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Binary Logistic Regression Analysis of Livelihood Strategies of the Protected Gola Forest Edge communities in Tunkia Chiefdom

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Abstract

The study investigates the effect of Gola Forest Conservation on the livelihoods of the forest edge communities and how it affects farming, the main livelihood strategy; and the cost and benefit of conserving the forest. A qualitative research design was employed and household heads were randomly selected from 13 forest edge village communities, within 4km to the Gola Forest. A semi-structured questionnaire was administered to household heads and also data were collected from Gola Rain Forest National Park (GRNP) office in Kenema through desk survey and discussion. Two informants, one from GRNF management and another from Tunkia chiefdom were very instrumental in data collection. The data was analyzed using Statistical Package for Social Sciences (SPSS). Not all households were part of the land-owning families (7.89%) as the study revealed. The locals feel the boundaries between the GRNP and their farm bushes are not well defined in some places. Farming is the main livelihood strategy of the communities, but subsistence farming is what they use. Rice which is purposely grown for home feeding is produced on small scale and cannot support households throughout the year. Permanent cash crops are the key source of income, but these are usually damaged by wild animals, and farmers, therefore, realize less income. Even though there is a good relationship between the community people and the GRNP management, the locals want some conservation rules to be amended that will give them better access to forest resources. The forest edge communities are poor and want sustainable livelihood programs properly implemented.

Keywords: sustainable livelihoods; Gola Forest; conservation policy; forest edge communities; benefits; relationship.

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I. Introduction

The rural village communities like many other rural settings greatly depend on farming for their living. This study mainly focused on investigating the livelihood strategies and how forest conservation affects the Gola Forest (GF) edge communities in Tunkia Chiefdom. Furthermore, we investigate how the communities uphold forest conservation policy and accessing the cost and benefit of conserving the forest. The Gola Rain Forest National Park (GRNP) was originally designated in the 1920s and in December 2011 was officially launched as the Gola Rain Forest National Park (GRNP) and was declared by Sierra Leone [1]. The Gola Rain Forest Park sits within seven chiefdoms (Tunkia, Gaura, Nomo and koya (kenema District); Barri and Makpele (Pujehun District); and Malema (Kailahun District), comprising 140,00 population, with 122 Forest Edge Communities directly adjacent to the park, dominated by the Mende tribe which has its own culture [2]. Kenema and Kailahun districts are in the eastern province of Sierra Leone and Pujehun in the south. Further, these communities describe themselves as poor and a vast number lack basic amenities including clean water supply, health, and education and some are far from motorable roads, therefore restricting economic activities.

Forest conservation has become a global issue in recent times as it reduces global –warming. An increase in greenhouse gases is a result of man's activities – the release of huge amounts of greenhouse gases such as carbon dioxide. The greenhouse effect results in global warming (high-temperature rise). There is every need therefore to conserve some of our forests. Over a decade or two, there has been a manifestation of active timber industries in many West and Centre African countries; and in Sierra Leone, it has been surprising and abrupt and several Chinese companies 2007 bypassed the forestry department, exporting timbers from community woodlands in the northern area, Munro [3, p. 70]**.** He also explained how Sierra Leone Forest conservation in the colonial era focused on centralized control, restricting subsistence use, while providing laws and formalized timber exploitation, and concluded that between the colonial era and the present the rhetoric of forest management might have changed but commercial exploitation has not. [4, p. 5] believed that in most tropical regions' small fragments of less than 5000 hectares of forest edge are in danger of diminishing occurrence; and that if so large proportion of remnants in fragmented landscapes is already protected or available for conservation are doomed to disappear without proper management based on current knowledge about forest edge effects combined with increasing harshness.

In Sierra Leone, there is unusual opportunities the Gola Forest Reserves offer which can be coordinated for rural communities outside the reserves with the forest management with them; little has been done to link rain forest management in collecting information from villages that help to identify potential projects and establishing pilot schemes and recommended for research [5, p. 98]. The Gola Forest has been reserved for its biodiversity and global carbon for future generations. According to Klop and his colleagues [6, p. 182] between 1986 and 2003 within the Gola Forest reserve boundary, 0.86% of forest cover was lost; this loss was divided into two periods; the first period (293 ha) was eight times longer than the second period (265 ha). A large proportion of farmlands have been taken from households over a long period since the 1920s. Communities in Tunkia chiefdom are predominantly farmers and therefore get their livelihoods in farming. Though conserving the forest is a good thing in itself, enough provisions are needed for the local people to support their lives. If the conservation policy has been made known to the people; do they understand and accept it? Do they appreciate the benefits of

conserving the forest? What is the relationship between the local communities and the forest management and how does it affect forest conservation? The welfare of local people is improved when they are involved in sustainable forest management from planning to the management stage, the management should take lead in the welfare of carrying out specific activities as laid out in the forest long term plan [7]. They further stated that, a policy that supports the growth of community forest businesses, small- and medium-scale has the great potential to absorb labour, increase the income of the local people, and make a direct contribution to eradicating poverty.The integration of community development programs and good management of natural resources can contribute immensely to improving the living conditions of the Gola Forest Edge Communities. Community Forest Management shows small mean effects on household consumption; and its impact can mask heterogeneity, at the same time the average effect may be closed to zero and some households probably benefit and others suffer Rasolofoson and his colleagues (2017, pp. 350–352). This study tried to look into various factors affecting the lives of households and the benefits they get forgiven up their lands for conservation. Understanding the boundaries between community forest and the protected forest is an important factor for GRNP management and community sustainable livelihood development programs. It is also necessary to investigate land ownership of the Gola Forest in Tunkia chiefdom particular those communities adjacent to the forest.The contribution of this study can bring the understanding of the locals of forest conservation, policies and the implementation of these policies. Since some part of the land belonging to the communities had been protected for conservation purpose, and restriction on the use of the GF resources, dynamic strategies for survival is obvious. Farming is the key source of the rural community's livelihood; how do they manage this amid forest conservation rules and regulations. But, according to Olaniyi and his colleagues [9] forests play an important role in human existence, but agriculture has been cited as the major cause of depletion; 56 percent or approximately 2 billion hectares has been in increased over the past 3 to 5 decades. Addressing this balance between farming and forest conservation needs to be investigated. The key criterion for successful protection and sustainable management is land-use- planning of land use can ensure sustainable management and protected areas strategies and consistent with all parties' values, thereby forging cooperation rather than conflictual relationships Carlson and his colleagues [10, p. 20] The Gola Rainforest National Park was established in 2011, and the 70,000-hectare park and its 70,000-hectare buffer zone are better protected by working with the communities and other stakeholders [11]. The long-term plan is enabling stakeholders (government, communities and national NGOs) to manage this entire landscape sustainably, not only to benefit local communities directly but also wildlife such as the critically endangered Western chimpanzees [12].

