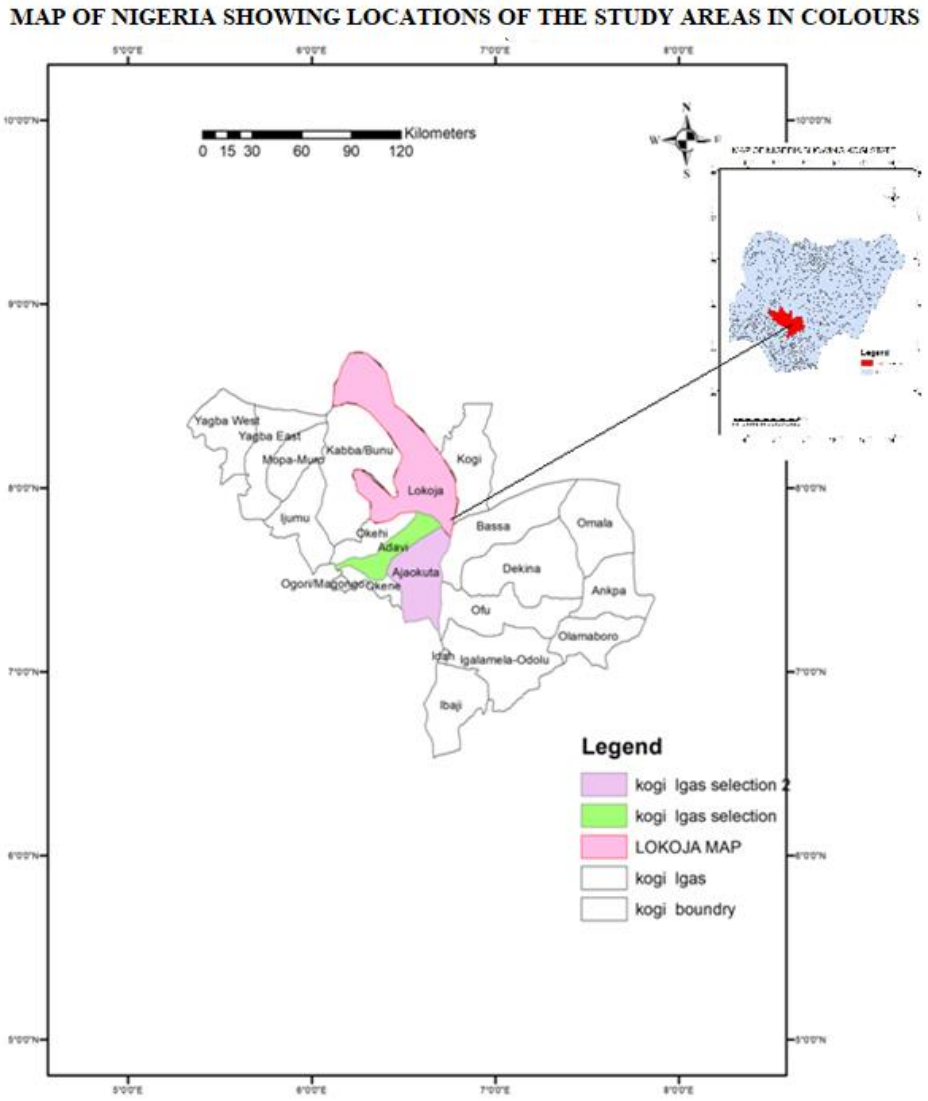

Figure 1: Map of Nigeria showing Kogi State and the study area

Data acquisition

The materials used to execute this study include a well-structured questionnaire that were designed. At first, a pilot testing was conducted and then, a more refined one was produced. Identified targets which the questionnaires were distributed to were farmers and relevant farming stakeholders. Direct interviews were conducted in cases where farmers or stakeholders are unlearnt. More so, the google form was administered to some farmer's whatsapp groups. In all, 95 responses were acquired including the online responses. The questionnaire was structured in such a way that it covers the economic impact of open grazing and ways of mitigating the impacts.

RESULTS AND DISCUSSION

The processing of the acquired data was performed to check for sampling adequacy and Principal Component Analysis (PCA) and the Keiser-Meyer Olkin (KMO) were deployed. The matrix table labeled 1 showed that the sample population was adequate for this study.

Table 1: Total variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.123	56.138	56.138	1.123	56.138	56.138
2	.877	43.862	100.000			

Extraction Method: Principal Component Analysis.

All the questions that pertained to this study were extracted and included in table 2. They appear as questions 1 to 5 which addressed the effects of cattle grazing on farmlands as well as the movement of trucks; questions 6 and 7 address the mitigation measures.

