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EROSION CONTROL AND FOOD SECURITY: ANALYZING VARIATIONS IN LIVELIHOOD MOBILITY OF RURAL POPULATIONS IN SOUTHEASTERN NIGERIA

Akujobi Chiedoziem Theophilus[⋆,1], Dr. Onyige Chioma Daisy[†,2]

[1] *Department of Sociology, University of Port Harcourt, Rivers State, Nigeria*
[2] *Department of Sociology, University of Port Harcourt, Rivers State, Nigeria*

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ABSTRACT

The role of indigenous knowledge in mitigating on erosion and food insecurity of the southeastern Nigeria has widely been influenced by disparities in micro mobilities of rural households. This has dissipated the availability of manpower for effective mitigation on erosion menace. The objectives of this study was to assess how the various aspects of indigenous knowledge in erosion control have affected variations in livelihood mobility and food security of rural population in South-Eastern Nigeria. The data for the study originated mainly from farming households in the study area through a mixed method embedded in an ethnographic survey. The study utilized the multi-stage sampling technique to sample three states of the south-eastern Nigeria vulnerable to erosion menace. Both structured questionnaire survey and qualitative focus group discussion methods were applied to collect the necessary information from 315 farm households. The received data was analyzed using descriptive statistics and the content analysis. Findings from the study indicate that the indigenous erosion control networks have significantly declined owing to the discord between the communities' capacities and the erosion control agencies. Furthermore, the data shows that the manpower capacities of the young generation are constantly disconnected and insufficient to promote sustainable erosion control. This clearly undermines sustainable subsistence food production and resilient erosion control capacities of communities in the South eastern part of Nigeria. The study recommends that youth participation in farming and environmental conservation should be encouraged by communities as a livelihood for the young generation. This can go a long way to advance as well as revitalize indigenous erosion control practices for soil and food output.

Key words: Erosion control–food security–livelihood mobility and rural population.

1 INTRODUCTION

Agriculture is sustainable when it nourishes people and restores and protects the land, air, water and other living creatures; when it mitigates and is resilient to climate change and provides livelihoods and dignity for farmers, workers and rural communities (Jeffrey: 2016) Thus, it is arguable that environmental conservation, food security and changes in migration patterns are key indices of environmental inequalities of most rural communities of Africa and the southeastern Nigeria with a burgeoning urbanization and erosion menace.

The above supports the declaration by the 68^{th} United Nations General Assembly that "soils constitute the foundation for agricultural development, essential ecosystem functions and food security and hence is key to sustaining life on Earth" (United Nations 2015, p. 1). Similarly, the UN declares that the sustainability of soils is key to addressing the pressures of a growing population, the sustainable management of soils that contributes to healthy soils and thus to a food-secure world, stable and sustainably used ecosys-

⋆ Email: theophilus_akujobi@uniport.edu.ng
† Email: chioma2nv76@gmail.com

tems. Accordingly, the United Nations (2015) asserts that good land management is of economic and social significance, and this includes soil management, particularly for its contribution towards economic growth, biodiversity, sustainable agriculture and food security, which in turn are key to eradicating poverty and allowing women's empowerment, and to urgently address issues such as climate change, water availability, desertification, land degradation and drought, as they pose global challenges (United Nations 2015).

Food and Agricultural Organization (FAO) led Global Soil Partnership (2017) reports that 75 billion tonnes of soil are eroded every year from arable lands worldwide, which equates to an estimated financial loss of US $400 billion per year. The latest reference document of Food and Agricultural Organization of the United Nations (2015) on the status of global soil resources stresses that "the majority of the world's soil resources are in only fair, poor or very poor condition". Ikponmwosa, et al (2016) observed that although soil erosion is one of the main themes in environmental studies, an unresolved question is whether its relevance is accorded due place in agriculture and related studies because of its great concern and implications on all human activities; especially the agricultural sector which is the most affected. Similarly, FAO (2001) states that Nigeria is one of the countries with high declining soil fertility. The country was estimated to be losing an average of 24 kg nutrients/ha per year (10 kg N; 4 kg P2O5, 10 kg K2O) in 1990 and 48 kg nutrients/ha per year in 2000, that is, a loss equivalent to 100 kg fertilizers/ha per year.

