

# Drivers of land use change and forest degradation in peri-urban communities surrounding Yenagoa, Bayelsa State, Nigeria

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Submitted: 01-11-2022

Accepted: 12-11-2022

## ABSTRACT

The study examined the drivers of land use change and forest degradation in peri-urban communities surrounding Yenagoa, Bayelsa state, Nigeria. Five (5) peri-urban communities (Ikibiri, Otuokpoti, Otuasiga, Yenaka and Yenegwe) were selected based on some criteria for inclusion of communities to be sampled for the study. Random sampling technique was employed to sample 100 households whereby 20 representatives were selected from each peri-urban community. Thus, 100 copies of the questionnaire were administered among household representatives in the selected peri-urban communities. Preference was given to respondents who have lived in the community for at least 30 years. Descriptive statistics in the form of tables, percentages and inferential statistics using Spearman Rank Correlation and ANOVA analyses were employed in the study. The copies of the retrieved questionnaire were coded and imported into SPSS 24.0 for effective data and statistical analysis. Findings of the study identified predominant activities such as subsistence and extensive agriculture (65.4%); residential and commercial activities (61.5%); road construction and other developmental activities (57.7%) amongst others as drivers of land use change and forest degradation. The effects of these activities were reduction in plant species composition (66.6%); reduction in wildlife (83.4%); reduction in ethno-medicinally valued resources (70.5%); and reduction in vegetation cover (83.3%). Drivers of land use change significantly correlate with forest cover degradation ( $r=0.311$ ;  $p<0.05$ ) in the study area. Findings also revealed that drivers of forest degradation were similar among sampled peri-urban communities ( $F=1.581$ ;  $p<0.05$ ). The constraints to sustainable forest management in the study area are poor planning (73.1%); neglect on the part of government (55.2%); cultural laws of

the land (73.0%); over exploitation (79.5%); and extensive agricultural practices (53.8%). The study recommends that poverty eradication programmes to promote sustainable development goals will help reduce exploitation of forest resources in peri-urban communities surrounding Yenagoa, Bayelsa state.

**Keywords:** Perception, Land use change, Forest degradation, Human activities, Peri-urban communities

## I. INTRODUCTION

In many parts of the world, drastic deforestation and degradation of vegetal cover persist in order to exploit forest resources or to further other economic ends. However, there are determined and widespread efforts to rehabilitate forests and the resources that they provide (Food and Agriculture Organization (FAO), 2015). The level of degradation of forest resources is a factor of uncoordinated land use policy and other forms of land-use such as agriculture, grazing, industrialization, urbanization and water management leading to formation of deserts, bare surfaces and general environmental degradation. In the rainforest region, deforestation has risen to a disturbing rate that urgent policy instruments are needed to save the forests and reduce environmental challenges (Aigbe and Oluku, 2012).

Land use as described by Melese (2016) is the use of land for grazing, agriculture, urban development, logging and mining among others. Conversely, land use change is the conversion of land use due to human intervention for various purposes, such as for agriculture, settlement, transportation, infrastructure and manufacturing, parks, recreation uses, mining and fishery (Williams, 1994; Turner and Meyer, 1994; Melese, 2016). In the same vein, there is human activities which involves clearing of vegetative

lands for farming, logging, bush burning, residential housing, petroleum exploitation and exploration coupled with its associated oil spill pollution, road construction and industrialization. All these are factors causing forest cover degradation; and are always impacting negatively on forests resources (Baptista, 2008; Ekpenyong, 2015).

Peri-urban communities are communities found close to urban centres. As described by Zasada et al., (2011) peri-urbanisation relates to those processes of dispersive urban growth that create hybrid landscapes of fragmented urban and rural characteristics. Peri-urban areas (also called outskirts or the hinterland) are defined by the structure resulting from the process of peri-urbanisation. It can be described as the landscape interface between town and country or as the rural-urban transition zone where urban and rural uses mix and often clash. It can thus be viewed as a landscape type in its own right, one forged from an interaction of urban and rural land use (Lambert, 2011). The forest resources and plant biodiversity in these areas are threatened due to increasing anthropogenic activities and their land use systems spilling over into the hinterlands.

Forest degradation occurs when forest ecosystems lose their capacity to provide important goods and services to people and nature (International Union for Conservation of Nature (IUCN, 2019). Over half of the tropical forests worldwide have been destroyed since the 1960s, and every second, more than one hectare of tropical forests is destroyed or drastically degraded. The degradation and loss of forests threatens the survival of many species, and reduce the ability of forests to provide essential services such as clean air and water, healthy soils for agriculture, and climate regulation (United Nations Organization, 2018). World Bank (2016) reports that healthy forests support the livelihoods of 1.6 billion people globally, one billion of who are among the developing countries of the world of which Nigeria is not an exception.