Therefore, work like this, can serve as a blueprint for understanding livelihood strategies and how best the government can intervene in ensuring the proper implementation of sustainable livelihood programs is one to improve the living conditions of the rural forest edge communities.

II. Materials and Method

A. Description of the Study Area

The study was conducted in the Gola Forest edge communities of Tunkia chiefdom, which is in the Gola East. Tunkia is in Kenema district in the Eastern Province of Sierra Leone. It is one of the seven chiefdoms the Gola

Rain Forest partly covers. Tunkia is in the south of Kenema city and its chiefdom headquarter is Gorahun. Gorahun is about 40 miles from Kenema city. It shared border with Koya chiefdom, Makpele, Barri, Gaura, Nomo, and the Republic of Liberia.The Gola Forest reserve is approximately 330km southeast of the Sierra Leone political and commercial capital city, Freetown. The forest extends to form part of the border between Sierra Leone and Liberia. Figure 1 shows the Map of Sierra Leone indicating the position of the forest. The forest is divided into three portions: Gola North, Gola Center and Gola South.

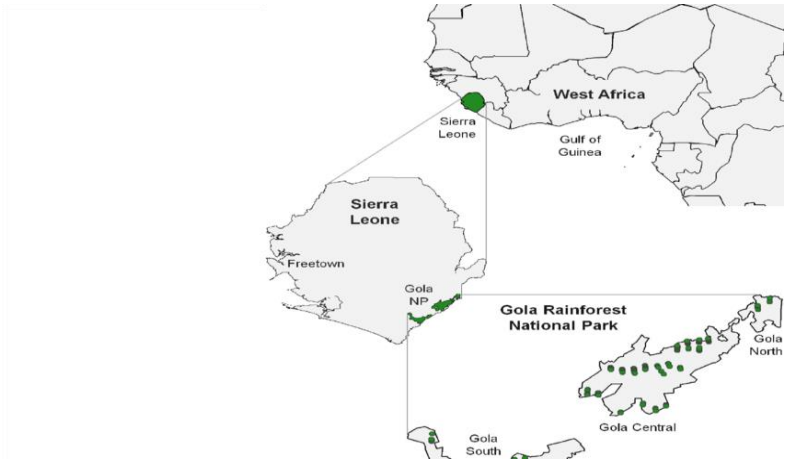

Figure 1: Map of Sierra Leone showing the Location of the Gola Rainforest National Park. Forest plots and the green circles represent the Gola Forest areas (Jucker and his colleagues 2016).

The main economic activity of the rural forest edge villages like other communities in Tunkia is farming. Cash crops like cocoa, coffee, kola-nut and oil-palm. are crucial determinants of the source of household income. Mixed farming (rice being the main crop) is an important activity, that is, it is a tradition that households must fulfil for their livelihoods. The chiefdom has communities that are close to the protected Gola Forest. The protected forest and the community forest are crucial for the livelihoods of the forest edge communities; as they are farmers that use the forest resources for their living. The study considered village communities that are within 4km of the Gola Forest reserve. The chiefdom has a periodic market which usually takes place at Gorahun every Friday. The Tunkia communities traded their goods in that market. The rural communities sell their agricultural products in this market and may buy goods brought from other areas. People travel far and wide to attend this market: from Kenema city which is about 40 miles from Gorahun, Zimi town in the southern province, about 13 miles off and other places. Transportation from the forest edge rural communities to Gorahun is very challenging. The roads are poor and most are not accessible by motorbikes or vehicles. The means of transportation common is walking on foot. Rural people have to walk miles with their loads to the market. Tunkia chiefdom has two secondary schools, one located at the chiefdom headquarter, Gorahun Tunkia and the other at Njabwema village and a number of primary schools.

B. Data Collection, Data, Sample and Variables

To elicit information from households and the Gola Forest organization, interviews and observation were used. The main purpose of collecting the data was to bring out facts concerning the livelihood strategies of the forest

edge communities and assess the effect of forest conservation on their lives. We travelled to Kenema town, where the Gola Forest Programme (GFP) headquarter office is located; there we get secondary data about the study area. The GFP provided one officer who accompany us to Gorahun, the chiefdom headquarter, were further information about Tunkia was recorded.

In addition to GFP information given, further information was given by the paramount chief representative in Gorahun, who represents the chiefdom in matters connecting forest conservation and the Tunkia community. The chiefdom, through its representative, provided us with one contact person, who accompanied us to all the selected villages, and helped passed vital information to the local people. The GPF also provided one contact person through whom vital information for the research was obtained.

Both contact persons were very instrumental as they helped solve the anticipated problem of respondent's reluctance, which could crop up, particularly because of being a stranger to them. Also, the problems of travelling through the forest were overcome through their emphatic efforts.

A semi-structured questionnaire was the key instrument employed in collecting data for this study. The questionnaire captured household socio-economic factors, farming and other livelihood strategies, and forest conservation policy and implementation. A pilot survey was first conducted including pre-testing of the questionnaire and the necessary modification made. A sample of 90 household heads or representatives were randomly selected from 13 villages (Malema, Giewuba Landa, Semabu, Fartoh, Bakeima, Bongorma, Buwama, Nemahugoima, Njagboima, Junctionhun, Matakahun, Jopowahun and Gendema) at random. Data was collected using random sampling design with a focus on household heads/representatives. The villages were chosen based on the pilot survey conducted around the study area and based on the proximity to the protected forest region. The villages selected were within less than 1km and 4km. The distance taken was based on the GRNP approval of communities considered to be forest edge communities. Judgement on proximity is crucial in guiding the interaction of communities with the forest. Households were targeted very early in the morning and few in the evening as they are farmers and have to go to their farms in the morning and come back late in the evening – this enables the researcher to meet relatively good response rates. Also, the essence of the research was explicitly explained to farmers and they were encouraged to participate in the study.

Variables that are used for descriptive statistics analysis about the forest household communities are identified below.

2.1 Distance of the Household to the Forest and to the Chiefdom Headquarter

Description of household distance to the protected Gola Forest was considered. This consideration is necessary for the household's interaction with the forest Also, the distance to the chiefdom headquarter is important since it is where households trade, attend clinics and often where children go to school.

2.2 Household ownership of the Gola Forest

The ownership of the protected forest is one of the variables described. Description of land ownership was included as it is a crucial factor for forest conservation.

