ISSN: 1595-8051 EISSN: 3092-9571

Rural Livelihood Activities and Ecological System Stability of Ikom Education Zone of Cross River State

JOHN, SUNDAY OKON
Department of Environmental Education Faculty of Science Education University of Calabar, Calabar

ABSTARCT

The study examined the rural livelihood activities and ecological system stability of Ikom Education Zone of Cross River State, specifically examined the relationship between farming activities, timber exploitation. The research design adopted for this study was the quantitative research design using the expost facto approach. To successfully carry out the study, 2 research questions and two hypotheses were formulated in line with the objectives of the study. The population of the study consisted of 8,448 adults between the ages of 18 years and above. A sample of three hundred and eighty-six (386) respondents, representing 6% of 8,448 of the population of farmers, hunters, timber and non-timber forest products dealers and sand miners in the study area were selected for the study. The instrument for data collection was a 35-item questionnaire titled "Rural Communities Livelihood Activities and Ecological implication Questionnaire" (RCLAEQ). The instrument was face and construct validated by two experts from Educational Foundation (Measurement and Evaluation) and one from Environmental Education Department, University of Calabar, Calabar Cross River State. The reliability coefficient ranges between 0.78 and 0.93 was obtained using Cronbach Alpha reliability method statistics and was high enough to accept that the instrument was reliable. In answering the research question the simple regression model, while the simple regression analysis was employed to analyze hypotheses the hypotheses. The findings revealed that farming activities do have a reliable relationship with ecological system stability and timber exploitation significantly impacts on the ecological system stability in Ikom Education zone. This study concludes that rural livelihood activities, including farming and timber exploitation have significant impacts on ecological system stability in Ikom Education zone of Cross River State. It was recommended among others that farmers in Ikom Education zone should adopt sustainable farming practices, such as crop rotation and organic farming, to reduce the impact of farming activities on ecological system stability.

Keywords: Rural Livelihood, Ecological System Stability, Farming activities, Timber Exploitation.

Introduction

Most often, a larger population of forest dwelling communities depends completely on the ecosystem as a means of livelihood. Forests are among the most diverse and widespread ecosystems that provides some array of benefits to human societies above and beyond their pivotal roles as habitat and environmental regulations of natural ecosystem. These benefits are often described as resources that people can draw upon for food, fuel wood, bush meat, raw materials as well as provision of ecosystem services. The concept of forest exploitation has emerged as a global phenomenon, owing to its implication in the attainment of forest conservation at various levels (Briceno-Mendez, et al., 2016; Colchester, 2018). Nigeria continues to suffer from extremely high rates of forest loss. Between 2017 and 2021, the country lost 55.7 percent of its primary forest, primarily due to logging, timber exports, subsistence agriculture, and the harvesting of fuelwood and other non-timber forest products (UN-REDD, 2023)

Livelihood activities among the dwellers of Ikom education zone are many but those activities commonly practiced by farmers in this zone include but not limited to cropping, hunting and logging activities. The Zone is one of the three Education Zone in Cross River State. Ikom Education Zone consist of six Local Government Areas which include Abi, Boki, Etung, Ikom, Obubra and Yakurr Local Government Areas of Cross River State. These Local Government Areas and few others in the state house part of the remaining Rain Forest in Nigeria. The inhabitants of these areas are mostly farmers, though many are civil servants, public servants, and business men and women. The farmers are mostly involved in cropping, hunting, and logging while most civil servants, public servants and business men and women in Ikom Education Zone are equally involved in part time cropping, hunting and logging. This has cause severe dependency on the forest and the extinction of some animal species. According to Offiong, Offiong and Ekpe (2014) the disappearance of

plants and animals' species of nutritional and economic values are reported, that much is on the Cross River Forest, where animal species such as Giant pangolin (*manisgiganta*), the Leopard (Panther pardus), the Elephants (*Loxondonta africana*), the Bush cow (*Trangelifus spp*), the Buffalo (*Syncerus caffer*) and the Giant porcuoine has disappeared.

The high consumption rate of forest resources by the rural populace has led to the deforestation of the Cross River-rain forest. This is because the rural dwellers especially in Ikom Education Zone, perceive the forest as a source upon which their livelihoods depend; hence the disruption of biodiversity is unavoidable. The status and trends of wildlife will not be adequately considered without giving consideration to their habitats. According to Andrew-Essien (2019), until the beginning of the 19th century, tropical wildlife was reasonably undisturbed and was considered to be balanced with the use of primitive tools such as traps, snares and flint stones.