With increasing crave for lands and rapid urban expansion into hinterlands and peri-urban areas, the available land per individual shrinks drastically (Foris, 2015). Since lands in urban areas are scarce and costly, migration to the peri-urban areas for residential, agricultural, commercial and other forms of development activities are common land use practices among the people. These activities influencing land use change and causing forest degradation are immediate actions of the indigenous people who in order to fulfill their needs from the use of land embark on agricultural

expansion, wood extraction, infrastructural expansion amongst others (Geist and Lambin, 2012; Metz 2015). In other words, different human driving forces mediated by their socio-economic settings and influenced by existing environmental conditions normally lead to the manipulation of biophysical conditions of land. Therefore, the research questions important for the study are: what are the drivers of land use change and forest cover degradation in the study area? What is the relationship between land use change and forest degradation? Are the drivers of forest cover changes the same in the study area?

## **II. MATERIALS AND METHODS**

### **Description of the Study Area**

The study area is the peri-urban communities surrounding Yenagoa which is the capital city of Bayelsa State (Figure 1). Bayelsa state is among the core Niger Delta states which are found geographically within latitude 4° 15' 0" N and 7°20' 0" N and longitude 5° 0' 0"E and 9° 00' 0" E. The study area enjoys a humid tropical climate (Adejuwon, 2012) with two major seasons (wet and dry seasons). These two periods are normally characterized by wet seasons of between 8 to 10 months and dry seasons of between 2 to 4 months (Adejuwon, 2012). The mean monthly temperature ranges between 26° and 28°C, while rainfall is between 1800mm and 3000mm per year which is normally heaviest in July (Ologunorisa & Adejuwon, 2003; Adejuwon, 2012; Emaziye, Okoh & Ike, 2012). Relative humidity rarely falls below 60%, fluctuating between 80% and 100% for most of the year (Emaziye et al., 2012). The relief of study area comprises of coastal plain (Adejuwon, 2012). The investigation area is transversed by various levels of rivulets and streams that eventually empty into the Atlantic Ocean. The soil types are made up of ferrosols dominated by sandy soils (Imorua, 2000; Okoh, 2013). The sediments are deposits comprising of gravel, soils, peats, sands and silt from the River Niger (Wessey and Egirani, 2017). The vegetation of the area like any other state in the Niger Delta is composed of four ecological logical zones. These include: coastal barrier island forests, mangrove forests, freshwater swamp e.g. forests and lowland rain forests. Parts of the fresh water swamp forests in the state constitute the home of several threatened and even endangered plant and animal species (Niger Delta Budget Monitoring Group (NDEBUMOG), 2022). The socio-economic activities of peri-urban communities in Bayelsa state include peasant farming, petty trading and fishing, sand dredging, lumbering and shifting cultivation (Slash and burn),

which involves cultivating a piece of land for a number of years and then abandoning it for a more

fertile land (Iloba and Ruejoma, 2014; Enaruvbe and Atafo, 2015).