2.3 Household ownership of domestic animals

Households were asked whether they rear farm animals or not

2.4 Household size

Number of households is considered as it determines agricultural productivity and feeding.

2.5 Gender of households

Household heads were targeted as the key respondents for obtaining data from questionnaires and observation. The gender randomly selected depends on whether the person as the household head is male or female.

2.6 Rice Farming

Rice is the king of crops in Sierra Leone, it's the staple food. This farming is carried out by almost all farmers. The different types and methods of farming were described statistically.

2.7 Cash Crop

Cash crop is considered the main source of household income.

2.8 Marital status

Household heads marital status were classified as: Single or married or widow/widower.

2.9 Binary Logistic Regression Model and Variables

The choice of using binary logistic regression is based on two reasons as suggested by: firstly, its mathematical point of view, and extremely flexible and easily used function; and secondly its clinical meaningful interpretation [14]. Logistic regression uses the maximum likelihood (ML) method for best fitting equation and this method maximizes the probability of classifying the observed data into the appropriate category given the regression coefficients. It predicts group membership; calculates the probability of success over the probability of failure, the results are in the form of an odds ratio. It also determines the impact of multiple independent variables presented simultaneously to predict the membership of one or other of the two dependent variable categories. The dependent variable must be mutually exclusive and exhaustive. The maximum likelihood method uses large sample estimates; larger samples are therefore needed, a sample size of 76 which is greater than 50 was used in this research. This is in line with what van Smeden and his colleagues [15]Stated that the sample size criterion for events per variable (EPV) should be equal to or greater than 10, ($EPV \geq 10$) . However, he further expressed the controversy surrounding the EPV criterion as it is not based on convincing

scientific reasoning as some authors expressed and surprisingly few alternatives for considering sample size for logistic regression analysis have been proposed to move beyond EPV criteria, except those that have focused on significance testing of logistic regression coefficients (van Smeden and his colleagues 2019 in Demidenko E (Stat Med 2006; 26: 3385–3397)).. Also, Hilbe [16, pp. 4–6] expressed that logistic regression is based on the Bernoulli probability distribution which consists of a distribution of 1s and 0s and that one of the nice features of presenting the log-likelihood functioning exponential form and link function can be abstracted as well as the mean and variance functions of the underlying Bernoulli. Logic link is purposely used to take a linear combination of the covariate value, and covert those values to a probability scale between 0 and 1. He further expressed that log transformation is original, the most popular among the different types of transformation used to transform skewed data to approximately conform to normality. In logistic regression, the odds (log) transformation serves as the dependent variable as follows:

$$Log(odds) = logit(p) = ln\left(\frac{p}{1-p}\right) \text{..... (1)}$$

the above dependent variable and odd a regression equation for independent variables, logistic regression is obtained. $(p) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \cdots \beta_{im} x_{jn}$ **..... (1)**

The relationship between the $log(p)$ and x as to be linear just as in the least square regression.

The equation for calculating p is given in the formula below

$$p_{ij} = pr(y_i = j/x_i) = \frac{exp(x\prime\beta_j)}{1+\sum_j^J exp(x\beta_j)} \text{.....(2) } \textit{Reduced in equation (3) for this study.}$$

$$p = \frac{exp(\alpha+ \beta_1 x_1+ \beta_2 x_2+ \beta_3 x_3+ \beta_4 x_4+ \beta_5 x_5 + \beta_6 x_6)}{1+ exp(\alpha+ \beta_1 x_1+ \beta_2 x_2+ \beta_3 x_3+ \beta_4 x_4+ \beta_5 x_5 + \beta_6 x_6)} \text{..... (3)}$$

Where:

$\boldsymbol{x_1}$ = Grow cash Crops (GCC), $\boldsymbol{x_2}$ = Type of Rice Farming (TRF), $\boldsymbol{x_3}$ = Assessment of Benefit from Gola Rain Forest Program (ABG), $\boldsymbol{x_4}$ = Involve in Policy Making (IMP), $\boldsymbol{x_5}$ = Perception on Forest Conservation Rules (PFCR); and P = the probability that a case is in a particular category, exp = the exponential function, α = the constant (or intercept) of the equation and β = the coefficient (or slope).

Types of questions asked:

The response y coded yes = 0 for 'household (Hh) does not want forest conservation policy modification' and yes = 1 considered as desire for household heads want conservation rules modification (amendment) which is the binary response variable (y) in the analysis.

The respondents: x_1 (GCC), x_2(TRF), x_3(ABG), x_4 (IMP) *and* x_5 (PFCR) were also coded. Households that responded yes for growing cash crops (GCC) was coded 1 and those no coded 0; Type of rice farming (TRF)

has three categories: Households that practice only swamp rice farming = 1, practice only upland rice farming = 2 and households that practice both upland and swamp = 3; households assessment of benefits (ABG) has three categories: Encouraging = 1, small = 2 and moderate = 3; households that involved in conservation policy (IMP) has binary category: yes = 1 for household was involved and no = 0, for none involvement of household; and households perception on forest conservation rules: Rules considered rigid and tough was assigned 1, soft and flexible 2 and fair 3.

The data for the logistic regression model was analyzed using Statistical Package for Social Sciences (SPSS) version 21.0. According to David Garson (2014., p. 18) in ordinary least square (OLS) regression the dependent variable (dv) is a direct link function of the values of independent variables (IV); whilst binary logistic regression uses the logit link to create a logistic regression model whose DV is assigned 0 and 1 values and does not extrapolate out of range (below 0 or above 1. This is line with what this study employs; and he further explained that the binary logistic regression predicts the "1" value of dependent variable in SPSS and the default reference level is always the lowest-coded value and need not be changed.

III. Result and Discussion

A. General and Socio-Economic Factors of the Forest Edge Communities

To consider a village a forest edge community the distance between it and the edge of the forest is an important. The village that is farthest to the Gola Rain Forestt edge is Maalema (4.000km), all the other villages are less than 4.00km. The nearest village is Nemahugoima (0.700km), and most of the other villages are less than 2.000km from the forest. Njagboima and Nemahugoima are the only two villages that lie on the Kenema – Gendema highway (to the Liberia border).