Based on the above, one can surmise that erosion like any other environmental disaster provokes an overriding effects on livelihoods especially in the southeastern Nigeria where the problem of erosion is so severe that the lives and livelihoods of millions of people are constantly destroyed and had amounted to an estimated $100 million annual expenditures (National Erosion and Watershed Management Project Report 2014) despite it multiplier effects on primary livelihood occupation of the people centered on cultivation of arable land and sales of the produce garnered from the soil.

Evidently, erosion happens to be one of the severe contemporary environmental problems communities in this region are faced with. The outcome of this has been negatively impacted land use changes since the post-civil war era. This as enunciated Udo (1971), that the problem of gully erosion had been long recognized by the British colonial government in the 1920s which have assumed steep politicization of the disaster from historic time as listed by Federal Radio Cooperation of Nigeria, Enugu (FRCN 2008). According to Chief Okoye, Mbuze I of Nanka (see; www.frcn.radionigeria.net);

"The gully erosion in Nanka and Ekwulobia started from the flood waters that flow down from Isuofia some seven kilometres and seventy-five meters higher to the west of Nanka, Oko and Ekwulobia. The people had wanted to tackle the problem but were told to wait for the government. In Agulu, the surface flood incidence was the genesis of the erosion problems which was left unattended to, thus was the gullies created".

From the above, one would surmise that the knowledge capacities or efforts of the southeastern communities in addressing erosion menace is been undermined by both rural and state environmental management systems. This indicates that till today, local erosion control remains widely politicized and inundated by undue bureaucratization and thus stifles the local food security. In addition, the ineptitude and negligence of both state and federal government to intervene holistically on the issue of erosion control have driven several socio cultural imbalances affecting household livelihood changes and migration of rural manpower into the cities for menial jobs and other entrepreneurial engagements. It is in light of the above that this study **analyzes the variations in livelihood mobility of rural populations through the lens of** soil erosion control and food security focusing on migration and inequality amongst the communities of the south eastern Nigeria. The study seeks to answer the question: In what ways have erosion control practices affected variations in livelihood mobility and food security of rural population in South-Eastern Nigeria?

Conceptual Framework

In the conceptual framework it has been assumed that the adherence to indigenous land conservation practices to mitigate erosion menace by household has declined due to deficit in social capital amongst local land management networks. The outcomes are cynical to increasing migration as an alternative to livelihood and in turn a decrease in food security that reinforces more development challenges.

Source: Author's Conceptual Framework

From the above, the study examined the tenets of the political ecology and the vulnerability theories to understand the interplay of power relations, inequalities, environmental governance in addressing erosion control risks on rural livelihoods and the micro mobilities of rural manpower to urban cities in search of alternatives to sustain their households. As a result, the political ecology attempts to integrate human and physical approaches to environmental change through an analysis of people that are marginal with respect to political, ecological and economic indices; the social and cultural pressures of production on local resources; and, the interaction of local-global politics (Zimmerer & Basset, 2003; Robbins, 2004; Peet & Watts, 2004 cited in Blaikie & Brookfield, 1987). In light of this, Blaikie and Brookfield (1987, p. 17) maintain that political ecology merges "the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also, within classes and groups within society itself".

Bryant and Bailey strand of political ecology developed three fundamental assumptions in practicing: First, costs and benefits associated with environmental change are distributed unequally. Changes in the environment do not affect society in a homogenous way as political, social, and economic differences account for uneven distribution of costs and benefits. Second, this unequal distribution inevitably reinforces or reduces existing social and economic inequalities. Following this assumption, political ecology runs into inherent political economies as "any change in

