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## Environmental Security and Its Effect on Land Use Pattern and Human Mobility in Southern Kaduna, Nigeria

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### Abstract

Environmental security is the degree to which the public is safeguarded from environmental risks from inside or outside international boundaries, whether human or natural processes, ignorance, incompetence, or malice causes them. The massive increases in consumption and pollution in today's high-energy societies have led to drastic reductions in primary land use patterns, the forcible relocation of people due to eutrophication's reductions in water and pasture for livestock, encroachment and possible clashes between farmers and herders, and the forced migration of the people. The study answers these questions using survey research: What environmental threats did southern Kaduna's indigenous people face? How have those risks changed land use and mobility in the region? Three research questions guided the inquiry, which tested three hypotheses regarding how environmental security affects land use patterns and human mobility. Descriptive statistics like frequency counts and percentages were utilised to analyse the data and answer the research questions, and chi-square statistical approaches established statistical significance between the study's variables. Statistical approaches were used to portray findings in tables and graphs. The study revealed that armed conflict was the biggest hazard, resulting in poor land use and forced migration. The study found a link between climate-related armed conflict and regional migration. Government and agencies should mitigate climate change's consequences and develop adaption methods.

**Keywords:** Environmental Security, Land Use Pattern, Human Mobility

### Introduction

Environmental security is an element of regional and national security. According to the U.S. Department of State (2001), it encompasses the mitigation and prevention of energy threats, including threats to sources and supply lines, and environmental risks and related stresses that directly contribute to political and economic instability or conflict in a country or region of importance within the country. Moreover, it addresses selected environmental, and related national security concerns that pose a direct conflict. In addition, environmental security examines threats posed by environmental events and trends to individuals, communities or nations. It

may focus on the impact of human conflict and international relations on the environment, or on how environmental problems cross state borders.

The world community is increasingly concerned about the relationship between climate change, security, stability, and development. Climate change is known to increase security and development concerns by depleting natural resources, altering traditional livelihoods, causing losses and damages, and influencing migration and mobility patterns. Climate change and migration are often discussed through a security lens, with climate change and migration seen as threats to peace, securitizing these issues and restricting mobility. The data is inconclusive; therefore, assertions relating climate change, migration, security, and war should be taken with caution. Above all, climate-related hazards, migration, security, and conflict are complicated, connect with political, social, economic, and demographic issues, and are mostly indirect and context-dependent.

The International Organization for Migration (2022) views migration, environment, and climate change through the prism of human security and prioritizes vulnerable individuals. Assessing the links between development, human rights, and security is vital since the 2030 Agenda emphasises human security for sustainable development. Climate change affects food, water, environmental, and livelihood security, which might affect movement patterns. Environmental stress may aggravate ethnic prejudice, socioeconomic inequality, and bad governance. Human security contexts might make migration a negative response to climate change or an adaptive strategy. Climate change and war heighten dangers for already stressed populations and might lead to prolonged displacement and increasing humanitarian needs. These conditions require long-term development, adaptation, and catastrophe risk reduction programs to empower migrants and communities and provide lasting solutions.

Migration from areas at risk from sea and storms has certainly contributed to ethnic conflict for example in northeast India. But predictions that climate change will be associated with armed conflict in a major way remain speculative at present, since we do not know how climate change or future conflict will unfold. Droughts and falling rainfall seem likely to provide adverse effect on land use pattern significantly enhancing food insecurity and lowering the incomes of poorer farmers while possibly raising those of richer farmers. Lower runoff to rivers may trigger disputes between riparian states. Parching continental interiors and loss of low-lying land to the sea may intensify disputes over land and other agricultural resources for example, destabilizing relations between pastoralist and agrarian communities (Bercovitch & Jackson, 2001). There

will certainly be increased migration, both internally and internationally, though whether this triggers or mitigates conflict depends on circumstances. Over the longer term, the melting of the Himalayan glaciers will have a devastating impact on the river valleys of India and China. Rising sea levels and storms will affect the large deltas, which are densely settled and economically important. The melting of the Arctic is already contributing to a race for the hydrocarbon resources thought to lie beneath the ice. So an impact on armed conflicts is quite possible, though international cooperation has so far proved to be a viable option (Homer-Dixon, 2001).