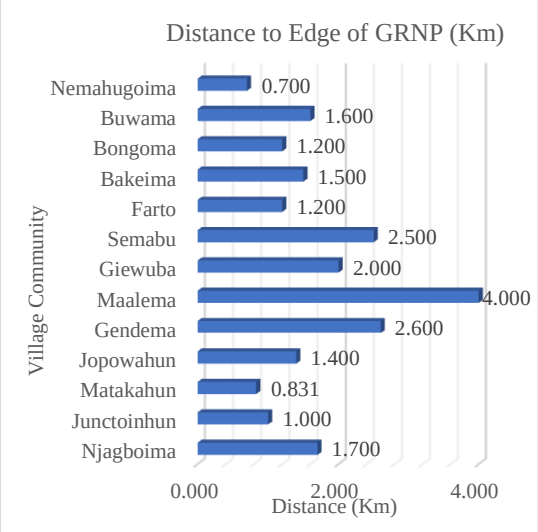

Figure 2: Distance from Village to GRNP

Table 2 shows the household demographic characteristics. Household size can be ascertained through direct counting and reliable information

obtained from household heads. The average number of persons in the household is 8, the maximum being 17. The average number of men and women is approximately equal (4 each) and children below 18 is 3; and those going to school is 2. They can The age distribution of household heads indicates that majority are within middle age (36 - 59) making up 56.6%, young adults make up 19.7% and old age (60 or above) 23.7%. The sex of household heads indicates that most are male (86.8%) and few are female (13.2%). Households considered as landowning families of the Gola Rain Forest revealed that 92.2% of the forest edge communities are title owners of the Gola Forest.

Table 1: General Characteristics of Forest Edge Communities

Individual Attributes	**Mean**	**Maximum**	**Minimum**	**Sum**	**Per cent of Total Population**
persons in HH	8	17	2	584	100.0%
Male in the HH	4	10	1	273	46.75%
Female in the HH	4	10	1	311	53.25%
children <18 yr	3	8	0	231	39.55%
School Children	2	9	0	152	26.03%
Age of HHh	**Age (Year)**			**Frequency**	**Percent**
	18 – 35			15	19.74%
	36 – 59			43	56.58%
	60 and Above			18	23.68%
	Total			**76**	**100.00%**
GRNP Land Owners	**HHh GRNPL**			**Frequency**	**Percent**
	No			6	7.89%
	Yes			70	92.11%
	Total			**76**	**100.00%**
Gender	Sex of HHh			**Frequency**	**Percent**
	Female			*10*	13.2%
	Male			*66*	86.8%
	Total			**76**	**100.0%**
Marital Status	Married			**59**	**77.63%**
	Single			**4**	**5.26%**
	Widow/Widower			**13**	**17.11%**
	Total			**76**	**100.00%**

Table 2 depicts land ownership of the Gola Forest Reserve in the different chiefdoms that the reserve forest covers. Role 7 in the table indicates land ownership in Tunkia varies from time to time. For instance, the land ownership in 2007 and 2008 are the same (216) but different for 2009, 2010 and 20 (226) for each, and 2012 was 223.

Table 2: Landowners of The Gola Forest Reserve

No.	Chiefdom	2007	2008	2009	2010	2011	2012
1	Barri	48	48	48	48	48	48
2	Gaura	19	19	19	19	19	19
3	Koya	8	8	8	8	8	8
4	Makpele	14	14	14	14	14	14
5	Malema	61	61	61	61	61	61
6	Nomo	12	12	12	12	12	12
7	Tunkia	54	54	64	64	64	61
Total		216	216	226	226	226	223

Source: *GRNP Office in Kenema*

Various forms of farming activities are carried out by households in their village communities and this is illustrated in Table 4. Rice farming practices by every household as an important means of livelihood. Three forms of rice farming are shown in row 1: households that practice only inland swamp farming, upland and those that practice both swamp and upland. From the result, most (81.58%) households practice both upland and swamp as compared to only a single form of farming.

Analysis was made to look for whether a household grows a permanent cash crop or not and which type. To do this, the percent proportion of various crops was compared. Figure … shows that the majority grows cash crops (90.79%) and most grow major crops (coffee, cocoa, palm oil and others such as kola nut and rubber plants). Permanent cash crops are one of the major sources of household income. Crops mainly grown are Coffee, cocoa, oil palm and other crops such as kola nut, orange and banana as shown in row 2. Every household grows at least the crops listed; and cocoa is the leading crop, grown by 72.4%, followed by other crops (68.42%). Except for oil which is below 50.00%, all other crops grown are above. Rearing is another key source of livelihood for the village community. The results revealed that every household participates in poultry. Goat and sheep are other farm animals house reared, and the result shows that 44.7% and 23.68% of households are involved in these practices respectively.

Table 3: Farming Activities

No	Variable	Category	Response (Yes)		Response (No)	
			Count	Percent	Count	Percent
1	Type of Rice Farming	Inland-Swamp	6	7.89%	70	92.11%
		Upland	8	10.53%	68	89.47%
		Both swamp and upland	62	81.58%	14	18.42%
2	Permanent Cash Crops	Coffee	48	63.2%	28	36.8%
		Cocoa	55	72.4%	21	27.6%
		Oil palm	28	36.84%	48	63.16%
		Others	52	68.42%	24	31.58%
3	Rear Farm Animals	Poultry	76	100.0%	0	0.00%
		Goat	34	44.74%	42	55.26%
		Sheep	18	23.68%	58	76.32%

B. Basic Household Needs (Water, Food, shelter and education)

Table 5 display the basic household needs. It comprises Shelter, water, feeding and level of education of household heads. The result in row 1revealed that majority of households live in houses built with sticks and mud (mud-stick = 77.6%) and with mud blocks; these houses are mostly roofed with thatches (84.2%). Response of household heads as to water commonly used by households for drinking and cooking shows three common sources: rivers/streams, local well water and protected hand pump. By comparison, water for drinking and cooking obtained from rivers/streams (88.16%) is by far the major source of the other two sources combined. The results for feeding in row 3 (Table 5) demons two things; the number of meals households normally have per day and how long does the farm rice produce last in a year. The analysis revealed that the average meal per day is approximately 2 times every day (mean = 2.16), and the rice cultivated for nearly 5 months 2 weeks mean = (5.4671). Household heads were asked whether they had formal education (read and write in English) or never went to school and cannot read or write in English (Non-Formal). The finding shows that majority household heads belong to non-formal sector of education.

Table 4: Households Basic Needs

No.		Variable		Count	Percent	Mean
1	**Shelter**	i. Building Type	**Category of housing**			
			Mud and Sticks	62	81.58 %	
			Mud blocks	10	13.16 %	
			Mud blocks plastered with cement	3	3.95 %	
			Mud and sticks plastered with cement	1	1.32 %	
		ii. Type of House Roofing	Thatch	60	78.95 %	
			Corrugated Zinc	16	21.05 %	
		iii. Average person in house per household				7.68
		iv. Average rooms per household				3.00
2	**Water**	Water for drinking and domestic work	**Source**			
			i. Stream/river	67	88.16 %	
			ii. Local Well water	6	7.89 %	
			iii.Protected Hand pump well	3	3.95 %	
3	**Feeding**	Number of meals per day				2.16
		a. Average duration of feeding on rice locally produced by households (in months). b. Meal per day				6.4671 2.36
4	**Education**	Literacy level of household Heads	**Form**			
			Formal	2	2.63 %	
			Non-Formal	74	97.37 %	

Table 6 shows the benefits GRNP programme contributes to Tunkia chiefdom and communities for development and livelihoods. The communities that have benefitted from the project include road maintenance, culverts construction, Guess house construction at Belehu, chiefdom court Barrie rehabilitation and agricultural support for farmers.