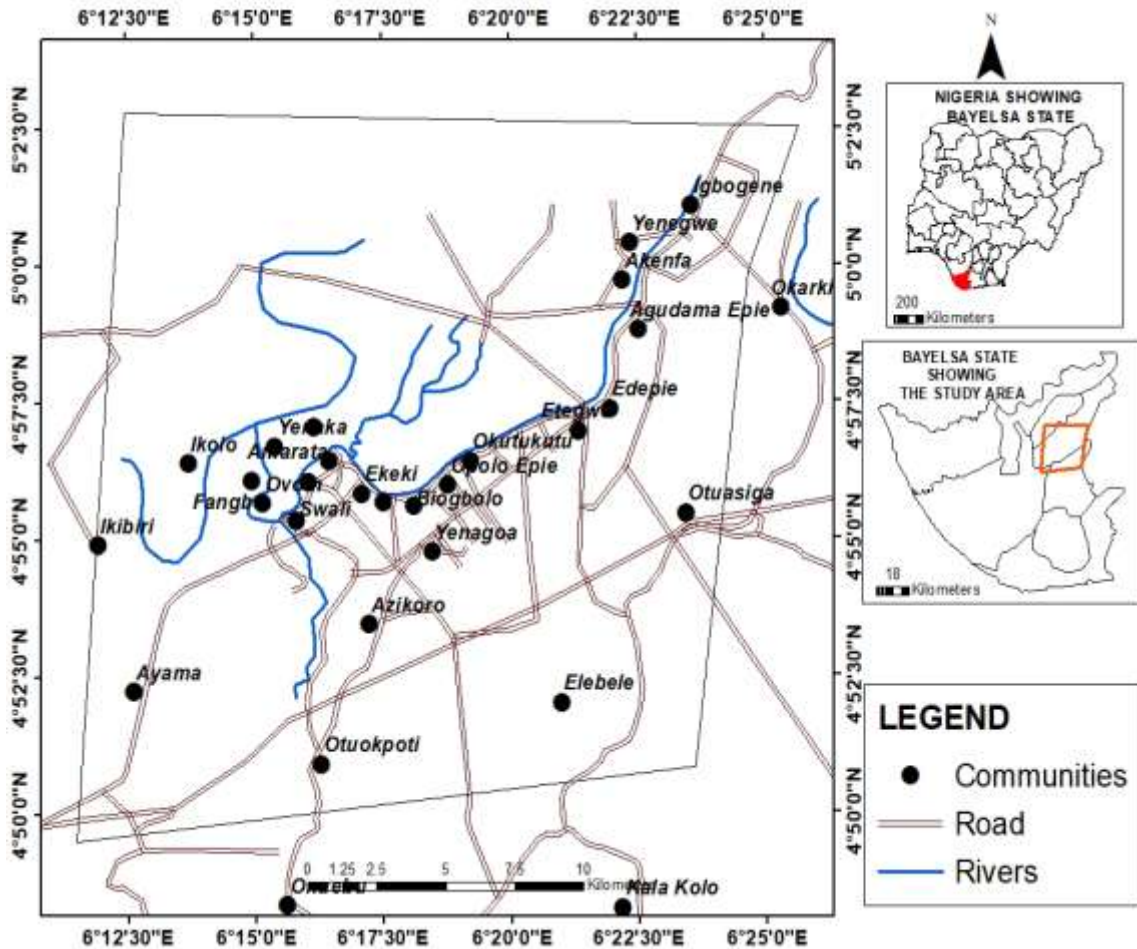


Figure 1: Yenagoa and its Surrounding Peri-urban communities

**Data Gathering and Sampling Procedure**

The study was designed to elicit information from selected peri-urban communities surrounding the capital city of Yenagoa. These communities were purposively selected because it was not feasible to study all peri-urban communities and yet effectively answer the research questions (Visigah and Enwin, 2018). Based on this, the study employed inclusion and exclusion criteria for selection. Consideration was given to several factors considered important for the study. The criteria for selection are (i) size of the peri-urban community; (ii) settlement pattern of the community; (iii) distance to the capital city (community should be in close proximity); (iv) accessibility (the community must be accessible and the possibility of allowing for conducting a

research of this nature). Thus, five (5) peri-urban communities were selected in line with the highlighted criteria for inclusion while the rest were excluded. Random sampling technique was used to select 100 household representatives (20 from each selected peri-urban community) from the study area. A total of 100 copies of the questionnaire were administered whereby 78 copies (78% return rate) were retrieved for the study (see details on Table 1). The targeted population of 100 household heads was purposively selected based on the number of years lived in the community which must be at least 30 years. Thus, both purposive and random sampling techniques were employed for questionnaire administration among sampled peri-urban communities.

Table 1: Details of Sample size and Questionnaire Administration

S/N	Selected urban Communities	Peri-urban	No. of Household representatives	Sampled	No. of copies of questionnaire administered	No. of copies of questionnaire returned
1	Ikibiri		20		20	16
2	Otuokpoti		20		20	16
3	Otuasiga		20		20	15
4	Yenaka		20		20	16
5	Yenegwe		20		20	15
	Total		100		100	78

### III. DATA ANALYSIS

A descriptive statistical tools of percentages and frequencies was used to summarize feedbacks from the respondents across sampled peri-urban communities. Spearman Rank Correlation and ANOVA statistical tools to determine the relationship between drivers of land use change and forest degradation; and variations in level of forest degradation among sampled peri-urban communities. Questionnaire samples returned were coded, recorded in excel worksheet 2010 and imported into the Statistical Package for Social Scientist (SPSS) 24.0 version for effective data analysis.

