

Livelihood Resources of Gombe Mountains: A Geographical Perspective

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Abstract-Environmental resources provide livelihood sources to millions of peoples around the world. Resources like forests, rivers, lakes have been assessed to determine their contribution to peoples' livelihood. One rarely assessed environmental resources is Gombe mountain. Gombe mountain comprise three uplands (*Dutsen Gombe, Dutsen Tsakiya and Dutsen Liji*), these uplands were been exploited by people from different areas of influence as a source of livelihood. The economic impact of Gombe Mountains to the people of Gombe area was investigated. The study was conducted to document information of the area; inventory of livelihood resources of the study area, economic activities of the study area, income level of respondents as compared with public service minimum wage. A field questionnaire survey was conducted and data collected were summarized in relative frequency, percentages and tested using chi-square statistical analysis. This study shows how these uplands contribute significantly to the livelihood of thousands of people in the area. Furthermore, the test conducted on minimum wage and income data revealed that Gombe Mountain significantly influences the livelihood of the people.

Index terms- Excavation, Gombe, Livelihood, Mountains Resources.

I. INTRODUCTION

Mountain is a large geological formation that ascends steeply above the surrounding level of the earth [1]. Mountains occupy greater portion of the world's land surface and has direct impact on a quarter of the world's people inhabiting the region [2]. There are four major types of mountains based on their formations: Fold, Block, volcanic and residual mountains. Fold Mountains are made when plates on the earth's crust collide and push into one another. This pressure forces the crust upwards and causes it to wrinkle and fold. Block Mountains are created when faults or cracks in the earth's crust force block of rocks upward or down. The uplifted blocks are Block Mountains. They usually have a steep front side and then sloping back side. Volcanic mountains are formed when magma reaches the earth surface and solidify forming a cone shape. Residual mountains is formed as a result of weathering of surrounding area of the mountain leaving a highland that rises above the rest of it surroundings [3].

The existence of mountains in many parts of the world play vital role in supporting the economic status of the people exploiting them for their source of livelihood. Mountains are exploited for its numerous benefits ranging from sourcing of

building materials (gravel, limestone sandstone and laterite), precious stone (diamond, gold, gypsum, etc) for ornamental industries. It is also used for defense purpose (training ground for military personnel), tourism, agriculture (Arable farming and grassing of animals) and hunting. Originally, the word livelihood meant nothing but "occupation" or "employment", that is, a way of making a living. More recently, the meaning of the term has expanded to include broader system that encompasses the economic and other attributes. Within these livelihood systems various factors have an effect on the strength, resilience and vulnerability of people's way of life. These may be their assets, their work and other cultural activities and factors that help people get access to these assets and activities [4].

This research reviews the works done on Lake Chad Basin Area on The Contribution of Inland Fishers to Rural Livelihood in Africa [4], and a similar research work done on Assessment of Morom River Basin to the Livelihood of the People in North-East of Gombe conducted by [5]. The focal point of these authors is mainly on rivers and lake as source of livelihood. This study however looks at other environmental resources other than water- in this case mountains- that equally provide a means of survival to the people in Gombe who live not far from them. The study therefore is aimed at assessing the economic importance of Gombe Mountains to the livelihood of its host communities which include, Nassarawo, Kagarawal, Mallam Inna and Unguwa Uku quarters of Gombe city. The study also wants to find out if the existences of these mountains/uplands and the economic activities undertaken have a significant relationship to the livelihood of the residents of these areas. It therefore, observed the inventory of livelihood resources and the significance of the mountains to the residents' livelihood based on the management systems and opportunities open to them.

II. THE STUDY AREA

Gombe town is located between latitudes $10^{\circ} 15' N$ to $10^{\circ} 20' N$ and longitudes $11^{\circ} 10' E$ and $11^{\circ} 19' E$. It is the capital of Gombe State and occupied an area of about 45km^2 [6]. The climate of Gombe is characterized by a dry season of six months, alternating with a six months rainy season. The mean annual precipitation is 835 mm and the mean annual temperature is about 26°C whereas relative humidity has same pattern being 94% in August and dropping to less than 10% during the harmattan period [6].

The study hills form part of the Gombe formation with a continental sequence of sandstone, shale, siltstones and ironstones. These display outcrops of three uplands in a narrow north-south of Gombe city. The materials on these

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uplands have a maximum thickness of 300m and its sequence can be divided into two parts; the upper 223m mainly consisting of sandstones and lower which consists of shale and contains ironstone layers up to 200m thick. [7].

Three uplands make up the study hills, Gombe hills locally called *Dutsen Gombe*, *Dutsin Liji* and *Dutsin tsakiya*. The above named hills cut across two local government areas, Gombe and Yamaltu/Deba. The uplands lies between latitude 11°00'N and 10°36'N longitude 11°00'E and 11°45'E [7]. There are five communities around the Gombe mountain formation which residents benefit more as a source of livelihood. These include, Nasarawo, Sabon Gari, Unguwa Uku, Mallam Inna and Kagarawal. It should also be noted that the spread of influence in terms of livelihood resource of these uplands extends to the whole city and beyond.