Towards the end of the nineteenth century, plantation agriculture especially cocoa, palm oil, and rubber was introduced into West Africa. This development marked the onset of large-scale exploitation and transformation of the tropical forest ecosystem. Extensive habitat clearance and land-use alteration that accompanied plantation expansion became the most significant threats to biodiversity in the region. In Cross River State, the Central Senatorial District, which includes the Ikom Education Zone, has been particularly affected. This is largely because the area hosts major government-owned agricultural establishments that intensified forest conversion and ecological disturbance. Among these factors influencing environmental quality are farming activities, timber exploitation activities among others (Eneji et al., 2014)

Farming activities, involves the cultivation of farmland for the production of crops, fruits, vegetables, ornamental and flowering plants, and the utilization of farmland for the

production of crops, fruits, vegetables, ornamental and flowering plants, and the utilization of farmland for the production of dairy, livestock, poultry and all other forms of agricultural products having a domestic or foreign market. Agricultural activities contribute to a great extent to environmental and forest degradation including climate change, deforestation, biodiversity depletion, loss extinction, genetic erosion, pollution and soil degradation among others.

Butchart et al. (2015) observed that while farming activities provide food, fiber, income, and scenic value, they also contribute to environmental problems such as deforestation, pesticide use, and loss of species. Similarly, Yue et al. (2015) highlighted the negative effects of agrochemicals on both human health and ecosystems. Xiong et al. (2017) and Ray et al. (2020), noted that agricultural activities, including deforestation and runoff of nitrates and pesticides, degrade water quality and aquatic habitats, affecting species such as crabs, fish, mollusks, and oysters, as well as commercial fishing and recreational water facilities. Additionally, Orji et al. (2021) reported that bacterial contamination from animal waste and odors from concentrated livestock facilities negatively impact drinking water quality and the quality of life in surrounding communities.

Timber exploitation involves cutting trees for timber or pulp. The timber is used to build houses, furniture, etc, while the pulp is used to make paper and paper products. Timber exploitation is generally categorized into two categories: selective and clear cutting. Selective timber exploitation is selective because loggers choose only wood that are mature and highly valued, such as mahogany, ebony, iroko, obeche, mimosop, etc, while clear cutting is not selective. Loggers are interested in all types of wood and therefore cut all the trees down for their economic gains. Clearing the forest in this form is called clear cutting. The adverse impacts of timber exploitation on forest resources have been acknowledged to

include soil erosion, accumulation of greenhouse gases, climate change, watershed destruction, shortage of rainfall, habitat decimation and destruction, loss of environmental services, harsh weather and soil compaction and soil fertility loss amongst others.

Chris (2019) noted that timber exploitation has long been used by land managers to meet human needs such as construction materials, land for development, and fuel for homes and industry. However, timber exploitation has complex ecological implications, including the removal of habitats for birds, mammals, rodents, and other wildlife that rely on trees for cover, nesting, or food. For instance, owls prefer older, larger-diameter trees for nesting cavities. Timber exploitation along stream banks increases the risk of flooding and soil erosion, as trees play a critical role in anchoring the soil. Additionally, the operation of large trucks on unimproved roads during timber harvesting further exacerbates soil erosion and contributes to watershed degradation

Statement of the problem

Recent research has shown that the exploitation, mining, and processing of environmental resources in Nigeria have caused a wide range of environmental damages. These include ecological disturbance, destruction of natural flora and fauna, pollution of air, water, and land, soil and rock instability, landscape degradation, desertification, and contributions to global warming. Environmental resources in areas such as the Ikom Education Zone of Cross River State are being exploited at an increasingly rapid rate. These highlight the severity of resource exploitation in the region and indicate that the rate of resource use far exceeds the natural rate of regeneration, creating a significant imbalance between exploitation and regeneration.

In recent times, environmental problems and degradation have become issues of serious concern in both urban and rural communities across Nigeria. Natural environmental

resources nationwide have been severely depleted as a result of continuous and unsustainable exploitation. Consequently, many of these resources are rapidly diminishing, posing significant threats to ecological balance and sustainable development.

Rural communities as a means of survival embark on livelihood activities like clearing, burning and planting of crops. cutting down trees for fire wood, roofing of houses, furniture making, extracting sand massively for building of houses, hunting of animals to eat as food, harvesting of vegetable, medicinal plants, fruits and nuts etc.

