



ILLEGAL ACTIVITIES IN AGO-OWU FOREST RESERVE IN OSUN STATE AND ITS IMPLICATION ON SUSTAINABLE FOREST MANAGEMENT

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ABSTRACT

This study aimed at assessing illegal activities with a view to enhancing sustainable forest management (SFM) in Ago-Owu reserve. Purposive sampling was used to select four communities from eight communities around the reserves. The major targets were the households. Based on this, 162 respondents (48, 27, 45, and 42) were selected from 480, 266, 447 and 420 households in Mokore, Ejemu, Abaoba and Famuyiwu respectively using 10% sampling intensity. Primary data were collected using questionnaire and analyzed using descriptive statistics, chi-square and logistic regression. Majority of the respondents were male (62.9%), 51-60years (33.3%), married (50.6%), had secondary education (48.1%), had 16-30 years of residency (67.9%), with household size of 4 (32.7%), farmers (58.6%) and indigenes (77.2%). Majority (18.5%) generated income/annum of ₦310000 - ₦400000. Major illegal activities were; collection of fuelwood (96.3%), trespass (96.3%) and illegal felling of trees (89.5%). Illegal activities were dependent on communities ($\chi^2 = 19.30$); sex ($\chi^2 = 6.33$); education ($\chi^2 = 11.59$), nativity ($\chi^2 = 12.30$), years of residency ($\chi^2 = 45.13$) and occupation ($\chi^2 = 13.09$). Major socio-economic impacts include; damaging of NTFPs (90.1%), loss of revenue (90.1%) and climate change (84.5%). High population was the most significant factor contributing to illegal activities with odds-ratio of 1249218286570. Methods mostly used in monitoring illegal activities include; Use of law enforcement agency (100%), Forest guards (88.3%) and Community vigilante (75.3%). Illegal activities in forest reserves are a major threat to forest conservation. Therefore, strategies aimed at reducing dependence on forest should be established thereby enhancing SFM.

Keywords: Illegal activities, Forest reserve, Households, Conservation, Sustainable forest management.

INTRODUCTION

Over the years, the forests have been known to sustain life on earth (FAO, 2005). They supply food, medicine, energy, shelter, fodder, wood and non-wood forest products and they are a source of economic development for individuals and communities. In Nigeria, majority of the rural dwellers depend on forest for their daily needs (Olaniyi *et al.*, 2013). The first forest reserve in Nigeria was created in 1901 with the sole aim of promoting afforestation, regulating log exploitation and introduction of forest resources management. It was also aimed at controlling logging activities with sole aim of preventing untimely timber deficits. However, due to porosity and believe of the people on the use of the forest,

the forest have been vulnerable to destruction in recent times (Azeke 2002).

Illegal activities in forest reserves are far becoming a major threat to biodiversity conservation. Galvin *et al.*, (2009) defined illegal activities as commercial and subsistence use that violates forest regulations. Illegal activities are events carried out in the forest zones without approval from the authorities in control of the reserves. These illegal activities entail violations of ownership rights, such as taking of resources from protected areas or private land without permission, illegal land occupation, and violation of resource-use regulations, including use that is in excess of established limits, out of season and conducted with prohibited extraction methods,

without required permits, or in prohibited areas. Illegal resource use also includes extraction of prohibited resources, such as protected species. The impact of illegal activities ranges from biological, economic and social. Biological activities impact range from decline in genetic diversity and species richness to changes in community composition and ecosystem services (Edirisinghe, 2003). On the other hand, economically, illegal resource use can provide alternative livelihood strategies to marginalized people and windfall profits to poachers of prized species (Yonariza and Webb 2007; Tacconi, 2008), but legitimate resource users can suffer significant revenue losses as a result of illegal use of resources (Gutierrez-Velez and MacDicken, 2008). Socially, illegal resource use can reflect and further exacerbate differences in access to resources. Therefore, the study aimed at assessing illegal activities in Ago-Owu forest reserve in Osun state with a view to enhancing sustainable forest management in the forest reserve.

MATERIALS AND METHODS

Study Area

Osun State covers a total area of approximately 8,602km² and is bounded in the south by Ogun State, in the north by Kwara State, in the west by Oyo State and in the east by Ondo State. Agriculture is the traditional occupation of the people of Osun State. The tropical nature of the climate favours the growth of a variety of food

and cash crops. The vegetation consists of high forest and derived savanna towards the north. The trees and other living components of the area have been disturbed by annual forest fires and other human activities. Sizeable parts of the old Oyo forest reserve are located in the present Osun State. These include Ago-Owu Forest Reserve with 32,116 hectares in the high forest area, the estimate terrain elevation above sea level is 204 metres.