C. Households' Perception on Forest Conservation

Majority of households (81.6%) want the existence of the Gola Forest (Table 5), and in Table 6, most households understand forest conservation (94.7%).

Table 5: Households want the existence of Gola Forest Conservation

		Frequency	Percent
Valid	N0	14	18.4
	Yes	62	81.6
	Total	76	100.0

Table 6: Households understanding of forest conservation

		Frequency	Percent
Valid	No	4	5.3
	Yes	72	94.7
	Total	76	100.0

Tunkia, like the other chiefdoms, benefit from the GRNP financially. Apart from the fiscal cash given to individuals and the community, developmental projects were carried out in the chiefdom including, rehabilitating the chiefdom N.A.Barry and furnishing with plastic chairs and constructing bridge at Gorahun.

Table 7: Benefits from GRNP to Communities

	Table 6:CD (Community Development) Projects Budget Updates_2004-2012 (Status As At June 2008 – All Project Completed)			
No	***Project Type***	***Location***	***Chiefdom***	***Date Funded***
1	Road Maintenance (21 Miles)	Ward II	Tunkia	Jun-05
2	Feeder Road Rehabilitation	Ward 1	Tunkia	May-05
3	Culverts X 5 Construction	Gorahun	Tunkia	Mar-05
4	Guest House Completion	Belebu	Tunkia	Apr-05
5	Rehabilitation Court Barrie	Gorahun	Tunkia	Jul-07
6	Rehabilitation Community Centre	Ngegbwema	Tunkia	Jul-07
7	Support To Agric Farmers	11 Communities	Tunkia	23/6/09
8	Bridge Construction	Nagbena/Tigbwema	Tunkia	28/1/10
9	FEC Support	12 communities	Tunkia	2010-11
10	P.C. Conference In Bo	Gorahun	Tunkia	17/4/2011
11	Livelihood Development Project	20 Communities	Tunkia	4th/6/11

Source: *GRNP Office in Kenema*

Table 7 shows how scholarships are awarded to pupils by GRNP. The male pupils (boys) received more scholarship than the female (girls) throughout, from 2007 to 2013. In fact, female student never had any scholarship at tertiary level; male had only four. A total of 251 scholarships were awarded to the male pupils, 119 to female in the Junior Secondary Schools, and 4 to male students in tertiary institutions.

Table 8: Scholarship Awarded to Tunkia Chiefdom by GRNP (2007 to 2013)

YEAR	LEVEL	Gender	
		Male (M)	Female (F)
2007/2008	Secondary	63	21
	Tertiary	1	0
2008/2009	Secondary	27	9
	Tertiary	1	0
2009/2010	Secondary	39	15
	Tertiary	1	0
2010/2011	Secondary	29	17
	Tertiary	1	0
2011/2012	Secondary	50	34
	Tertiary	0	0
2012/2013	Secondary	39	23
	Tertiary	0	0
TOTAL		**251**	**119**

Source: (GRNP Office in Kenema)

D. Financial and other Benefits

Table 7 shows the financial benefits received by stakeholders in Tunkia. These benefits are received annually except, the amount that was generally given to the village communities once ever since.

i. Road maintence, undertaken by chiefdom development committee
ii. Guess house at Belehun
iii. Support to farmers worth Le23,732,000+
iv. Bridge construction Nagbema/Tigbwema and

v. 57 HH benefitted support including building materials, food items, planting materials and livestock worth Le44,592,200.

It should be noted that the US$10,000 given to the chiefdom is not given in cash-projects are written through a committee set in the chiefdom, and when approve, it is then funded.

Table 9: Relationship between Households/Village Community and GRNP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cordial	32	42.1	42.1	42.1
	Fair	30	39.5	39.5	81.6
	Poor	14	18.4	18.4	100.0
	Total	76	100.0	100.0	

E. Forest Conservation Policy and Household/Village Community

Binary Logistic Regression Model

Table 10: Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	76	100.0
	Missing Cases	0	.0
	Total	76	100.0
Unselected Cases		0	.0
Total		76	100.0

a. If weight is in effect, see classification table for the total number of cases.

Table 11: Dependent Variable Encoding

Original Value	Internal Value
No	0
Yes	1

Table 12: Categorical Variables Codings

			Parameter coding	
		Frequency	(1)	(2)
PFCR	Rigid and tough	49	1.000	.000
	Soft and flexible	13	.000	1.000
	fair	14	.000	.000
TRF	Swamp	6	1.000	.000
	Upland	8	.000	1.000
	Both swamp and upland	62	.000	.000
ABG	encouraging	9	1.000	.000
	Small	55	.000	1.000
	Moderate	12	.000	.000
IPM	No	56	1.000	
	Yes	20	.000	
GCC	No	7	1.000	
	Yes	69	.000	

Block 0: Beginning Block

Table 13: Classification Tablea,b

Classification Tablea,b				
Observed		Predicted		
		FCPM		Percentage Correct
		No	Yes	
Step 0 FCPM	No	0	13	.0
	Yes	0	63	100.0
Overall Percentage				82.9

a Constant is included in the model.

b The cut value is .500

Block 1: Method = Enter

Table 14: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	22.888	8	.004
	Block	22.888	8	.004
	Model	22.888	8	.004

Table 15: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	46.660[a]	.260	.434

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 16: Classification Table,a

Classification Table,a					
Observed		Predicted			
		FCPM			Percentage Correct
			No	Yes	
Step 1	FCPM	No	5	8	38.5
		Yes	2	61	96.8
Overall	Percentage				86.8

a The cut value is .500

Table 17: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	GCC(1)	.443	1.430	.096	1	.757	1.557	.094	25.655
	TRF			5.562	2	.062			
	TRF(1)	18.918	15068.853	.000	1	.999	164467440.588	.000	.
	TRF(2)	-2.649	1.123	5.562	1	.018	.071	.008	.639
	ABG			4.247	2	.120			
	ABG(1)	-1.715	1.432	1.436	1	.231	.180	.011	2.976
	ABG(2)	.649	1.164	.311	1	.577	1.913	.196	18.712
	IPM(1)	-1.742	1.187	2.155	1	.142	.175	.017	1.793
	PFCR			9.405	2	.009			
	PFCR(1)	-.196	1.315	.022	1	.881	.822	.062	10.828
	PFCR(2)	-2.906	1.326	4.801	1	.028	.055	.004	.736
	Constant	4.092	2.276	3.232	1	.072	59.868		

a. Variable(s) entered on step 1: GCC, TRF, ABG, IPM, PFCR.