Thus, the benefit of forest resources exploitation, sustained local communities' livelihood for the purposes of generating income, provision of food, employment and improving their general wellbeing. These activities are seen now as a problem because these environmental resources are being exploited at a much faster rate than before; besides, their rates of exploitation to meet their livelihood needs are far higher than their rates of regeneration. Based on the extent to which the livelihood activities are carried out in Ikom Education Zone, this research examined how these livelihoods activities influence the ecological system of these areas.

Objectives of the study

The purpose of this study is to examine the rural livelihood activities and ecological system stability of Ikom Education Zone of Cross River State. Specifically, the study sought to;

1. examine the impact of farming activities on ecological system stability of Ikom Education zone.
2. investigate the impact of timber exploitation on the ecological system stability of Ikom Education zone.

Research questions

The following research questions were formulated to guide the study.

1. What are the impacts of farming activities on the ecological system stability of Ikom Education Zone?
2. How does timber exploitation affect the ecological system stability of Ikom Education Zone?

Statement of hypotheses

The following null hypotheses were formulated for the study:

1. There is no significant impact of farming activities on the ecological system stability of Ikom Education zone
2. Timber exploitation does not significantly impact on the ecological system stability of Ikom Education zone.

Methods

The research design adopted for this study was the quantitative research design using the expost facto approach. To successfully carry out the study, 2 research questions and two hypotheses were formulated in line with the objectives of the study. The population of the study consisted of 8,448 adults between the ages of 18 years and above. A sample of three hundred and eighty-six (386) respondents, representing 6% of 8,448 of the population of farmers, hunters, timber and non-timber forest products dealers and sand miners in the study area were selected for the study. The instrument for data collection was a 35-item questionnaire titled “Rural Communities Livelihood Activities and Ecological implication Questionnaire" (RCLAEQ). The instrument was face and construct validated by two experts from Educational Foundation (Measurement and Evaluation) and one from Environmental Education Department, University of Calabar, Calabar Cross River State. The reliability coefficient ranges between 0.78 and 0.93 was obtained using Cronbach Alpha reliability method statistics and was high enough to accept that the instrument was reliable. In answering the research question the

simple regression model, while the simple regression analysis was employed to analyze hypotheses the hypotheses.

Results

Two research questions were raised and two hypotheses formulated and empirically tested in this study to investigate the impact of rural livelihood activities and ecological system stability of Ikom Education Zone of Cross River State. Each hypothesis was analyzed at a 0.05 significance level.

Research question one

What are the impacts of farming activities on the ecological system stability of Ikom Education Zone?

The independent variable is farming activities while the dependent variable is ecological system stability of Ikom Education Zone. In answering the research question the simple, the regression model in Table 1 was used. The analysis in Table 5 showed that the Adj $R^2$is 0.041. This implies that 4.1% of the variance in the dependent variable (ecological system stability) could be accounted for by rural livelihood activities. The small percentage contribution of farming activities to ecological system stability (4.1%) might suggest a limited impact on the ecological system. However, this relationship is notable and statistically significant. This means that farming activities do have a reliable relationship with ecological system stability. The significance of this relationship indicates that the impact of farming activities on ecological system stability is not coincidental. Despite the relatively small contribution to the overall variance, the relationship between farming activities and ecological system stability is meaningful. This suggests that farming activities are a relevant factor in understanding ecological system stability. Overall, the findings

highlight the importance of considering farming activities in efforts to promote ecological system stability.

Research question two

How does timber exploitation affect the ecological system stability of Ikom Education Zone?

The independent variable is timber exploitation while the dependent variable is ecological system stability of Ikom Education Zone. In answering the research question the simple, the regression model in Table 6 was used. The analysis in Table 2 showed that the Adj $R^2$is 0.102. This implies that 10.2% of the variance in the dependent variable (ecological system stability) could be accounted for by timber exploitation. The small percentage contribution of timber exploitation to ecological system stability (10.2%) might suggest a limited impact on the ecological system. However, this relationship is notable, meaning that timber exploitation does have a discernible impact on ecological system stability. The significance of this relationship indicates that the impact of timber exploitation on ecological system stability is not coincidental. Timber exploitation is a relevant factor that affects the stability of the ecological system in Ikom Education Zone. This suggests that timber exploitation is one of the contributing factors to ecological system instability. The findings highlight the importance of considering timber exploitation in efforts to promote ecological system stability. Overall, the results underscore the need for sustainable forest management practices to mitigate the negative impacts of timber exploitation on ecological system stability.