Sampling Procedure and Sample Size

Purposive sampling was used to select four communities from the eight rural communities around Ago-Owu forest reserves. These include Mokore, Ejemu, Abaoba and Famuyiwu. Selection was based on the fact that these communities were noted for their involvement in various forest activities as well as active involvement in other land use practices in the forest reserve. The major target were the households. Based on this, 480, 266, 447 and 420 households were identified in Mokore, Ejemu, Abaoba and Famuyiwu respectively. Furthermore, the sampling intensity adopted by Diaw *et al.*, (2002) was used to select the respondents. This stated that a minimum of 10% sampling intensity could serve as a representative figure for a population less than 500 people. Therefore a total of 162 households were selected for this study. Below is an illustration of the sampling procedure and sample size (Table 1).

Table 1: Sampling size of respondents in the study area

Communities	Population of households	10% of household head selected	No of respondents
Mokore	480	48.0	48
Ejemu	266	26.6	27
Abaoba	447	44.7	45
Famuyiwa	420	42.0	42
Total	1613	161.3	162

Source: Field survey, 2018

Data Collection and analysis

Data were collected from both primary sources. Primary data were collected with the aid of structured questionnaire. Data was analysed using descriptive statistics, chi-square and logistic regression analysis. The logistic regression model can be expressed as:

$$Y = \exp (b_0 + b_1x_1 + b_2x_2 + \dots + b_9x_9) / 1 + \exp (b_0 + b_1x_1 + b_2x_2 + \dots + b_9x_9) - - - (2)$$

Where:

Y = Factors contributing to illegal activities (FCIA) (Dependent variable).

b₀, b₁, b₂ ... b₉ = regression parameters

Independent variable includes:

X₁ = High population (HP)

X₂ = Poverty (P)

X₃ = Low income (LI)

X₄ = Political influence (PI)

X₅ = Non- renewal of property hammer (NPH)

X₆ = Inadequate land for farming (ILF)

X₇ = Lack of provision for forest guards (LPFG)
 X₈ = Failure to produce log certificate (FPLC)
 X₉ = Inadequate consultation with stakeholders (ICS)

RESULTS AND DISCUSSION

The results on the age distribution revealed that (33.3%) of respondents are within age of 51-60years, this was followed by respondents (27.2%) who are within the age of 31-40years while those within the age range of 71years and above recorded the least with 1.9% (Table 2). This is an indication that the respondents were within the middle age bracket and were still active in carrying out forest activities, this corroborated with the findings of Olaniyi *et al.* (2013) who stated that the highly productive age in agriculture and forestry activities fall within the age group 31-60 years. The sex distribution (Table 2) revealed that majority of the respondents are males with 62.9% while the females had a lower percentage of 37.0%. This implies that the males are more engaged in forestry practices including the illegal forest activities than their female counterpart in the study area. This could be attributed to the socio-cultural milieu which gives males more access to production resources (Tacconi, 2008).

It was further revealed that 50.6% of the respondents were married, while the divorced recorded the least with 6.2%. This showed that the married people are more involved in illegal forest activities in the area. This may also be attributed to the fact that the married in an attempt to cater for the needs of their family indulge in various forest activities to sustain themselves. With reference to educational level of respondents (Table 2), it was revealed that majority (48.1%) of respondents were educated at the secondary level while those that had no formal education recorded the least percentage with 13.0%. This is an indication that the educational level of respondents were low as a result they may not be well informed on the need for protection of forest

resources as their utmost concern is the easy, cheap and readily available practices needed to sustain livelihood (Obasi *et al.*, 2012). Furthermore, majority (58.6%) of the respondents in the study area were farmers, this was followed by those involved in the collection of non-timber forest products with 18.5%. However, respondents involved in other forms of occupation recorded the least with 1.9%. This is a clear indication that most forest dependent communities with the aim of meeting their daily needs source for various means of generating income for sustaining their families. This they do mostly, though farming activities or the collection of non-timber forest products in forested areas. This therefore corroborated the findings of Azeke (2009) that the forest reserves of Edo state have been greatly reduced during the last decades through various farming activities. Likewise, indigenes recorded the highest percentage with 77.2% while the non-indigenes were few in number with 22.8%. This is also an indication that most illegal forest activities are perpetrated by the indigenes (Table 2).