III. MATERIALS AND METHOD

The data required for this study include:

- 1) Data describing the inventory of livelihood resource on the study uplands. The data basically define the economic activities of the people in the study communities. These economic activities are categorized into agricultural and non-agricultural livelihood activities. Information on these variables was obtained from questionnaire, interviews and focus group discussion conducted with respondent during data collection exercise.
- 2) Data describing minimum wage and income level of respondents. The income level will be based on the major activity the respondents perform to earn a living on the study uplands. Information on these was sourced from interview conducted on the field.
- 3) Data describing the livelihood resources that are obtained on uplands on global scale. This data was sourced to discover those resources that are capable of providing means of livelihood but are not being harnessed. Information from this was sourced from literature in books, journals, pamphlet and the internet.

The central method adopted to achieve the result of this study was the activity ranking exercise combined with a participatory wealth ranking exercise. These methods looked at the allocation of household's working hours (time effort) and the contribution of the labour hours to the households' overall income. Purposive sampling technique used in communities closest to the study upland. The selection was based on head of household that make a living from working on the uplands. In total of 250 households have been interviewed by the authors and focus group discussion was held with the officials of Gombe Rock Crushers Association (GRCA).

IV. RESULTS AND DISCUSSIONS

A. Demographic Data

Demographic Data was obtained from head of households selected at random. Data obtained include names, sex, and age, level of education, occupation, and number of households.

Table 1: Demographic characteristics of respondents.

Data	Frequency	Percentage	Data	Frequency	Percentage
Gender			Age		
Male	271	79.47	18-25	57	16.72
Female	70	20.53	26-33	82	24.05
Total	341	100	34-41	180	52.79
Education			42-49	17	4.99
Informal	146	42.82	50-57	5	1.47
Primary	125	36.66	total	341	100.00
Secondary	50	14.66	Marital status		
Tertiary	20	5.87	Married	162	47.51
Total	341	100.00	single	138	40.47
			total	341	100

B. Inventory of Livelihood Resources of the Study Area

The identified economic activities of respondents on the studied uplands include rock excavation, rock crushing, transportation, buying and selling of rock materials, trading, farming, animal rearing, fire wood cutting and hunting. The study categorized the economic activities of Gombe mountains in agricultural and non-agricultural livelihood sources (table 2) is relevant.

Table 2: Inventory of Livelihood resources of the study area.

S/N	Livelihood sources	Activities
1	Agriculture	
	Arable farming	Growing of maize, rice, millet, guinea corn
	Animal rearing	Rearing of cattle, goats and sheep.
2	Non Agriculture	
	Rock excavation	Excavation mainly manual and use of explosives.
	Crushing/ excavation	Manual / mechanized/explosives.
	Rock crushing	Manual / mechanized.
	Transportation	Transportation of excavated and crushed materials within and outside the study area.
	Trading	Food hawking and provision items.
	Firewood cutting	Energy for domestic fire making.
	Hunting	Small scale hunting of hares, squirrels, guinea fowls and snakes.

C. Economic Activities of the Study Area

Figure 1 shows the economic activities that were carried out on the uplands. Results from the study shows that excavation and crushing of rocks constituted 29.91% of the activities, which formed the bedrock of all the economic activities of the area. More so, 9.97% of respondents participated in excavation of rocks only and 10.26% respondents engaged in crushing of rock only. Excavation and crushing of rocks are done both in small and large scale

as well. Small scale excavation and crushing of rocks into small particles is undertaken by peasant labourers. This group constitutes the majority of the people working on the mountain. Alongside the peasants labourers are companies with huge capital. They undertake a large scale excavation of rocks and crushing same into appropriate sizes based on request put forward by clients. Often explosives are used to blast rocks and heavy duty trucks transport the materials to crusher machines stationed near the mountains. Transportation of rock materials from quarry to different destination within and outside Gombe constituted 5.57% of the activities.

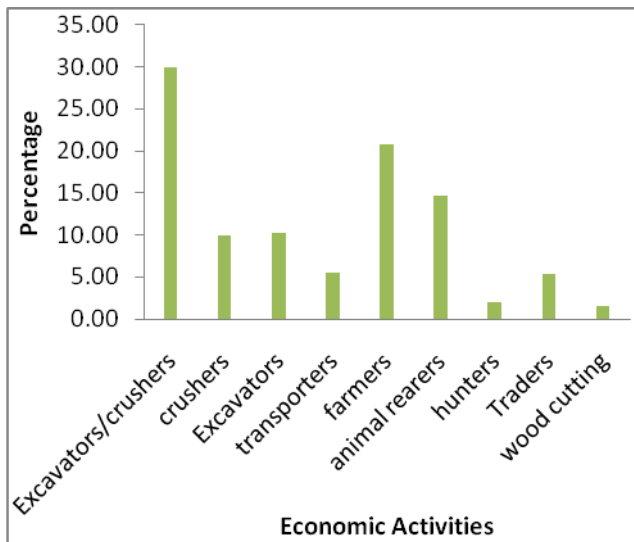


Figure 1: Respondents livelihood sources
Farming activities accounted for 20.82%, animal rearing 14.66%, wood cutting 1.47% and traders who engaged (in food hawking and provision shops) constituted 5.28%.