4.2.1 Hypothesis one

There is no significant impact of farming activities on the ecological system stability in Ikom Education zone. The independent variable is farming activities while the dependent

variable is ecological system stability. To test the hypothesis simple linear regression analysis was used and the result of the analysis is shown in Table 1. The analysis in Table 5 showed that the Adj R^2 is 0.041. This implies that 4.1 % of the variance in the ecological system stability could be accounted for by impact of farming activities. Though the percentage contribution is small, a careful look at the table showed that the F=17.131 (p<.705) is significant at 05 level of significance and 1 and 384 degrees of freedom. Also, since p(.000) is less than p(.05), it implies that there is a significant impact of farming activities on the ecological system stability in Ikom Education zone. Hence the null hypothesis is rejected and alternative hypothesis upheld.

TABLE 1: Simple regression analysis of impact of farming activities on the ecological system stability in Ikom Education zone (N=386)

Variable	R	R^2	Adj. R^2	Std. Error
Farming activities	.204[a]	.042	.041	2.11634

Source of variation	SS	Df	MS	F	p-value
Regression	103.445	1	103.445	17.131	.000[b]
Residual	4117.967	384	4.522		
Total	4221.412	385			

*Significant at .05 level, Adj R^2=.041

4.2.8 Hypothesis two

Timber exploitation does not significantly impact on the ecological system stability in Ikom Education zone. The independent variable is timber exploitation while the dependent variable is ecological system stability. To test the hypothesis linear regression analysis was used and the result of the analysis is shown in Table 2.

The analysis in Table 6 showed that the Adj R^2 is 0.102. This implies that 10.2% of the variance in the ecological system stability could be accounted for by timber exploitation. Though the percentage contribution is small, a cursory look at the table showed that the F=96.133 (p<.05) is significant at .05 level of significance and 1 and 384 degrees of freedom. And since p (.000) is less than p(.05), it implies that timber exploitation significantly impacts on the ecological system stability in Ikom Education zone. Hence the null hypothesis is rejected and alternative hypothesis upheld.

TABLE 2: Simple regression analysis of impact of timber exploitation on the ecological system stability in Ikom Education zone (N=386)

Variable	R	R^2	Adj. R^2	Std. Error
Timber exploitation	.322[a]	.104	.102	2.10912

Source of variation	SS	Df	MS	F	p-value
Regression	132.322	1	132.322	16.113 *	.000[b]
Residual	4089.090	384	8.332		
Total	4221.412	385			

*Significant at .05 level., Adj R^2 = .102

Discussion of findings

The results and findings of the study is discussed in these sections. Effort was made by the researcher to do this based on the variables under study hypothesis-by-hypothesis

Farming activities and the ecosystem stability

The results from research question one and hypothesis one indicated that farming activities have a significant impact on ecological system stability in the Ikom Education Zone, leading to the rejection of the null hypothesis.

This finding is consistent with previous studies. For example, Butchart et al. (2015) observed that while farming activities provide food, fiber, income, and scenic value, they

also contribute to environmental problems such as deforestation, pesticide use, and loss of species. Similarly, Yue et al. (2015) highlighted the negative effects of agrochemicals on both human health and ecosystems. The result is also in line with Xiong et al. (2017) and Ray et al. (2020), who noted that agricultural activities, including deforestation and runoff of nitrates and pesticides, degrade water quality and aquatic habitats, affecting species such as crabs, fish, mollusks, and oysters, as well as commercial fishing and recreational water facilities. Additionally, Orji et al. (2021) reported that bacterial contamination from animal waste and odors from concentrated livestock facilities negatively impact drinking water quality and the quality of life in surrounding communities.

Timber exploitation and the ecosystem

The results from research question two and hypothesis two indicated that timber exploitation significantly impacts ecological system stability in the Ikom Education Zone, leading to the rejection of the null hypothesis.