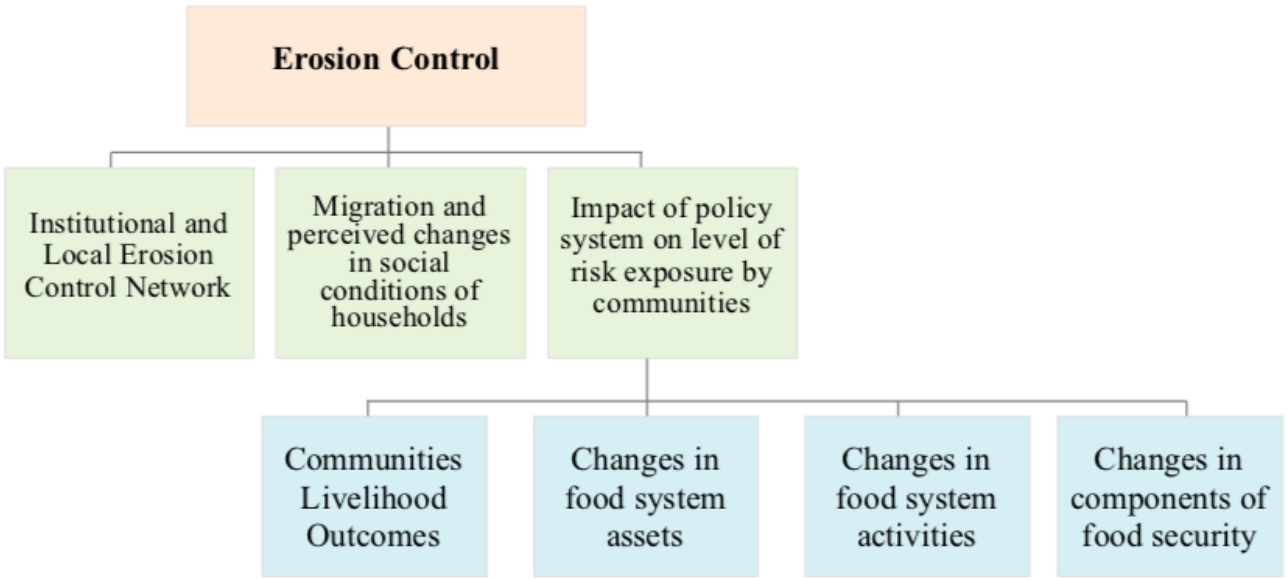

Figure 1.

environmental conditions must affect the political and economic status quo." (Bryant & Bailey, 1997, p. 28). Third, the unequal distribution of costs and benefits and the reinforcing or reducing of pre-existing inequalities holds political implications in terms of the altered power relationships that are now the result. In addition, political ecology attempts to provide critiques as well as alternatives in the interplay of the environment and political, economic as well as social factors.

More recently, the environmental/social dialectic literature in political ecology incorporated imbalances in ecological ideas into their analyses as part of their critique of states and aid donors whose models and interventions are based on equilibrium assumptions about the biophysical world. For example, states and World Bank aid donors (NEWMAP) that aims to promote "new enclosure movements" to combat environmental degradation (erosion control) by implementing territorial conservation strategies that are intended to contain and manage environmental degradation (Zimmerer, 2000).

However, these territorial strategies have been criticized for its constant failure to integrate the local knowledge capacities in improving landscapes and livelihoods of resource users because they misdiagnose the temporal and spatial dimensions of environmental change dynamics (Turner, 1993; Zimmerer, 2000). Assessing the above evidence, one would surmise that the imbalance in political actions towards erosion control that imposes a top-down solution with a clear negation of the indigenous knowledge banks and technological development continues to exacerbate the level of risk or vulnerability amidst the escalating indices of other emerging social risks such as the herders-farmers conflict. From these assumptions, political ecology becomes a relevant tool to inform policy implementation, understand and address the complexities surrounding environment and development. Thus, one would surmise that applying political ecology to study erosion control and food security in the southeastern communities of Nigeria is without doubts shrouded with the following:

1. Historical marginalization in erosion control of the southeastern communities from colonial times.
2. Power play that has sustained pressures and disregarded local land management networks altered the once local conservation practices coupled with shift in interest on land to entrepreneurial development as an adaptive measure to cushion the effect of politically-induced hunger and poverty policy that dislocated the farming population of the region.
3. Sustained land use policy that promoted urbanization indigenous environmental conservation.
4. Marginalized agricultural development plans that failed to check on the wide migration of rural manpower to urban cities and remittance that saw massive urbanization of most hinterland of the southeastern communities.
5. Alteration in the social relations of production within such communities and the way in which the quality of soil management and food availability (access, distribution and conservation) are distributed emerged gradually and unattended to by both local and national government.
6. The interplay of these social networks nonetheless sustained weak erosion control by local institutions until the World Bank introduced the NEWMAP program

that have not been able to address these gaps and inequalities.

Empirical review:

The most pressing challenge of Nigerian agriculture in the new millennium is how it can meet the food need of an ever-expanding population in the face of the myriads of social, cultural and economic problems that negates sustainable land management (Saheed & Isa, 2017).

Sustainable intensification of agriculture is very important in achieving global food security (United Nations, 2014: Onyenekwe, 2016). However, Sustainable development in agriculture in Nigeria has been threatened by environmental degradation arising from soil erosion menace (Onu, 2013). A study by Okorafor, Akinbile, Adeyemo (2017) found that soil conservation and population control if ignored, would result to more malnourished people and more deaths.

Extant studies such as; Abdulfatai et al., (2014), Anejionu et al., (2013), Ogboi and Odeh (2012), Umeugochukwu et al., (2012), Ogbonna et al., (2011), Obiadi et al., (2011), Ezezika and Adetona (2011), Akpokodje et al., (2010), Igbokwe et al., (2008)] have studied the effects/impacts of soil erosion and their findings reveals the following;

- Reduced agricultural productivity and outputs/yields due to degraded lands/soils. - Unavailability of land area for agricultural production due to continual dissection from gully formations.
- Reduction to removal of plant nutrients and organic matter content of the soil resulting in elevated soil infertility.
- Destruction of soil structure and biota to support plant root development and eventual growth.
- Depletion of soil volumes and quantities due to large volumes of surface runoff caused by high/heavy rainfalls which are synonymous to the region.
- Deposition of debris and pollution/contamination of aquatic ecosystem through direct runoff from farmlands.
- Eutrophication of rivers and streams resulting from fertilizer/manure runoff flows from agricultural farmlands. - Siltation and sedimentation of water reservoirs thus reducing the life expectancy of dams and storage dams which will lead to eventual failure.
- Distortion, destruction and breakage of major road networks example of such roads include Uturu/Isuikwuato road at Mgbelu Umunnekwu, Abia State, Orlu-Mgbee/Eziama road, Imo State, Nkporo Oso/Amasiri road at Edda, Ebonyi State, Nanka/Ekwulobia road Anambra and so many other roads.
- Decreased agricultural sustainability due to unavailable fertile lands for agriculture.
- Destruction of life and property for example in Oko community of Anambra deep gullies have widened into craters threatening to sweep away 826 families.
- Loss of vegetation and soil cover which exposes the soil to further environmental devastation; reduction of lands available for erection of residential buildings, industries, and other structures; siltation and sedimentation of existing channels resulting in over-flooding.

Nwobodo, Otunwa, Ohagwu, Enibe (2018) concludes that the economic cost of erosion is very difficult to quantify, but it is definitely very large, and involve huge sums of money in repairing damage caused by erosion or reinforcing existing structures and land against erosion yearly. Akinbile, Aminu and Kolade (2018 cf) found that erosion disasters affect livelihood of rural people through its effects on their lives and subsistence.

2 METHODS

The study employed the holistic ethnographic (ethnopedological) and narrative study design as the philosophical and conceptual issues that drive the research. The justification for the choice of these methods is to understand the interplay of the relationship between the farming households and environmental control institutions in addressing erosion, food security amidst micro scale migration that has expanded the disparities in livelihoods of rural communities in the southeastern Nigeria. The study was centred on selected states of Southeast Nigeria which comprises of Abia, Anambra, and Imo states. "The zone is located within latitudes 4° 47′ 35″N and 7° 7′ 44″N, and longitudes 7° 54′ 26″E and 8° 27′ 10″E in the tropical rain forest zone of Nigeria, with mean maximum temperature of 27 °C, and total annual rainfall exceeding 2500 mm" (Ezemonye & Emeribe, 2012). "It is mainly agrarian and inhabitants depend more on land resources, due to its dense population averaged to about 1000 people/Km^2.