D. Income Levels of Respondents

Using the minimum wage of Gombe state civil service of ₦18, 000 (\$50.00) per month or ₦216, 000 (\$600.00) per annum on GL1-15, the research discovered that 34.02% of the respondents earn between ₦19, 000 - ₦24, 250 (\$52.77-\$67.36) per month from the livelihood activities they engage in on the mountain. Moreover, 7.5% of the respondents earn between ₦3, 000 - ₦8, 250 (\$8.30-\$22.91) which is less than the stipulated minimum wage of the state civil service as shown in table 3 below.

Table 3: Minimum wage and Income levels of respondents

S/N	Income in ₦('000)	Frequency	Percentage
1	36-99	15	4.40
2	100-163	38	11.14
3	164-227	21	6.16
4	228-291	116	34.02
5	292-355	75	21.99
6	356-419	25	7.33
7	420-483	15	4.40
8	484-547	12	3.52
9	548-611	8	2.35
10	612-675	5	1.47
11	676-739	4	1.17
12	740-803	1	0.29
13	804-867	2	0.59
14	868-931	2	0.59
15	932-995	1	0.29
16	996-1059	1	0.29
	Total	341	100.00

A chi-square test was employed at table 4 below to test the significance of the respondents' activities and their level of income. The research revealed that the calculated value (705.38) is greater than the chi-square distribution table at both 0.01(30.58) and at 0.001(37.70) confidence levels. Hence, the research rejects the null hypothesis and accepts the alternative hypothesis which states that there is a significant relationship between the respondents' livelihood and their levels of income.

Table 4: Chi-Square table for the respondents' income

SN	Income	O	E	O-E	(O-E) ²	(O-E) ² /E
1	36-99	15	21.31	-6.31	39.85	1.87
2	100-163	38	21.31	16.69	278.47	13.07
3	164-227	21	21.31	-0.31	0.10	0.005
4	228-291	116	21.31	94.69	8965.72	420.7
5	292-355	75	21.31	53.69	2882.35	135.2
6	356-419	25	21.31	3.69	13.60	0.638
7	420-483	15	21.31	-6.31	39.85	1.87
8	484-547	12	21.31	-9.31	86.72	4.069
9	548-611	8	21.31	-13.31	177.22	8.315
10	612-675	5	21.31	-16.31	266.10	12.49
11	676-739	4	21.31	-17.31	299.72	14.06
12	740-803	1	21.31	-20.31	412.60	19.36
13	804-867	2	21.31	-19.31	372.97	17.5
14	868-931	2	21.31	-19.31	372.97	17.5
15	932-995	1	21.31	-20.31	412.60	19.36
16	996-1059	1	21.31	-20.31	412.60	19.36
	Total	341				705.4

O = Observed value.

E = Expected value.

$$\chi^2 = \frac{\sum(O-E)^2}{E} \quad (1)$$

V. SUMMARY, RECOMMENDATIONS AND CONCLUSIONS

A. Summary

This study shows how Gombe Mountains contribute enormously to household livelihood of the people within the mountain area. The inventory of the livelihood sources of the study area which categorically comprises Agricultural and non-agricultural sources was captured. The study found out that in the Agricultural category, farming and animal rearing constituted a greater percent and in the non-agricultural category, rock excavation, rock crushing and transportation formed the bedrock of all the economic activities in the study area. The minimum wage and income level data shows that majority of the people earn more than the Nigeria's public service minimum wage as their income. Hypotheses tested revealed that Gombe Mountains significantly contributes positively to the livelihood of the people engaged in economic activities on the uplands.

B. Recommendations

The following recommendations are proposed for action.

- 1) Conduct a complete and comprehensive environmental inventory of the area with view to develop those resources.
- 2) Develop a framework to appraise the diverse ecological settings agriculturally and non-agriculturally in order to meet the tenets of resource management which will represent the actual policy and practice regarding how resource are allocated and under what condition it may be developed.
- 3) A policy should be formulated to ensure strict adherence to safety precautions and the use of safety equipments.
- 4) First aids facilities/clinics should be readily made available at excavation and crush sites.
- 5) Government should provide security out-post to curtail criminal activities

C. Conclusions

Gombe Mountains provide great economic opportunity to people of different classes irrespective of educational background, age, and gender. Thus, from the findings of this study, the following conclusions are drawn.

- 1) In an effort to earn a living, thousands of people in the study area depend on what the mountains provide and treats it as common resources.
- 2) Hypothesis testing revealed a significant relationship between the mountains and peoples' source of livelihood
- 3) People who seek livelihood on the Gombe Mountains earn more than the nation's minimum wage.
- 4) Most of the people (excavators and crushers) do not use proper safety measures.

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