This finding aligns with previous research of Chris (2019) noted that timber exploitation has long been used by land managers to meet human needs such as construction materials, land for development, and fuel for homes and industry. However, timber exploitation has complex ecological implications, including the removal of habitats for birds, mammals, rodents, and other wildlife that rely on trees for cover, nesting, or food. For instance, owls prefer older, larger-diameter trees for nesting cavities. Timber exploitation along stream banks increases the risk of flooding and soil erosion, as trees play a critical role in anchoring the soil. Additionally, the operation of large trucks on unimproved roads during timber harvesting further exacerbates soil erosion and contributes to watershed degradation.

Conclusion

This study concludes that rural livelihood activities, including farming and timber exploitation have significant impacts on ecological system stability in Ikom Education zone of Cross River State. The findings suggest that these activities, both individually and collectively, pose a threat to the stability of the ecosystem. The study highlights the need for sustainable management practices and regulations to mitigate the negative impacts of these livelihood activities on the environment. The results of this study can inform policy decisions and interventions aimed at promoting sustainable development and environmental conservation in the area. The study hylignts importance of balancing economic development with environmental protection to ensure the long-term sustainability of the ecosystem and the well-being of rural communities.

Recommendations

Based on the findings of the study, the following recommendations were made:

1 Farmers in Ikom Education zone should adopt sustainable farming practices, such as crop rotation and organic farming, to reduce the impact of farming activities on ecological system stability.

2 The government should enforce strict regulations on timber exploitation, including reforestation and afforestation programs, to mitigate its impact on ecological system stability in Ikom Education zone.

References

Andrew-Essien, E. E. (2017). Synthesising natural resource conservation with human development goals in the Cross River National Park, Nigeria. In Afangideh, A. I. (2017) (Ed.) World Environmental Journal (WEJ), Publication of the Department of Geography and Environmental Sciences, University of Calabar, Nigeria,

Briceno-Mendez, M.,Naranjo, E. J, Mandujano, S, Alticher, M.& Reyna Hurtado, R. (2016). Responses of two sympatric species of peccaries (Tayassu pecari and pecari tajacu) to hunting in Calakmul, Mexico. *Tropical Conserv. Sci. 9*, 121-132

Butchart, S. H. Clarke, M., Smith, R. J. Sykes, R. K. Scharlemann, J. P. Harfoot, M., Buchanan, G. M. Angulo, A., Balmfor, A. Bertzky, B. & Brooks, T. M. (2015). Shortfalls and solutions for meeting national and global conservation area targets. *Conservation Letters* 8(5), 329-37.

Colchester, M. (2018). Salvaging nature: indigenous peoples, protected areas and biodiversity conservation. World rainforest movement. http://www.org.uy/subjects/nature

Chris, D. (2019). Timber exploitation and its ecological implications on forest ecosystems. *Journal of Environmental Management and Sustainability*, *11*(2), 45–59.

Eneji, Ogar, D. A., Essien, C. K. & Godwin, A. B., (2014). An assessment of deforestation rates in Bekwarra local government area of cross river state, *Nigeria. Journal of Environment, 3*, 28-37.

Offiong, R. A., Offiong, V. E. & Ekpe, I. A. (2014) Effect of land cover change on forest water ecosystes in Calabar Municipality, Cross River State, Nigeria. *International journal of physical and Human Geography, 2*(1), 27-36.

Orji, O. U., Ibiam, U. A., Awoke J. N., Obasi, O. D., Uraku, A. J. Alum, E. U. & Eze, A. Z. (2021). Assessment of Levels and Health Risks of Trace Metals in Soils and Food Crops Cultivated on Farmlands Near Enyigba Mining Sites, Ebonyi State, Nigeria. *Journal of Food and Protection, 84* (80), 1288-1294

Ray, A., Ray, R. & Sreevidya, E. A. (2020), 'How Many Wild Edible Plants Do We Eat-Their Diversity, Use, and Implications for Sustainable Food System: An Exploratory Analysis in India', *Frontiers in Sustainable Food Systems, 4*, 56-67

UN-REDD Programme. (2023). *UN-REDD 2023 Annual Report*. United Nations.

Xiong, J.,Thenkabail, P.S., Gumma, M.K., Teluguntla, P., Poehnelt, J., Congalton, R. G.,Yadav, K. & Thau, D., (2017). Automated cropland mapping of continental Africa using Google Earth Engine cloud computing. *ISPRS Journal of Photogrammetry and Remote Sensing; 126*:225-44.

Yue, S.,Brodie, J. F., Zipkin, E. F. & Bernard, H. (2015). Oil palm plantations fail to support mammal diversity. *Ecol. Appl.* 25, 22-35