The justification for the choice of this study area was owing to the fact that soil erosion is a peculiar environmental disaster confronting livelihoods in the South-Eastern communities. The study utilized the multi-stage sampling technique to sample three states of the south-eastern Nigeria vulnerable to erosion menace. Secondly, it purposively sampled two Local Government Areas affected by erosion control menace in the three South-eastern states of Nigeria culminating into seven (6) Local Government Areas. Thirdly, it randomly selected two communities affected by erosion from each of the local government areas equals (12) communities. Fourthly, a purposive sampling of 6 households from each of the village was done. The sample size of the study was 315 households delineated through multi-stage sampling technique.

The sample for the Focused Group Discussion (FGD) and the Key Informant Interviews (KII) were derived from the main sample frame. Individuals who fall into the categories and possessed local knowledge capacities on erosion control

like farmers associations, heads of households and women based associations were included in the sample due to their relevance to the objectives of the study. The study adopted both secondary and primary sources of data. Secondary data were sourced from library, desk and internet materials involving an extensive engagement with literature. While primary data involved the triangulation of qualitative instruments (FGDs and KIIs). The following data collection instruments were utilized in the data collection process: The interviews focused on key informants developed for community and household levels; the interview guide adopted an open-ended format.

The interviews were conducted to explore new themes that helped describe the underlying adaptation choices and triggers of migration between socio-economic classes of persons in the communities perceived to be threatened by erosion menace. The qualitative data derived from interviews and FGDs were coded and analyzed. Qualitative Content Analysis was used. This helped in **organizing, analyzing and finding insights with regard to the unstructured or qualitative data** derived from the interviews, open-ended survey responses, articles, social media and web content. The data analysis involved the use of both inductive (observation-based inference) and deductive (formal logical inference) reasoning.

3 RESULTS

Erosion control practices and variations in livelihood mobility (measure food security) of rural population in South-Eastern Nigeria.

Table 1. Distribution ofRespondents by Secondary Livelihood Portfolios S/N SecondaryLivelihoods Frequency (n= 315)

1	Petty Trading of household consumables	10
2	Commercial Motorcyclist (Okada Riding)	22
3	Hired Labour	14
4	Furniture	15
5	Barbing Salon	20
6	Tailoring	18
7	Pool/Sports betting	32
8	Food vendor and Restaurants	15
9	Plumbing and build materials	24
10	Security guard	8
11	GMP Installation	16
12	Teaching	25
13	Politics	15
14	Hair Dressing	29
15	Generator Repairer	17
16	Masonry	20

Source: Fieldwork, 2019

Data from the secondary livelihood activities showed that respondents in the study area have majorly diversified into different livelihood engagements for alternative support to their farming income as indicated by the distribution of secondary livelihood sets.

The result indicated that out of the 315 respondents who were engaged in non-agricultural livelihood activities. The percentage frequency varies across the various non-farming engagements which show a sharp shift away from farming as a livelihood within the study communities of the south-eastern Nigeria. Thus 10% were engaged in sport betting, 3.2% for petty trading of household consumables, 7% were commercial okada or keke drivers, 4.4% of them were engaged as hired labourers locally known as "oguaja", 4.7% were engaged in one form of furniture craft while 6.3% are barbers who either owned a barbing salon or were hired to manage one.

More so, while 4.7% were engaged in food vendor and restaurant business, 7.6% were engaged in building materials and plumbing jobs, 2.5% were security guards, 5.1% are engaged in GMP installations, 8% were teachers and 10% were engaged in local politics. Lastly, 9.2% were engaged in hair dressing and beauty shops, 5.4% were generator repairers and mechanics while 6.3% were mason. Data from the above suggest that majority of respondents in the study communities and by extension in the southeastern region of Nigeria have gradually moved away from their primary farming livelihood systems. This trend although portends its challenges to indigenous knowledge use in erosion and environmental management but also assisted households cope with the challenges of food security associated with erosion threat.