Table 2: Questions and responses from the questionnaire

S/N	Questions	Responses				
		Strongly agree (1)	**Agree (2)**	**Undecided (3)**	**Disagree (4)**	**Strongly disagree (5)**
1	Movement of heavy duty trucks and cattle trampling make tillage of the soil for irrigation farming very difficult	35	46	6	3	4
2	When cattle or heavy duty trucks trample the ground it leads to compaction and crusting of the soil?	18	51	3	6	17
3	The compaction and crusting of the land decreases water infiltration capacity of the soil	25	53	12	3	1
4	Trampling by cattle and heavy duty trucks could prone the land to erosion which in turn could lead to land deformation.	34	51	5	4	1
5	Continuous cattle trampling on vulnerable disrupt vegetation cover thereby exposing the land/soil to erosion.	42	48	3	1	1
6	Do you think that ranching of the cattle is the best solution for preserving the land for agriculture?	86	2	1	2	4
7	Good access roads should be created and followed by heavy truck users around farmlands to prevent indiscriminate access to farmlands by the drivers.	55	24	13	1	1

Source: Author's fieldwork

Negative impact of open grazing on agricultural land

The study conducted an in-depth analysis of farmers' opinions on various issues related to farming, as presented in Table 2. The demographic characteristics of the respondents revealed that 4.2% were between 18-25 years old, 16.8% between 26-35 years old, 51.6% between 36-45 years old, and 27.4% were 46 years old or above. To gauge farmers' opinions, the study posed several questions, and the responses were meticulously recorded and analyzed. For instance, when asked whether the movement of heavy-duty trucks and cattle trampling made tillage of the soil for irrigation farming difficult, 35 respondents strongly agreed, 46 agreed, 6 were indecisive, 3 disagreed, and 4 strongly disagreed. The mean response value of 1.86 fell within the "agree" interval, indicating that farmers overwhelmingly believe that these factors significantly contribute to tillage difficulties; and this agreed with Nnoruga (2022).

Similarly, when asked whether cattle or heavy-duty trucks trampling the ground lead to compaction and crusting of the soil, the response value was 2.51, which also fell within the "agree" interval. This suggests that farmers are in agreement that these activities cause soil compaction and crusting, which can have detrimental effects on soil health as already established by Gusa and Tijah (2021). The study also found that farmers concurred that compaction and crusting of the land decrease water infiltration capacity, with a mean response value of 1.96. Some farmers noted that this issue is more pronounced during the dry season when engaging in irrigation farming, highlighting the need for sustainable farming practices. Furthermore, the study explored the impact of cattle trampling and heavy-duty truck movement on erosion, with a mean response value of 1.81. Farmers observed that erosion is more likely to occur on terrains with loose soils and that human activity, such as truck movement and cattle trampling, significantly contribute to erosion.

Finally, the study revealed that farmers strongly agreed that continuous cattle trampling on vulnerable land disrupts vegetation cover, with a mean response value of 1.64. This has significant implications for food prices, scarcity, and erosion occurrence, underscoring the need for sustainable land management practices to mitigate these negative effects.

Mitigating the impacts of open grazing in farming communities

Regarding the implementation of ranching as a means of preserving land for agriculture, the farming stakeholders showed overwhelming support for the idea. A significant majority, representing 81.7% of the respondents, strongly agreed with the concept, as evidenced by a Likert value of 1.27, which falls within the "strongly agreed" interval. According to likert scale value, the respondents' perspectives aligned with Gusa and Tijah (2021) which submitted that, ranching would create a long term solution to land preservation for agricultural purposes.

Furthermore, the study explored the idea of providing access roads for heavy truck users around farmlands to prevent indiscriminate access to farmlands. The respondents showed strong support for this measure, with a Likert response value of 1.6, indicating that 79% of the farmers agreed with the idea. This suggests that the farming stakeholders recognize the importance of designated access roads in mitigating the negative impacts of heavy truck traffic on farmlands.

CONCLUSION

This study has highlighted the significant negative impacts of open grazing and undue access to farmlands on agricultural productivity and sustainability in Lokoja, Kogi State. The findings have shown that the movement of heavy-duty trucks and cattle trampling can lead to soil compaction, crusting, and erosion, ultimately reducing water infiltration capacity and disrupting vegetation cover. These effects have severe implications for food prices, scarcity, and erosion occurrence. The study has also demonstrated that farmers and stakeholders overwhelmingly support the implementation of ranching as a means of preserving land for agriculture and providing access roads for heavy truck users around farmlands to prevent indiscriminate access.

RECOMMENDATIONS

The recommendations suggested that relevant stakeholders should take a multifaceted approach to address the issues surrounding open grazing and undue access to farmlands. Firstly, legislation should be enacted to promote ranching as a sustainable means of livestock production, thereby preserving land for agriculture. Moreover, herders should receive formal training to recognize that cattle rearing is a business that requires professional management, rather than a cultural practice.

Additionally, designated access roads should be provided for heavy truck users around farmlands to prevent indiscriminate access and mitigate the negative impacts of heavy truck traffic. Finally, armed security personnel should be deployed to enforce laws and regulations related to open grazing and undue access to farmlands. By implementing these measures, it is possible to mitigate the negative impacts of open grazing and undue access to farmlands, promote sustainable agriculture, and ensure food security in Lokoja, Kogi State.

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