A logistic regression was carried out to assess the factors that are responsible for households' perception on forest conservation policy amendment. As shown in the 'Model' row of the Omnibus Tests of Model Coefficients' table, the overall model is statistically significant when compared to the null $\chi^2(8) = 22.888$, (p = .004 $<$ .05), explained 43.4% of the variation of households' perception on policy modification (Nagelkerke R-Square), Table, and correctly predicted 86.8% of cases (Table…) and shows improvement over the percentage accuracy predicted (percentage correction = 82.9) in Block 0, Table 13.

Table…("variables in the Equation") summarizes the odds and odd ratio. Upland Rice Farming (TRP(2)) is statistically significant (p = .018 $<$ .05), and Perception on Forest Conservation Rules (PFCR) is also statistically significant (p = .009 $<$ .05) and particular reference to those who think the rules are soft and flexible, PFCR(2), (p = .028 $<$ .05). The two factors are considered more informative on forest policy modification.

Type of rice farming (upland), TRF (2) is a significant factor in determining households view on forest conservation rules amendment as observed from the categorical variable analysis. Swamp rice farming (TRF (3)) was taken as the reference category. The result displays a negative odd (-2.649) for households that practice upland farming (TRF (2)). This implies that a change in type of farming from swamp to upland reduces the odds (Exp(B) = .071) of wanting conservation rules modification.

Also, households' perception on forest conservation rules is an important factor. Households with the perception that policy is 'fair' (PFCR (3)) was selected as reference category, and is statistically significant ($p = .009 < .05$). Perception of households considering forest conservation rules 'soft and flexible' (PFCR (2)) is significant ($p = .028 < .05$), The odds for PFCR (2) is negative, indicating that, with 1 uint increase, households who considered rules fair decreased by 2.906 units (B = -2.906); PFCR(2) has reduced odds (59.868) compared to PFCR(3). The category PTCR (1), which is households perception base on policy being 'rigid and tough' is not statistically significant ($p = .895 > .05$).

The variables GCC (Grow Cash Crops), IMP (Involve in Policy Making) and ABG (Assessment of Benefit from Gola Rain Forest Program) are all not statistically significant ($P > .05$).

The reference category for GCC those households who consider not to grow cash crops (No = 0) in the bivariate data. The result revealed that those in the yes category are willing to grow cash crops 1.557 times (Exp(B) = 1.588) than those that are not in deciding on amendment of conservation rules.

Assessment of benefits from the Gola Forest Program shows that households in the category of considering benefits being small (ABG (2)) are 1.913 times more than ABG (3), those that consider benefits moderate (the reference category). Those households that think benefits are encouraging (ABG (1)) has a negative odd coefficient (B = -1.715), implying that with 1 unit increase, households' assessment on benefits been moderate will reduce by .180 (Exp(B) = .180). The results on households' involvement on forest conservation policy making (IMP (1)) indicates that with 1 unit increase in involvement, 1.742 decrease for those that do not.

IV. Discussion

A. Gola Forest and Livelihoods

The study investigates the effect of protected Gola Rain Forest reserve on the lives of the forest edge village communities, and how livelihoods strategies have been managed in Tunkia Chiefdom. Farming is the main source of livelihoods. Proximity of villages to the forest, land ownership of GRFNP, conservation policy and relationship between households/village communities have effects on farming and livelihoods

1) ***Distance to protected Gola Forest:*** All the selected village communities are less than 5km to the Gola Forest. As some villages are very close to the forest, their activities tend to be in for forest products, contributing to their livelihoods. Forest is very important for the forest edge communities, it is the source of food, medicine, raw materials for craft work, housing and a lot more. Some communities are so close to the forest that it is difficult to separate them from it. Resources obtained from the forest is one important area households and

communities used to address their livelihoods and socio-culture demands. Communities around the forest should be empowered through sustainable programs.

The forest edge communities are at times confused about the boundary between community-forest and the GRNP. Misunderstanding between the Tunkia community and the GRNP about boundary demarcation had been amicably resolved through the chiefdom stakeholders and the GRNP officers based in Kenema where the GRNP head office is located. The conflicts about which forest belong to the community and which to GRNP is supported by the findings of Gardner & Beasley of RSPB [18] that the establishment and management of community-managed forest in Sierra Leone, there is no specific legislation, although mentioned in the Forest Act of 1988; however, a draft supported by FAO project had reached the stage of review by parliament committee but had a drawback due to the 2028 election. And Davies (n.d.) (page 89) further raised that for people to respect the boundaries if the management within the Golas is seen to be benefitting the surrounding villages.

It is difficult to understand while some families/households close to the Gola Forest are not landowners and also the number of landownerships keep changing. Though the landowners are identified and selected by chiefdom authorities in collaboration with government officers, and verified by GRNP management, is difficult ascertained who considered and whom not to as landowners.

2) Farming: The quantity of rice produced by households is not easy and exactly quantified to scale; since it is not bagged or weighed or measured by any standardized instrument. However, it was approximately estimated by the duration of time households fed on it. The quantity of rice sold was also ignored since it is also very difficult to access and in very small quantity. The rice takes most households 6 months (Table 4) to consume and very few seven months and above. Considering the average meal per day is 2 and the food lasts for less than a year is a key problem. Although a small quantity is been sold to address some household basic needs, the quantity produced was insufficient for the farmers. Low harvest was attributed largely to crop damage by wide animals. Also, the practice of traditional farming methods using crude tools is contributing factor.

Rice is cultivated by almost every household in the forest edge settlements and it is Sierra Leone's staple food. Upland land rice farming is carried out by every village community, some practice both inland swamp and upland rice farming. Upland farming incorporates other crops such as corn, beans and pepper and others. It is the whole period activity, starting from brushing to harvesting and or marketing. A fallow farming system is carried out in this practice: after harvesting the rice, farmland is allowed to retain nutrients for several years before returning to it. While in the fallowed period farmers have to cultivate other land areas. This method of cultivation requires a large area of farm bushes. The result shows that upland farming is very significant to conservation policy amendment. This study agreed with Kerr [19]**,** which finds that 73% of established cacao farms are being used as farmland each year.