According to Enger and Smith (2006), rising population and urbanization have caused many environmental concerns, changed land use, and environmental patterns, which may affect land climate change governance positively or negatively. Rogers (2010) argues that a 'fortress' approach of building barriers at borders to keep out migrants fleeing environmental security and other natural disasters may fail and increase insecurity as the oppressed strike back unexpectedly. Barnett and Adger (2007) argue that climate change would disproportionately harm the "bottom billion," who already have inadequate economies and governance. It will diminish economic prospects, because income and horizontal inequities, and increase human insecurity and government fragility, making impoverished nations least prepared to respond to climate change. Ersado et al. (2004) stated that most Sub-Saharan African countries should adopt more effective and productive farming practices and machinery to increase agricultural yield and improve environmental sustainability for economic development, food security, and poverty reduction. Terr Africa Partnership (TAP, 2009) stated that land users require land use patterns that allow them to enjoy economic and social advantages while conserving environmental support functions.

Homer-Dixon (2001) argued that resource load and environmental mortification cause inadequacy and structural fury, raising another question. The author meticulously documents how shortage may lead to societal repercussions, ethnic clashes, coups, and insurgencies. The instance of Haiti suggested that deforestation and erosion caused migration to towns, poverty, urban elite-slum-dweller conflict, and protracted war. Although, Buhaug et al. (2014) argue that the evidence to date does not support a link between resource scarcity and conflict and, on the other, by those who suggest the action works in contrary unsatisfactory social structures spawn both environmental scarcity and conflict. Theisen, et al. (2013) review the evidence that climate change is a driver of structural conflict and find it questionable, with an outstanding consensus deficit and diminutive backing for a correlation between rainfall, short-term warming and civil unrest.

The Intergovernmental Panel for Climate Change for the suggested with medium confidence a nexus between climate change and conflict in its Fifth Assessment Report (IPCC, 2014) that, 'Climate change can obliquely upsurge perils of violent conflicts in the form of civil war and inter-group violence by magnifying well-documented drivers of these conflicts such as poverty and economic shudders. Multiple outlines of evidence transmit climate variability to these forms of conflict such as herder's farmer's clashes which gradually aggravated into armed men attack.' This has altered land use pattern especially from the agrarian society, increase poverty and encourages rapid human mobility from affected rural communities. However, there are villages within the north central Nigeria that have flee away from their homeland due to these incessant armed men attack due to it impact on life and properties of the indigenous people. This study investigates environmental security and its impact on human mobility among the indigenous people of Southern Kaduna with the specific goal of x-raying the kind of environmental dangers the indigenous people confront and the effects on land use pattern and forceful human mobility in the region

### **The Study Area**

The region occupied an area of about 24,536 square kilometers between latitudes 9° 00' 00" and 10° 45' 00" North of the Equator and longitudes 7° 10' 00" and 8° 45' 00" East of the Prime Meridian. The region is bounded to the West by Niger State, to the East by the FCT, and to the Southeast by Plateau State, East with Bauchi and North with Kano (Atiyong & Micheal, 2022). The climate is Koppen Aw, which implies that the summers are rainy and the winters are dry. The dry season begins at the end of the calendar year in September and lasts until the beginning of the following April; the rainy season lasts from April to October, with August being the wettest month. Yearly precipitation in the study area varies from around 1203 mm in Kaduna's center to approximately 1733 mm in the southern Kafanchan and Kagoro parts, where orographic rainfall from the Jos Plateau plays a role (Abaje et al., 2015; 2010, 2009). The monthly average temperature is 28 degrees Celsius, and the relative humidity is 63%. This area's vegetation is representative of the Guinea Savanna biome. Temperature, vegetation, lithology, and terrain all have an impact on the major Ferruginous tropical soil type. Several annual, perennial, and tree crops may survive on well-drained soils just a few centimeters thick and ranging in texture from loamy sand to sandy loam (Eroarome, 2005). The region's undulating and mostly flat terrain influences water movement.

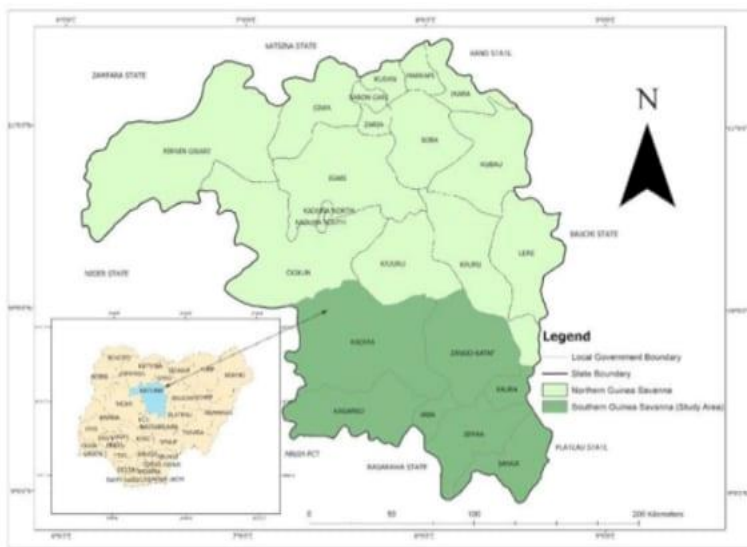


Fig. 1 Geological Location of Southern Kaduna

Source: Kaduna State Ministry of Land and Survey (2017)