It was revealed (Figure 1) that majority (67.9%) of the respondents had been living in the area for about 16-30years while a few (0.6%) of the respondents have been living in the area for 45-60years. This implied that most of the respondents have been residing in the area for quite a long time and as a result they depend on the forest resources to meet their various needs. This corroborated the findings of Ladipo (2013) who reported that communities residing within and on fringes of protected areas including forest reserves, use the forest for agriculture, livestock grazing, hunting, firewood and wood products, and non-timber forest products collection. The result on household size of respondents revealed that that majority (32.7%) of the respondents had household size of 4 people while the least was recorded in respondents with household size of 1 and 7 with 0.6% (Figure 2).

Table 2: Socio-demographic characteristics of respondents

Socio-demographic characteristics	Frequency	Percentage
Age (years)		
≥ 30	8	4.9
31 – 40	44	27.2
41 – 50	39	24.1
51 – 60	54	33.3
61 – 70	14	8.6
71 above	3	1.9
Total	162	100.0
Sex		
Male	102	62.9
Female	60	37.0
Total	162	100.0
Marital status		
Single	38	23.5
Married	82	50.6
Widowed	32	19.8
Divorced	10	6.2
Total	162	100.0
Education		
No formal edu.	21	13.0
Primary	34	21.0
Secondary	78	48.1
Tertiary	29	17.9
Total	162	100.0
Occupation		
Farming	95	58.6
Processing	10	6.2
Civil servant	14	8.6
NTFPS collectors	30	18.5
Livestock rearing	6	3.7
Driving	3	1.9
Nativity		
Indigenes	125	77.2
Non- indigenes	37	22.8
Total	162	100.0