### IV. RESULTS AND DISCUSSION

#### Socio-economic Characteristics of Respondents

The information on the socio-economic characteristics of sampled household heads were presented on Table 2. The gender ratio for sampled respondents showed that the total number of sampled males were 74% while the remaining 26% were females. The age ratio of sampled respondents revealed that 14% of sampled respondents were between the ages of 31-40 years, 28% of the respondents were within 41-50 years while the remaining 58% were either 51 years old or above. The level of education of sampled respondents for the study showed that 26% of sampled respondents had primary level education, 70% of sampled respondents had secondary level education, while the remaining 4% of sampled respondents belong to the tertiary level. The marital status of

respondents for the study revealed that 88% of sampled respondents were married, 6% of respondents have separated from their marriages while 6% of the remaining respondents are widowed. The type of occupation of respondents for the study revealed that 20% of sampled respondents were civil servants, 20% of respondents are into trading, artisanship recorded 16% of the respondents, and farmers were 34%, while the remaining 10% of the respondents were into other kinds of activities like native medicine and transporters.

The information for the average monthly income of sampled respondents revealed that 2% of respondents earn between 0 and ₦25,000, 34% of respondents earn between ₦26,000 and ₦50,000, 58% of respondents earn between ₦51,000 and ₦100,000, while the remaining 6% of respondents earn between ₦101,000 and ₦150,000 respectively. The findings on the community status of sampled respondents revealed that 6% of respondents are community chief priest, 74% of respondents were native of the land, while the remaining 20% of respondents have one community title or the other. The information on the number of years lived in sampled communities by respondents revealed that 10% have lived in their community between 21- 30 years; 20% of respondents have lived between 31 – 40 years; 30% of respondents have lived between 41 – 50 years; while the remaining majority (40%) of respondents have lived for at least 51 years and above.

Table 2: Socio-economic Characteristics of Sampled Respondents for the Study

Socio-economic Characteristics	Response	
	Frequency	Percentage (%)
<b>Sex</b>		
Male	46	59.0
Female	32	41.0
<b>Age (years)</b>		
41-50	8	10.3
51-60	35	44.9
61 and above	35	44.9
<b>Educational status</b>		
Primary	15	19.2

Secondary	53	67.9
Tertiary	10	12.8
<b>Marital Status</b>		
Married	43	55.1
Single	18	23.1
Divorced	10	12.8
Widowed	7	9.0
<b>Occupation</b>		
Civil Servant	35	44.9
Trading	12	15.4
Artisan	4	5.1
Student	6	7.7
Farmer	21	26.9
<b>Household Size</b>		
2	2	2.6
3	35	44.9
4	30	38.5
5 and above	11	14.1
<b>Average Monthly income (#)</b>		
0-25,000	8	10.3
26,000 – 50,000	38	48.7
51,000 – 100,000	22	28.2
101,000 – 150,000	10	12.8

#### Benefits Derivable from Forest Resources

The benefits derivable from the forest resources as indicated by sampled peri-urban communities are displayed on Table 3. It was revealed that (9.0%) of sampled respondents indicated the provision of food for domestic needs; (11.5%) of respondents indicated high ethno-

medicinal value; (65.4%) of respondents indicated source of income; while the remaining respondents of (14.1%) indicated source of firewood/timber. The benefits of the forest to the inhabitants of the peri-urban communities shows that it supports their well-being in so many ways from domestic to income sources especially among women.

Table 3: Benefits Derivable from Forests Resources

Benefits	Frequency	Percentage (%)
Provision of food for domestic needs	7	9.0
High ethno-medicinal value	9	11.5
Source of income	51	65.4
Source of firewood/timber	11	14.1

#### Drivers of land use change and Forest cover Degradation

The information for the perception of the drivers of land use change and forest cover degradation are displayed on Table 4. The distribution revealed that prevalent subsistence agriculture (65.4%) is a common practice among peri-urban communities which is one of the drivers of forest cover loss in the study area. It was also revealed that extensive farming (65.4%) which takes the form of expansion of farmlands was agreed as drivers of forest cover loss in the study area. The study also discovered that increasing land use practices like residential and commercial (61.5%) are also prevalent and are amongst the

major drivers of land use change and forest cover loss. Industrial activities are one of the drivers of land use change and forest loss as indicated by 32.0% of sampled respondents. However, 68.0% of sampled respondents indicated otherwise. This means that industrial activities as one of the drivers of land use change and forest cover degradation are not common practices among peri-urban communities. Besides road construction and other developmental activities are some of the drivers of land use change and forest cover loss as indicated by 57.7%. However, these practices are not common among peri-urban communities since the percentage of respondents were just slightly above average.