Hunting is prohibited in the GRNP and this is likely to increase the size of the animals and eventually high tendency to damage crops and destroy farm animals. The local forest edge communities believed that hunting is one way to protect their crops and farm animals. A study conducted by Garriga [20] finds out that the size of

animals is a factor that could influence farmers' thinking that species like buffalos and bushbucks as more destructive.

Income from this plant is very small or almost contributes nothing to household income. Crops like cocoa, oil palm, kola-nuts, banana and orange are key for household income. But some of these crops (cocoa, orange and banana) are seriously damaged by wild animals. And one of the conservation rules is the prohibition of hunting animals in and around the forest reserve. Another source of household income is the sales of vegetable grows mainly pepper and beans. These crops are usually inter-crop with upland rice. These vegetable crops are managed and marketed by women.

Animal rearing is another livelihood strategy of households in the village communities. Chickens, goats and sheep are the common animals' households reared. Almost every household reared chickens. Chickens are grown by all households (100.0%) and it is mainly for home consumption; goats and sheep are mostly for commercial purposes. Farmers are most at times frustrated by the loss of these animals by wild bush animals. Many households do not even rear sheep (100.0%), goat is somehow encouraging (44.74%). According to households, sheep easily die from unknown diseases and treat as wild animals. This affects the income of households greatly.

Hunting is an illegal activity in the GRNP. Bush animals are one main source of food, especially for households adjacent to the Gola Forest. From field observation, hunting is been carried out in the forest reserve, this is been supported by a study conducted by Jones and his colleagues [21, pp. 339–342] suggested that bushmeat hunting is widespread with signs found in 66% of households within 1 km-squares. They further find out that if hunters' home range was greater than 6km^2 rule-breaking changes could not be easily detected even if with the largest sample size of over 300 squares (55% of the study area), but if less than 2km^2, 80% chance

Working for population on farmland is an important factor in crop production. After the Sierra Leone civil war that lasted for nearly 11 years (1991-2002), the trend of rural-urban migration increases especially among youths. Youth, mainly males move to big towns for greener pastures. Despite most household heads being males (86.8%), some are aged (23.68%), some are widows (17.11%) and some are single (5.26%), Table 2. All these factors affect the productivity of crops which is the main livelihood source. In rural settings in Sierra, Leone men do the harder work like brushing farmlands and felling trees, households that do not have adult males may have to do higher labour or help other households to survive.

Indigenous forests incurred a series of costs to the local communities, including damage to crops especially main crops like rice, cocoa and banana and loss of farm animals (chickens, sheep and goats etc.) due to predatory and disease. This finding is supported by Lindsell and his colleagues [22]. And the study also finds that forest services accrue beyond its borders and confirmed that households next to the forest incur the highest cost of keeping the forest, therefore, it is logical that both national and global communities help to offset the costs for

most affected households.

B. Basic Household Needs: Shelter, Food, Access to Safe Drinking Water and Education

1) Education: It is believed that with high education deforestation can be reduced as stated early in the literature. The educational level in the GF edge communities is very low among household heads, (Table 4) and 26.0 % represent children under 18 going to school (Table 1). Children have to travel miles to go to the nearest school, usually Gorahun, the chiefdom headquarter**.**

2) Shelter and Accommodation: The study revealed that most villages live in poor houses – built with mud and sticks, and roofs with thatch. Accommodation remains one of the biggest problems after the Sierra Leone rebel war as almost all of the houses were burnt in the villages. Because of the very low income of households in many cannot afford decent dwelling houses. In some homes, children sleep on the floors of their parents' rooms. Many of the houses have two or three rooms, meaning members of households are overcrowded.

3) ***Food and Safe Drinking Water and Access to Healthcare Service:*** Households mainly feed on rice, which is grown by every farmer in the forest edge communities. It is the staple food of Sierra Leone. The quantity produced by farmers is difficult to measure, however, the duration households fed on what the produced last for 6 to 7 months (Table 4). Some quantity of rice is sold to address few economic problems, and this is one factor that makes it difficult to precisely quantify the total harvest. The average meal of households is 2.4. Households are there underfed for a long period within the year. It is between the harvest period (October) and planting (April) that food is relative sufficient, but they experience food shortage from June to September (rainy season). The raining season is tough period in terms of feeding for most households in the rural poor in the country like those in Tunkia. It is in this period some households loan to address feeding problem. The loans are paid with agricultural products mostly cocoa and palm oil. This affects the farmer's income and encourages increased poverty. Low-income earning is the factor responsible for poverty in rural settings as pointed out in [23] the cause of poverty in Mentaraman village is due to income and direct cash assistance will have a very low impact.

The Gola Forest village edge communities' main source of water for drinking and for other domestic purposes is a stream/river which is not protected. People in these communities do not have access to safe drinking water and are therefore highly vulnerable to water-borne diseases. The drinking water is not treated for safe drinking, it is directly drunk from streams/rivers. Households normally the cover the water and are easily been polluted, adding to the unsafe nature for drinking.

Access to health is one of the biggest challenges faced by the rural communities. People often travel far and wide to obtain healthcare services in Gorahun where government health centre is located. The health center is under equipped and do not to address difficult health problems, patients are therefore referred to Kenema Government Hospital for issues above these health center. Although Free Healthcare services for children under five years, pregnant women and lactating mother, health facilities need improvement and this is being identified by the fact that, implementation and accountability were major challenges faced by the Free Healthcare, for instance, women described how they were sent to buy drugs (Free Mother and Child Healthcare in Sierra Leone _ Centre for Public Impact (CPI), n.d.). As poverty is high in Sierra Leone, the rural communities sometimes find alternative ways of medication since they cannot sometimes afford to pay for healthcare which may have an adverse effect on them.

C. Benefits from GRNP

A good proportion of Tunkia chiefdom land area is part of the GRNP, thereby prohibiting many local communities from carrying out certain activities including farming, hunting and logging. However, extraction of non-timber products to meet livelihoods is allowed but very limited. The village communities are allowed extra non-timber products such as rattan, and plants for medicine for household use but are monitored and controlled. Tunkia communities especially villages along the forest edge (within 4km to the forest) like many other rural areas chiefly depend on farming; therefore, conserving some of their land areas need serious compensation so as to enable them at least obtain their basic needs (food, shelter, clothing, access to education and health). GRNP has been providing benefits for GF regions; benefits received by Tunkia chiefdom are discussed and evaluated under various categories

1) ***Scholarship Awarded by GRNP:*** GRNP award scholarships to pupils in Junior Secondary School (JSS), and in extreme cases (strong recommendations) very few are given to students in tertiary institutions. The scholarship parcel contains tuition fees and learning materials to pupils. Who gets this benefit and on what ground were concerns raised by the researchers? The study revealed that committees are formed in the chiefdom to access pupils based on the following criteria:

- Performance of pupils in their classes – they most score good grades.
- Family background – Children from very poor homes are given priority; how poverty is accessed is an important issued to be looked into.
- Indigenes - Children must be indigenes of Tunkia.
- Completion of JSS – Upon pupils completing JSS, the scholarship is taken away from him/her and awarded to another pupil from a different family that has not gained it before.