With the vast agricultural field which made the people predominantly an agrarian society, they region has been under intense violent attacks since 2013 however; ethno-religious violence was predominant since 1992. The change in dimension of violence recently takes a toll on armed conflict and incessant attacks with a major hit yearly in recent times.

## Methods and Procedure

The data for the study was gathered using two sources namely; primary data sources which encompasses the use of survey questionnaires and secondary data sourced from existing literatures such as journals and news papers. The study used a cross-sectional design, so researchers could assess individuals' exposures and outcomes simultaneously. Zonkwa, Kafanchan, Manchok, Kagoro, and Gidan waya were all included in the research. This is because these cities provide a convenient hub for accessing the relocated communities. From 2015 and now, 2,476 persons have been uprooted and found new homes in the aforementioned municipalities. The study's data came from surveys with a random sample of 40 migrants from each city. The information was gathered through a 15-item, closed-ended survey; five questions each aim. A local volunteer greatly contributed to the success of the on-site administration of the instrument for individuals who do not speak the language in which it was written. The r-coefficience (.89) was calculated using the Cronbach Alpha reliability technique, and the content validity ratio (CVR-1) was calculated using Lawshe's template. Frequency counts and percentages were utilised to examine the acquired data to provide answers to the questions posed by the goals, while Pearson's correlation coefficient was employed to determine statistical significance.



## Results

### Kinds of Environmental Dangers

In a quest to provide answers to the research questions on the kinds of environmental dangers the indigenous people of southern Kaduna are confronted that warrant forceful displacement. Data collected was analyzed using frequency counts and percentages to describe the nature of environmental dangers that contribute the more in displacing the people from their settlements and presented in graph while, Pearson correlation coefficient at  $p < .05$  was used to establish statistical significance. The results are presented as follows:

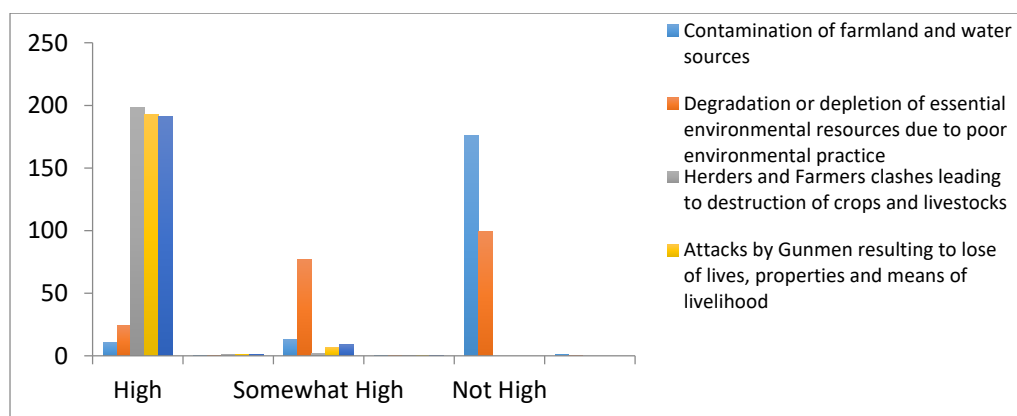


Figure 2: Kinds of Environmental Dangers Faced by the Indigenous People of Southern Kaduna

Source: Field Survey, 2023

The descriptive statistical analysis provided that, environmental factors as a result of climate change such as contamination of farmlands and water sources, degradation or depletion of essential environmental resources due to poor environmental practices contributes less to the forceful migration of the indigenous people of southern Kaduna. The outcome provided that, majority of the displaced persons forcefully migrate due to herders farmers clashes over grazing and farming fields, unexpected armed men attack which over the years have destroyed houses and result to loss of viable agricultural workforce which have reduced food supply and food insecurity due to fear and non-access to arable agricultural field.

The test of association conducted to establish the statistical significance on how the kind of environmental danger witnessed by the people impact migration among the indigenous people of southern Kaduna yielded the following results;  $r=0.879$ ,  $N=200$ ,  $df=3$  and  $p=0.000$ . Given that,  $p=0.000 < .05$  level of significance, the result is significant at .05. Therefore, human mobility among the indigenous people of southern Kaduna is dependent on the kind of environmental dangers they are confronted with.