Table 4: Drivers of Land use Change and Forest Cover Loss in Peri-urban communities

S/N	Major Drivers	SA	A	D	SD	Remark
1	Subsistence farming/agriculture is prevalent	12 15.4%	39 50.0%	12 15.4%	15 19.2%	Agreed
2	Extensive farming is prevalent	16 20.5%	35 44.9%	19 24.4%	8 10.3%	Agreed
3	Increasing residential and commercial activities	10 12.8%	38 48.7%	17 21.8%	13 16.7%	Agreed
4	Industrial activities	3 3.8%	22 28.2%	44 56.4%	9 11.5%	Disagree
5	Road construction and other developmental facilities have been constant	17 21.8%	28 35.9%	18 23.1%	15 19.2%	Agreed

SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Agree

#### Effects of Activities Contributing to Forest Cover Degradation

The information for the effects of activities promoting forest cover loss is displayed on Table 5. The distribution revealed that reduction in plant species composition was indicated by 66.6% of sampled respondents; 83.4% of sampled respondents indicated reduction in wildlife; 70.5% of sampled respondents agreed to the reduction of ethno-medicinal plants overtime; 83.3% of sampled respondents have agreed to the fact that forest encroachment have impacted on vegetation cover in the area; while 65.4% agreed that the

introduction of non-native plant species are gradually replacing the native species.

The effect of forest cover loss and forest degradation is therefore evident in the study area. Thus forest cover loss and degradation will definitely impact on plant species diversity and composition especially when forested land use areas are being constantly encroached due to several anthropogenic activities. Thus, rate of biodiversity loss will therefore equal scale of deforestation and forest degradation in the sampled peri-urban communities in the study area.

Table 5: Effects of Activities Promoting Forest Cover Degradation

S/N	Effects	SA	A	D	SD	Remark
1	The reduction in number of plant species composition	15 19.2%	37 47.4%	11 14.1%	15 19.2%	Agreed
2	The reduction in wildlife diversity	24 30.8%	41 52.6%	9 11.5%	4 5.1%	Agreed
3	Reduction in ethno-medicinal value	13 16.7%	42 53.8%	14 17.9%	9 11.5%	Agreed
4	Higher degree of forest encroachment promoting forest loss	28 35.9%	37 47.4%	13 16.7%	0 0.0%	Agreed
5	Introduction of non-native species which is gradually replacing the	26 33.3%	25 32.1%	18 23.1%	9 11.5%	Agreed

native plant species

### Constraints to Sustainable Land use and Forest Cover Management in Peri-urban Communities

The constraints to sustainable land use and forest cover management are displayed on Table 6. The information for the constraints to sustainable land use and forest cover management in the study area is displayed on Table 6. The identified constraints are: poor planning (73.1%); neglect on the part of government (55.2%); cultural laws of the land (73.0%); over exploitation (79.5%); and

extensive agricultural practices (53.8%). Thus, these constraints are factors affecting the sustainable land use and forest cover management practices in the study area. However, the government and the people have significant roles to play in ensuring that forest are well preserved and embrace sustainable activities which consider forest management at all times so as to reduce forest degradation which is still on-going in the study area.

Table 6: Constraints to Sustainable Land use & Forest cover Management

S/N	Constraints	SA	A	D	SD	Remark
1	Poor planning	28 35.9%	29 37.2%	18 23.1%	3 3.8%	Agreed
2	Lack of awareness	20 25.6%	17 21.8%	28 35.9%	13 16.7%	Disagreed
3	Neglect on the part of the government	18 23.1%	25 32.1%	17 21.8%	18 23.1%	Agreed
4	Cultural laws of the land	31 39.7%	26 33.3%	13 16.7%	8 10.3%	Agreed
5	Over exploitation of forest resources	23 29.5%	39 50.0%	13 16.7%	3 3.8%	Agreed
6	Extensive agricultural practices	15 19.2%	27 34.6%	20 25.6%	16 20.5%	Agreed

### Relationship between Drivers of Land use change and Forest cover Degradation

The results in Table 7 showed that the correlation coefficient (r) was 0.311 which indicated a positive relationship. The significant

level was 0.02 and this indicated a lesser value when compared with the p-value (probability value) of 0.05 (95%). This means that there is a significant relationship between the drivers of land use change and forest cover loss in the study area.