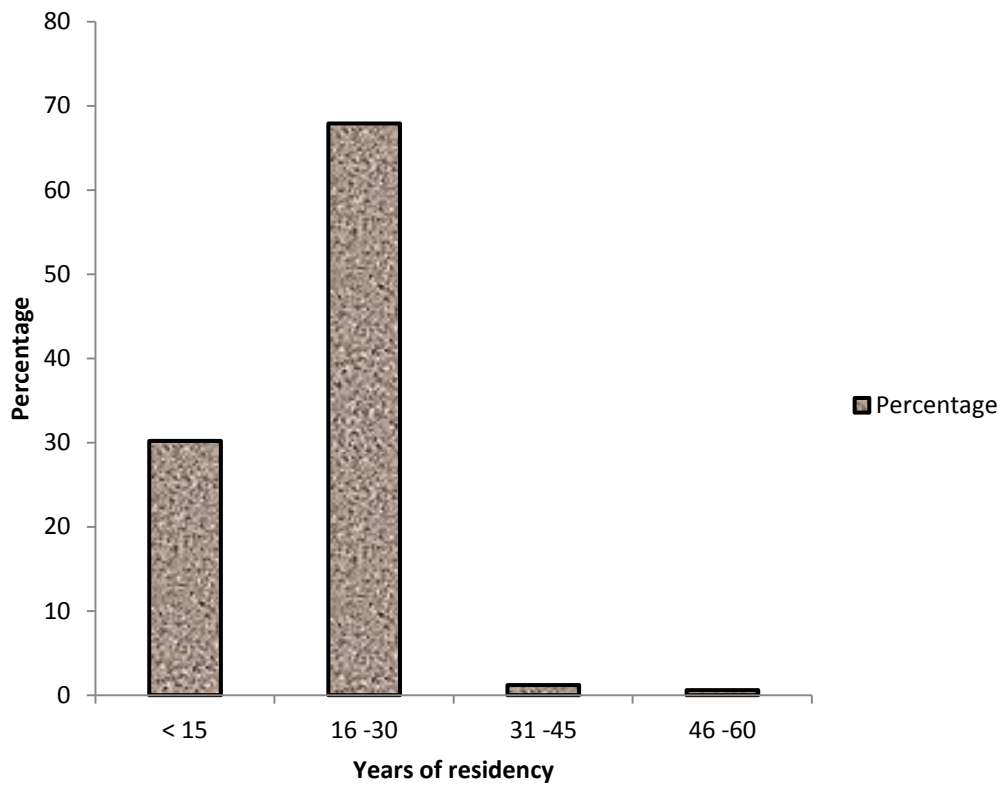


Figure 1: Years of residency of respondents

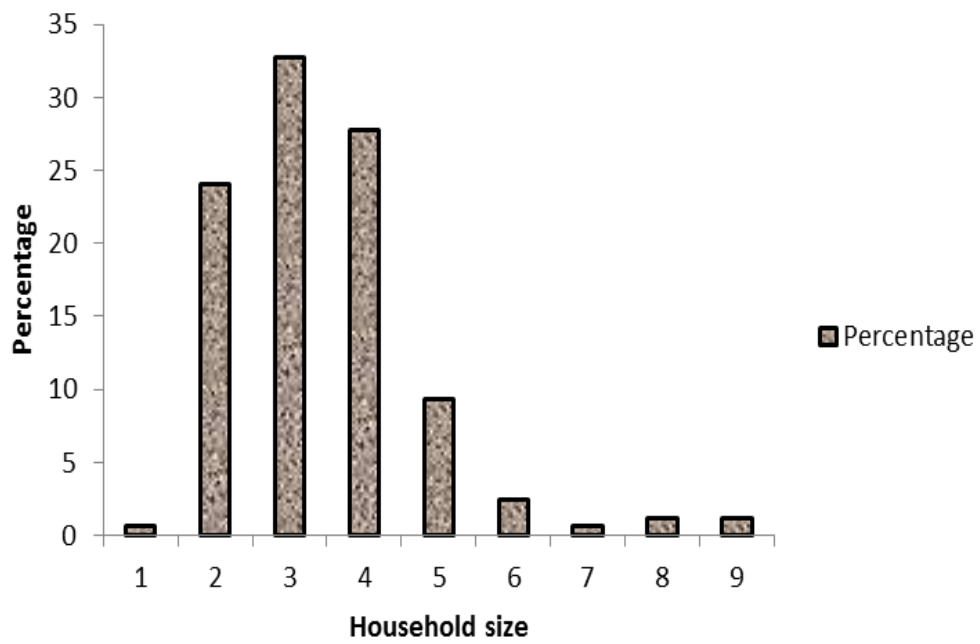


Figure 2: Household size of respondents

Table 3: Income (₦)/ annum of respondents

Income (₦)/ annum	Frequency	Percentage
≥ 100,000	7	4.3
110,000 – 200,000	9	5.5
210,000 – 300,000	23	14.2
310,000 – 400,000	30	18.5
410,000 – 500,000	26	16.0
510,000 – 600,000	26	16.0
610,000 – 700,000	14	8.6
710,000 – 800,000	13	8.0
810,000 – 900,000	8	4.9
900,000 above	6	3.7
Total	162	100.0

Source: Field survey, 2018

The income generated from the various forest activities indulged in by the respondents in the study area as shown in Table 3 revealed that majority of the respondents (18.5%) generated about ₦310,000-₦400,000 yearly from the forest reserve. This was closely followed by those respondents who generated between ₦410,000 – ₦500,000 and ₦510,000 – ₦600,000 per annum with (16.0%) respectively. However, the least percentage (3.7%) of the individuals are respondents who generated ₦900,000 and above.

This is an indication that forest activities are profitable venture and because of this the forest dependent communities tend to explore the forest resources not minding the consequences that their actions might cause to the forest itself. This therefore corroborated with the findings of Azeke (2002) that forest reserves in Nigeria have experienced great decline as a result of competition for forest resources to meet daily needs.

Table 4: Illegal activities carried out in the study area

Illegal activities	Yes		No	
	Freq.	%	Freq.	%
Illegal farming	144	88.9	18	11.1
Illegal felling of trees	145	89.5	17	10.5
Poaching	145	89.5	17	10.5
Felling of undersized trees	134	82.7	28	17.3
Non- renewal of property hammer	52	32.1	110	67.9
Failure to produce log certificate	61	37.7	101	62.3
Arson or illegal burning	155	95.7	7	4.3
Trespass	156	96.3	6	3.7
Obtaining fuel wood from the reserve	156	96.3	6	3.7
Hunting in the reserve	61	37.7	101	62.3

Source: Field survey, 2018

Table 4 showed various illegal activities carried out within the reserves. These include; obtaining fuel wood from the reserve (96.3%), trespass (96.3%), illegal felling of trees (89.5%), poaching (89.5%), illegal farming (88.9%), felling of undersized trees (82.7%) etc. This is an indication that the forest dependent communities explore the forest resources through various illegal means to sustain themselves. This therefore corroborated

with the findings of Azeke (2002) that forest reserves have experienced great decline as a result of competition for forest resources to meet daily needs. Ladipo (2013) therefore reported that if the forest resource base is to improve then various illegal activities militating against the sustainable forest development in the nation must be properly addressed.