From the data gathered, one would surmise that this situation might negatively lead to loss of cultural knowledge on farmland and environmental conservation systems amongst the southeastern people in Nigeria. Further investigation into the primary reasons why households were diversifying away from farming was examined. Results as indicated in figure above reveals that 45% of respondents diversified into non-agricultural livelihood activities as a result of poor income derivation from farming, 28% diversified due to seasonal poor yield caused by to erosion, 21.2% diversify due to poor access to land for farming activities while 9% diversify due to need to substitute household income.

Survey result shows that out of the total population sampled, 68.6% were female while 31.4% were males. According to group discussion in the study areas, agricultural production activities were mostly carried out by female members of the family and males were limited mostly to performing other engagement with secondary livelihood activities.

Table above shows the cross tabulation and significance of the relationship between Gender and Communities land management Practice in Erosion Control. When analyzed, it was confirmed that the relationship was significant since the responses from the discussant reveals that there is significant relationship between male household manpower capacities (gender) and successful execution of physical land management practices such as terracing and soil bund in erosion control.

In support of the above result, data from one of the discussant was noted thus:

"Despite men been the custodians, energetic manpower and owners of land; the women are more engaged and interact with the soil than the men. This leaves a gap in the

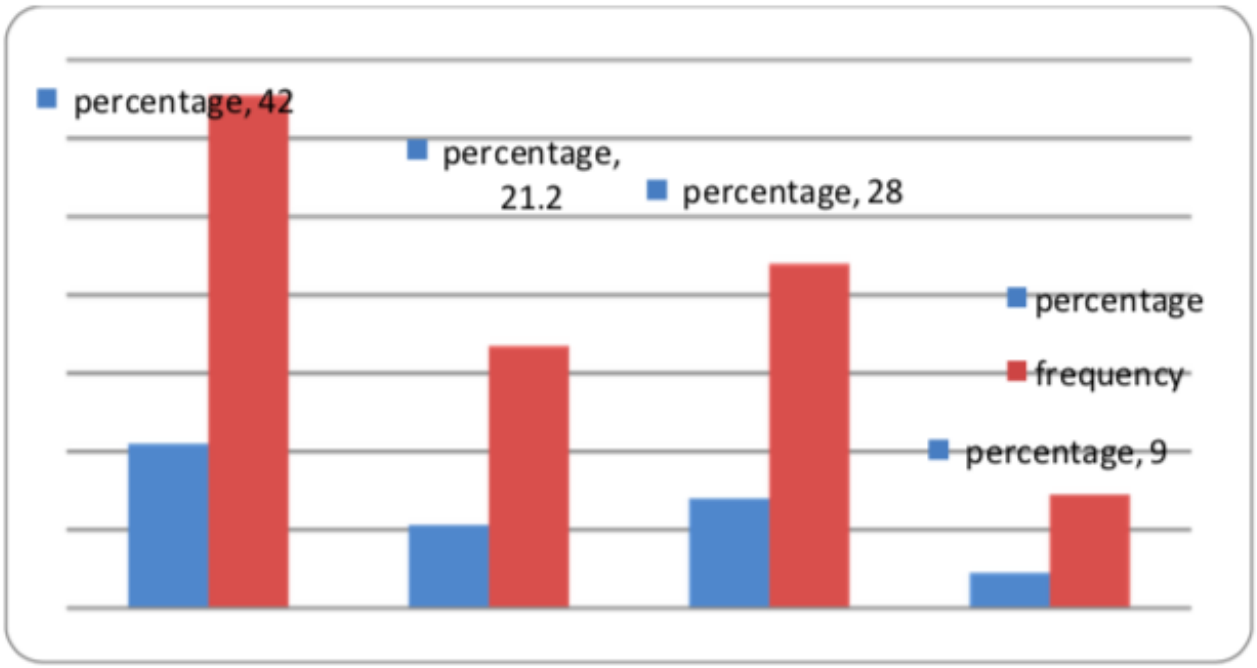

Figure 2. Respondents' Reasons forLivelihood Diversification Source: Fieldwork, 2019

Table 2. Cross Tabulation of data between Gender and Erosion Control.