### Impact of Environmental Security on Land Use Pattern

Haven't identified the possible kind of environmental danger that promoted forceful migration of the indigenous people of southern Kaduna, the study further seek to find out ways the menace has affected land

use pattern leading to forceful migration due to conflicts which posed a high risk to livelihood. The findings are presented as follows:



Figure 3: Effects of Environmental Security on Land Use Pattern

Source: Field Survey, 2023

Results from the descriptive statistical analysis revealed that the decline in agricultural productivity is direct outcome of rising population mobility as a result of incessant attack on communities with viable arable land for both farming and livestock grazing which has further made it difficult for the indigenous people to access their farmland which serve as their major source of livelihood. In general, most of the communities that have been under attack experienced a diminishing number of agricultural workforces due to fatality and migration. However, environmental resources which the people depend on like water bodies for fishing at small scale, gallery forest vegetation for hunting and harvesting of dead trees for fuel wood as their major source of domestic energy and for commercial purposes have been underutilized in some instance and in another completely altered due to fear of armed militias.

The test of association conducted to establish the statistical significant effect the threats the people are confronted with have on the land use pattern yielded the following results;  $r=0.999$ ,  $N=200$ ,  $df=3$  and  $p=0.000$ . Given that,  $p=0.000 < .05$  level of significance, the result is significant at .05. Therefore, there is a strong correlation between the threats that the indigenous people of southern Kaduna faced from environmental security and the region's patterns of land usage hence, the treat provided underutilization of environmental resources and altered the land use pattern of the indigenous people of southern Kaduna.

## Effect of Environmental Security on Human Mobility

Data gathered were descriptively analyzed using frequency counts and percentages while, a statistical significant correlation was established using Pearson correlation coefficient at  $p < .05$  and the results are presented as follows:

**Table 1: Effect of Environmental Security on Human Mobility**

Responses n=200	True		Uncertain		Not True	
	Freq.	%	Freq.	%	Freq.	%
Multidimensional security and development risks leading to human displacement	179	89.50	19	9.50	2	1.00
Depletion of natural resources which further lowers the standard living of the vulnerable people	11	5.50	51	25.50	138	69.00
Destruction of traditional source of livelihoods of the indigenous people hence forcing them to migrate	186	93.00	13	6.50	1	0.50
Creation of losses and damages that affect migration or mobility patterns	163	81.50	34	17.00	3	1.50
Threat to peace leading to increased securitization provided basis for the indigenous people to seek for means of livelihood and survival through migration	188	94.00	9	4.50	3	1.50
Creation of restrictions to mobility especially for the purpose of agriculture	172	86.00	22	11.00	6	3.00
Insecurity and conflict between farmers and herders for arable grazing land and limited sources for water for household house, irrigation and for livestock consumption	190	95.00	8	4.00	2	1.00
Small scale agricultural practices promotes food insecurity	177	88.50	18	9.00	5	2.50
Water scarcity in most instances with no alternative sources	169	84.50	23	11.50	8	4.00
Tensions resulting from ethnic discrimination	152	76.00	47	23.50	1	0.50
Socio-economic inequalities, and poor governance	184	92.00	13	6.50	3	1.50
Negative response to adverse climate impacts or an adaptation strategy to armed conflicts	195	97.50	2	1.00	3	1.50
Protracted displacement and increased humanitarian needs as a means of adaptation	139	69.50	56	28.00	5	2.50

$r = 0.823$ ,  $p = 0.000$

The descriptive statistical analysis provided the following outcome and are interpreted as follows:

Multidimensional security and development risks which emanated from environmental security confirmed to have a great impact on human mobility, few of the participants affirmed depletion of natural resources due to rapacious means of exploitation which have a diminishing impact on standard living of the vulnerable people, did not determine the pattern of human migration rather majority of the participants confirmed the multidimensional security and development risks creates losses and damages that affect migration or mobility patterns, threat to peace leading to increased securitization, creation of restrictions to mobility especially for the purpose of agriculture. Insecurity and conflict between farmers and herders for arable grazing land and limited sources for water for household use, irrigation and for livestock consumption was identified as an indicator for population mobility in the area as this factor has decreased agricultural production due to fear of attack from armed militias leading to small scale agricultural practices which only support food insecurity, water scarcity in most instances with no alternative sources, tensions resulting from ethnic discrimination. Forcing people to migrate. It was established by majority of the indigenous people that socio-economic inequalities, and poor governance to response to the adverse climate impacts or an adaptation strategy to armed conflicts results in the protracted displacement and increased humanitarian needs as a means of adaptation.