Table 5: Relationship between socio- economic characteristics and illegal activities in the study area

Socio-economic characteristics	Chi-square value	Df	p-value
Communities	19.30	3	0.002*
Age	40.90	5	0.56
Sex	6.33	1	0.008*
Marital status	5.98	3	0.50
Education	11.59	3	0.009*
Nativity	12.30	1	0.000*
Years of residency	45.13	29	0.029*
Occupation	13.09	6	0.042*
Household size	13.07	9	0.16

Source: Field survey, 2018

The relationship between socio-demographic characteristics of respondents and illegal activities in the study area (Table 5), revealed that there was significant association between communities ($\chi^2 = 19.30$, $df = 3$, $p = 0.002$); sex ($\chi^2 = 6.33$, $df = 1$, $p = 0.008$); education ($\chi^2 = 11.59$, $df = 3$, $p = 0.009$), nativity ($\chi^2 = 12.30$, $df = 1$, $p = 0.000$), years of residency ($\chi^2 = 45.13$, $df = 29$, $p = 0.029$), occupation ($\chi^2 = 13.09$, $df = 6$, $p = 0.042$) and illegal activities in the study area but there was no

significant association between age ($\chi^2 = 40.90$, $df = 5$, $p = 0.56$); marital status ($\chi^2 = 5.98$, $df = 3$, $p = 0.50$), household size ($\chi^2 = 13.07$, $df = 9$, $p = 0.16$) and illegal activities in the study area. This implied that communities around the reserve depended on it for sustenance and as a result carry out several activities such as illegal felling, illegal farming etc. thereby negating the aim of sustainable forest management (Azeke, 2009).

Table 6: Socio-economic impact of illegal activities on forest dependent communities in the study area

Socio-economic impact	Yes		No	
	Freq.	%	Freq.	%
Displacement of people	45	27.8	117	72.2
Death of family members	42	25.9	120	74.1
Damaging of non-wood forest products	146	90.1	16	9.9
Loss of revenue by government	146	90.1	16	9.9
Reduction in soil fertility	133	82.1	29	17.9
Reduction in crop output	131	80.9	31	9.1
Loss of biodiversity	135	83.3	27	16.7
Rural-urban migration	58	35.8	104	64.2
High cost of living	34	21.0	128	79.0
Increased cost of timber and non-timber products	135	83.3	27	16.6
Climate change and global warming	137	84.5	25	15.4

Source: Field survey, 2018

The socio-economic impact of illegal activities on forest dependent communities include; damaging of non-wood forest products (90.1%), loss of revenue by government (90.1%), climate change and global warming (84.5%), increased cost of timber and non-timber products (83.3%), loss of biodiversity (83.3%), reduction in soil fertility (82.1%) reduction in crop output (80.9%), etc. (Table 6). This therefore implied that if the various illegal activities in the forest reserve are not checkmated, this can militate against the sustainable forest development in the nation (Ladipo, 2013).

Factors contributing to illegal activities in the study area

The binary regression model obtained for factors contributing to illegal activities in the study area

Odds- ratio (Unit change): Constant (0.00); HP (1249218286570); P (9692847390.80); LT (153.88); PI (0.00); NPH (1.33); ILF (137012.93); LPFG (0.00); FPLC (7139406841.30); ICS (0.15) Where: High population (HP), Poverty (P), Low income (LI), Political influence (PI), Non-renewal of property hammer (NPH), Inadequate land for farming (ILF), Lack of provision for forest guards (LPFG), Failure to produce log

certificate (FPLC), Inadequate consultation with stakeholders (ICS)