Variable			Communities land management Practice and Erosion control				
			Uturu N=62	Ogidi N=230	Ugiri N=106	x2value	P value
Sex	Male	Frequency	33	33	33	3.6	0.05
		Percent	10.5	10.5	10.5		
	Female	Frequency	72	72	72	4.8	0.05
		Percent	23	23	23		

Source: Own survey 2019.

capability of the physical engagement with technical construction of contours and terracing which I suppose are difficult task that has been left for the women and children as farmers to deal with". - KII/Male/Uturu/77years.

"Women often cultivate the soil for livelihood than men who have gradually diverted their energies to alternative livelihood income in order to meet up with the current demand of the livelihood" - FGD/Female/Ogidi/62years.

From the above data, one could surmise that women are more involved with land management and agricultural practices which continuously impact on the efficacy of local erosion control as manpower capabilities continue to retrogress because farming has been gradually feminized and as the erosion control which is an integral part of farming culture has been affected.

This is also peculiar within the community circles were most of the youths who are the capacity for environmental capital are gradually migrating to the cities in search of better livelihoods leaving farming for the female households and children. This result is in consonance with Benin, (2006) cited in Tadele (2016) who found that women are often inhibited from making decisions about land management practices while their husbands are away. The above reveals that there was significant difference on how gender responds to technical erosion control practices across communities' and land management practices for erosion control. This shows that agricultural activities are mostly carried out by women in the three communities and this has impacted on the current level of erosion control in the communities.

Major changes in household livelihood activities

The study analyzed the changes in major livelihood activities of the households; interplay of mobilities and to food security of households. The study shows a diverse range of livelihood activities currently practiced in the three selected communities. The level of engagement in the diversified livelihood activities however varied with the production systems and gender. Most of the households in the three communities were involved in agriculture with household preference in a decreasing order as; agro-pastoralism has been impacted greatly. Study reveals that the availability of local husbandry has reduced households' access to organic

manure for crop production system. The study reveals that majority of men had more livelihoods activities than the women. Majority of women derived their livelihoods from crop production and through use and processing of some natural resources.

Although many households are less actively involved in local erosion control practices like tree planting, terracing and contour ploughing, food security remains threatened due to expansive erosion menace and poor indigenous knowledge use that is constantly constrained to these adaptations. These were identified as 1) Low levels of productivity of the local animal and livestock breeds/varieties; 2) lack of and expensive rates of improved tolerant breeds/varieties; 3) poor improvement of effective application of local technologies/ erosion control practices; 4) diminishing land for farming; 5) Lack of financial capital; 6) Inadequate extension services.

4 CONCLUSIONS

The study concludes that the local capacities of southeastern communities in addressing erosion menace and food security is politically undermined by the increasing disparities in rural and state environmental management systems. This indicates that till today, local erosion control remains widely politicized and influenced by unequal access to improved farm technological machineries and knowledge development networks from the government and agric-extension workers. In addition, the ineptitude and negligence of both state and federal government to intervene holistically on the issue of erosion control have driven several socio cultural imbalances affecting household livelihood changes and migration of rural manpower into the cities for menial jobs and other entrepreneurial engagements therefore expanding their livelihood poverty baselines.

The study recommends that the southeastern communities should enhance and sustain its the relevant knowledge capacities and networks for erosion control. This would help check the impact of erosion on food security and as well address the impeding inequalities of rural households to mitigate on migration of rural manpower.

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AUTHOR BIOGRAPHY

Akujobi Chiedoziem Theophilus Department of Sociology,
University of Port Harcourt, Rivers State, Nigeria

Dr. Onyige Chioma Daisy Department of Sociology,
University of Port Harcourt, Rivers State, Nigeria