The test of association conducted to establish the statistical significant relationship between environmental security and human mobility among the indigenous people of southern Kaduna yielded the following results;

$r = 0.823$ ,  $N = 200$ ,  $df = 11$  and  $p = 0.000$ . Given that,  $p = 0.000 < .05$  level of significance, the result is significant



at .05. Therefore, the study concludes there is a linear correlation between environmental security and human mobility among indigenous people of southern Kaduna.

## Discussion of Results

Due to the fact that the data obtained and analyzed were from different location within the region, there are similarities in terms of responses as to the kind of danger they encountered, impact on land use and resultant effects of human migration. The outcome provided that, majority of the displaced persons forcefully migrate due to unexpected armed men attack which over the years have destroyed houses and result to lost of viable agricultural workforce which have reduced food supply and increase food insecurity due to fear and non access to arable agricultural field. With this the study found that the massive human mobility among the indigenous people of southern Kaduna is dependent on the kind of environmental dangers they are confronted with. This is in consonance with IPCC (2014) that climate variability can provide forms of conflict such as herders farmers clashes which can gradually aggravated into armed men attack causing harm and forceful migration.

Southern Kaduna was ones very densely populated and considered as a location predominately occupied with viable agricultural fields which in turned made the region an agrarian society. But due to environmental security caused by climate change, there are series of clashes between herders and farmers, which have resulted to armed men attacking and killing residence. This actions has resulted to displacement and loss of agricultural workforce, difficulties for the indigenous people to access their farmland and other land covers which the people depend on like water bodies for small scale fishing, gallery forest vegetation for limbering, hunting and harvesting of dead trees for fuel wood as their major source of domestic energy and for commercial purposes have been underutilized in some instance and in another completely altered due to fear of armed militias. This revealed that, there is a strong correlation between the threats that the indigenous people of southern Kaduna faced from environmental security and the region's patterns of land usage hence, the treat provided underutilization of land resources and altered the land use pattern of the indigenous people leading to forceful human migration. This aligned with Barnett and Adger (2007) who found a significant relationship between environmental security and economic wellbeing of poor rural dwellers. The author affirmed that climate change is most likely to affect the poorest the 'bottom billion', which already live in puny economies and scrawny governance. It will weaken economic prospects, result in loss of income and horizontal inequalities, and contribute to human insecurity and to the fragility of governments hence, poor countries will be least able to adapt to the challenges of climate change.

Multidimensional security and development risks emanated from environmental security confirmed to have a great impact on human mobility which the study affirmed strongly that depletion of natural resources due to rapacious means of exploitation with it diminishing impact on standard of living of the vulnerable people, did not determine the pattern of human migration rather multidimensional security and development risks creates losses and damages that affect migration or mobility patterns, threat to peace leading to increased securitization, creation of restrictions to mobility especially for the purpose of agriculture, insecurity and conflict between farmers and herders for arable grazing land and limited sources for water for household use, irrigation and for livestock consumption, decreased agricultural production due to fear of attack from armed militias leading food insecurity, water scarcity in most instances with no alternative sources, tensions resulting from ethnic discrimination. There is a strong relationship between environmental security and human mobility among the indigenous people of southern Kaduna as it has created socio-economic inequalities, and poor governance to response to the adverse climate impacts or an adaptation strategy to armed conflicts results in the protracted displacement and increased humanitarian needs as a means of adaptation. This support Bercovitch and Jackson (2001); Homer-Dixon (2001) who predicted that climate change will be associated with armed conflict in a major way as droughts and falling rainfall seem likely to provide adverse effect on land use pattern significantly enhancing food insecurity and lowering the incomes of poorer farmers while possibly raising those of richer farmers, destabilizing relations between pastoralist and agrarian communities and certainly increased migration both internally and internationally.

## Conclusion

The study concluded that, there are numerous elements of environmental security which posed challenges to the indigenous people of Southern Kaduna but the greatest among them all is the scramble for grazing lands which has led to armed conflicts as a result created food shortage due to poor land resource use and forceful migration.

## Recommendations

Populace should adopt agricultural best practices to minimize climate change impact on environmental resources. Government should align with the UN climate change protocols to reduce carbon to less than 2 percent as a measure of mitigation and curtail armed conflicts and forceful displacement of people due to fear of militia attacks, improve environmental safety, access to agricultural land fields, and utilization of other land covers such rivers and vegetation to better the livelihood of the indigenous people of Southern Kaduna.

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