2) Financial and other Benefits: Land-owning families are assisted with fiscal cash. According to households the cash given to them is so small that the entire village community or family normally do not share it. Instead, they use such money for community development programs and to address pressing issues like sickness and funeral arrangements. As been raised, to increase participation in forest management, equitable profit-sharing and conflict resolution; pertinent and practical actions are needed for more secure tenure, which is fundamental to the livelihoods of the poor

D. Gola Rainforest Conservation Policy and Management

Conservation policy has been designed in the past since the 1920s when Gola Forest was estimated. But the policy has undergone tremendous amendments since then, and up to 2012 when GF was declared National Park. The Literature Review brought out salient points; one of such is that the GRNP is to assist Forest edge communities in improving their livelihoods **(cite).** Data gathered for this research are analyzed and discussed to see whether these issues are addressed in the case of the forest edge communities in Tunkia chiefdom.Upland rice farming (TRP (2), p-value = .018) and household perception on forest conservation (PFCP (2), p-value - .0128)' stand out to be more informative on forest conservation policy amendment. The binary logistic

regression model (Table 16) shows people want the adjustment to the policy which will allow them more access to Gola Forest resources. Upland farming in these rural communities is predominant and carried out by every household (Table 4). It is the main livelihood strategies. A piece of land is cultivated by the household for rice and intercropped with other crops such as pepper, corn, beans and tomatoes. Swamp farming is not so common, few households are engaged in it, 7.89% (Table 4). Upland rice farming in these rural areas and most villages in Sierra Leone practice a fallow system. This type of farming requires a large area of farmland and this is the more reason why they want greater access to the forest and conservation rules modification as shown in the binary logistic regression model (Table 16). Farming along the remaining family land adjacent and closed to GF is being affected by wild animal destruction. As such the locals want policy change that will allow them to carry out some activities such as hunting to help protect their crops. Perception of households which is another factor that informed more about policy amendments is important for the management of the forest. According to a study conducted by Christensen and his colleagues [25] in Liberia, they do not find that citizen monitoring reduces deforestation, which policymakers focused on to mitigate climate change, instead, conservation is likely promoted by compensating communities for the cost of the foregoing forest used. People have accepted the conservation of GF, but have some problems with the implementation of many of the livelihood programs. And because of that, locals are sceptical about achieving meaningful contributions to livelihood programs.

E. Households' Relationship with GRNP

Households want the Gola Forest to continue and understand what conservation means. The GRNP Programme's successes greatly depend on the cooperation of chiefs, landowners of GF and the rest of the communities, especially those adjacent to GF. The relationship between households and GRNP management is an important factor if forest conservation is to be successful. As find out that the public mind is the most effective factor that can be used for changing local people's forest conservation behaviour with 52.7% and ensuring environmental participation [26]. This is in line with our findings which show cordial relationship (42.1%) and fair relationship (39.5%) between the locals and GRNP management. Although there are signs of illegal activities and conflicts about boundaries between the forest reserve and the community forests and due to certain activities of the locals in GF, the rural people in these communities have good ethical and moral backgrounds. The ethical and moral background is an important factor that has contributed to peace and management of the Gola Forest reserve, and a study conducted by Akakpo [27] in Nsawan, Ghana shows that 95% of respondents opined that ethics/morality is an important aspect of life and it ensures peaceful society, improves tolerance and understanding. According to GRNP management and chiefdom authorizes, the problem of boundary issue was amicably resolved and improved relation and understanding.Conservation held with the GRNP management revealed that the management is in need of more funds to address some immediate challenges like supporting sustainable livelihood projects for communities especially adjacent to the reserve Gola Forest. The GRNP management is seriously in need of funds. RSBP has been the main fund provider, and of recent the EU is assisting. Funds are needed to improve the conditions of service of workers; increase manpower; buy modern equipment; provide training facilities; increase benefits of landowners and communities; to increase more support for sustainable livelihood programmes for the rural communities. According to Agrawal and his colleagues [28] development support relating to forest has declined in recent

years based on analysis of forest-related projects in AidDatabase (2012).

V. **Conclusion**

Though there have been efforts, especially from GRNP management in providing assistance to the forest edge communities and GF land owners, the support is been seen as too small, and also their livelihood activities particularly, farming is been seriously affected by the Gola Forest Conservation; and they are therefore demanding some modification to some of the conservation rules that would give them more access to the forest resources. Generally speaking, farming is the main economic activity of adjacent Gola Forest communities. Rice is the main crop grown purposely for home consumption and its quantity produced lasted for an average of 6 months; and that means households may go for a long period of time within the year hungry. The low productivity is made evident by the fact that the local people still practice subsistence farming and couple with wild animals raiding. Permanent crops are the main source of household income, although very small income is obtained from animals reared, crops intercropped with upland rice farm and the sale of rice produced for household consumption. Cocoa, palm oil and kola nuts are the key permanent crops households realized some reasonable income comparatively. Cocoa particularly is usually raided and destroyed by animals, and the farmers are prohibited to hunt in and around the protected Gola Forest area. Illegal hunting is still ongoing, not only to protect crops and farm animals, but as a source of food and in some cases income. Coffee, another crop which before the Sierra Leone civil war (1991- 2002) had prices that encouraged farmers to grow and maintained farmlands are now been abandoned by many as the price in the market has drastically fallen in recent times. Households' poverty is evident of inability to properly address basic human needs and their income is very low. The communities and households lack decent housing, lack of safe drinking water, affordability to support children's education to higher level, poor access to market due to bad roads, difficulties in accessing good health facilities.Households have obtained benefits from GRNP management including cash to land owing families of GF, projects to support livelihoods, but they see these benefits very small and the projects have very little impact on them. Although there is a good relationship between the communities and the GRNP management, a concern for sustainable livelihood programs is eminent in achieving forest conservation; and that is the more reason the locals are asking for conservation policy modification that give then more opportunities to access forest resources. And education of their children is viewed as the most important benefit they can appreciate. Therefore, sustainable livelihood programs should be ongoing, and further research is needed.

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