Table 7: Correlation between Drivers of Land use Change & Forest cover Degradation

Drivers of Land use Change	Correlation Coefficient	Drivers of Land use Change	Forest cover Degradation
	1		0.311*
	Sig. (2-tailed)	.	0.02
	N	78	78

\* Correlation is significant at the 0.05 level (2-tailed).

**Variations in Drivers of Forest Degradation among sampled Peri-urban Communities**

The results in Table 8 revealed F ratio of 1.581 and a p-value of 0.092 which indicated that variation in drivers of forest cover degradation was not significant among sampled peri-urban communities. Thus, divers of forest/vegetation cover degradation/loss are the same in the study area. Therefore peri-urban communities in the

study area are characterized by similar activities leading to forest cover degradation/loss. These activities identified for the study were subsistence farming, extensive agriculture, residential/commercial and industrial activities amongst others. The peri-urban communities share common developmental and socio-economic activities driving forest cover degradation in the study area.

Table 8: Variations in Drivers of Forest Degradation

	Sum of Squares	Degree of freedom	Mean Square	F ratio	(p<0.05)
Between Groups	2.305	4	0.576	1.581	0.092
Within Groups	16.297	73	0.223		
Total	18.602	77			

**V. CONCLUSION AND RECOMMENDATION**

Forest resources are beneficial to the people and in most times serves as the source of income to the people. Forests have tremendous value through several ecosystem services they provide in the environment. However, it is one thing to understand the values of forests and how they can be properly harnessed sustainably. Thus, focus should be shifted from the immediate benefits derived from forests by peri-urban communities and concentrate more on its values and services to the environment. This will help checkmate those activities by community dwellers that are contributing to forest degradation. In the same vein, drivers of land use change and forest cover loss are linked with farming (both subsistence and extensive), commercial and residential activities and infrastructural development projects. These activities are geared towards community development but have in one way or the other contributed to loss in forest cover. These activities have led to reduction in plant species composition, wildlife diversity, reduced ethno-medicinal value of plants etc. Thus, these activities must be checkmated and ensure that forest conservation practices should be embraced at all times.

The constraints to sustainable land use and forest cover management have several implications for forest resource conservation and protection. As described earlier, focus should be shifted from the immediate benefits derived from forests by peri-urban communities and concentrate more on its values and services to the environment. Findings of

the study highlights anthropogenic activities as driving forest cover degradation among peri-urban communities. The forest cover in sampled peri-urban communities is observed to be gradually degrading which means that the benefits derived from these forests are reducing with increasing human activities. The effects identified were reduction in plant composition, wildlife diversity, ethno-medicinal value, higher forest encroachment impacting on forest cover thereby introducing more non-native species which are gradually replacing native ones. Based on these findings, there is a strong indication that increasing deforestation or loss in forest cover will mean increasing forest degradation which will result into degraded environment overtime if proper conservation efforts are not put in place. The socio-economic and medicinal values derived from these forests plants are crucial to residents in peri-urban communities. According to FAO (2005, 2015), forests play significant roles in supporting the socio-economic livelihood of the people especially in the rural communities; however, its measurements may vary from country to country depending on the level of development, social functions and traditions. Essien and Udoh (2015) reported huge loss of genetic base or gene bank, decrease in biodiversity, deforestation, siltation of streams and loss of wildlife as consequences of human occupational activities within forest reserves in Akwa Ibom state which means an automatic reduction in the socio-economic livelihood of the people. Furthermore, Ayanlade and Drake (2016) exposed the fact that in spite of the importance of the forest resources in the Niger



Delta region, forest continues to rapidly decrease due to demand from an ever increasing population.

The outcome of this study are in line with those of Akpan-Ebe (2014) who reported that a larger chunk of forest covers has been degraded due to human activities like farming, oil production, sand mining etc. Further expansion of such anthropogenic activities would mean more land shall be cleared which automatically will result in reduction in the benefits derived from the forest by the local people. It is evident that unregulated activities of humans in peri-urban areas around Yenagoa, Bayelsa Sate are bearing enormous pressure on natural resources in the area. Such activities contributes to forest depletion and degradation should be regulated to ensure the conservation of plant and animal diversity as well as sustainable use of natural resources in the study area. It is thus recommended that sustained sensitization of community be mounted; dwellers to shift focus from the immediate benefits derived from conversion of forested lands to agricultural or developmental purposes to future/sustainable benefits. Furthermore, poverty eradication programmes to promote sustainable development goals will help reduce exploitation of forest resources in peri-urban communities surrounding Yenagoa, Bayelsa state.

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