Model 1 presented above for factors contributing to illegal activities in the study area gave overall significant fit to the data judging from Chi-square value that was significant at $p < 0.05$. High population (HP) was the most significant variable with odds-ratio of 1249218286570 followed by poverty (P), failure to produce log certificate (FPLC), inadequate land for farming (ILF), low income (LI) with odd-ratios of 9692847390.80, 7139406841.30, 137012.93, 153.88, respectively (Table 8). The logistic regression analysis implied that there was sufficient evidence that the estimated coefficient for the factor was not zero. This also implied that the regression parameters in the model were statistically significant. In other words, the higher the value of odds- ratio, the more likelihood the factors contributed to illegal activities in the study area. The implication was corroborated by Deeks (1996) that the logistic model provides information on the consequences of one variable on the other. Methods used in monitoring illegal activities in the study area include; Use of law enforcement agency (100%), Forest guards (88.3%), Community vigilante (75.3%), etc. (Figure 3)

Table 7: Logistic binary nature for factors contributing to illegal activities in the study area

Independent variables	Coefficient	Odds-ratio
High population (HP)	37.06	1249218286570.00*
Poverty (P)	23.00	9692847390.80*
Low income (LI)	5.04	153.88*
Political influence (PI)	-30.56	0.00
Non- renewal of property hammer (NPH)	0.29	1.33
Inadequate land for farming (ILF)	11.83	137012.93*
Lack of provision for forest guards (LPFG)	-19.41	0.00
Failure to produce log certificate (FPLC)	22.69	7139406841.30*
Inadequate consultation with stakeholders (ICS)	-1.93	0.15
Model χ^2 (df = 11) = -56.025* p=0.000		

*= significant at $p < 0.05$

Dependent variable (FCIA) = Factors contributing to illegal activities in the study area (Yes =1; No = 0)

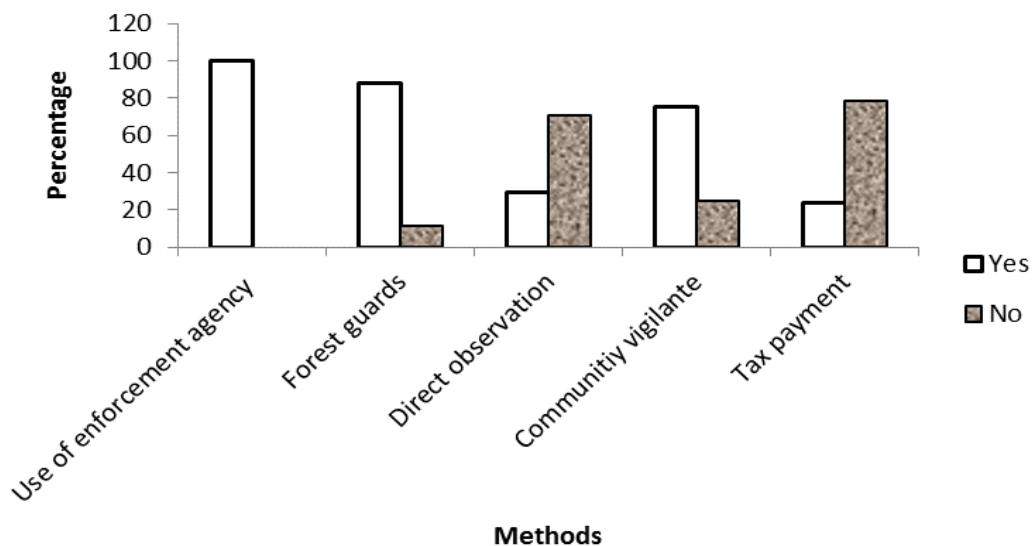


Figure 3: Methods used in monitoring illegal activities in the study area

CONCLUSION

The study indicated that location of communities, sex, education, nativity, years of residency and occupation are major determinants contributing to illegal activities in the study area. They also have a significant relationship with illegal activities which contributed a great deal to loss of forest resources in the study area. Therefore, the more respondents source for means of generating income to meet their daily needs, the more they will put pressure on the forest areas and this in turn will hinder effective sustainable forest management in the study area. The major socio-economic impact of illegal activities on forest dependent communities include; damaging of

non-wood forest products, loss of revenue by government, climate change and global warming, increased cost of timber and non-timber products, loss of biodiversity, reduction in soil fertility and reduction in crop output.

Factors contributing to illegal logging in the study area gave overall significant fit to the data judging from Chi-square value that was significant at $p < 0.05$. High population (HP) was the most significant factor followed by poverty (P), failure to produce log certificate (FPLC), inadequate land for farming (ILF) and low income (LI). Methods mostly used in monitoring illegal activities in the study area include; use of law enforcement agency, forest guards and community vigilante.

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