EXAMINATION OF STAND COMPOSITIONANDSTRUCTUREOF AMBOI FOREST RESERVEINTARABASTATE, NIGERIA.

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Abstract

The study examined the stand composition and structure of AmboiForest Reserve in Taraba State, Nigeria.Sixty eight (68) hectare plots were demarcated out in the forest. Each hectare plot was re-demarcated into four (4) equal sizes of 50m x 50m (2,500m^2) out of which one was randomly selected for the assessment. The enumeration covers all individual tree species from ≥ 5cm diameter. Data collected were the lists of the tree species, diameter at breastheight (dbh) and total heights.Halga altimeter and diametertape were used for the measurements of the trees total heights and diameter at breast heights (dbh). The result indicates that the forest was composed with 111 trees species belonging to32 taxonomic families. The family of Caesalpiniaceaehad the highestnumber of trees sampled, followed by Moraceae.*Cola digitata* in the family of Sterculiaceaewas the most abundant individual tree species in the forest, followed by *Myrianthusarboreus* in the family of Moraceae. The diameter class from 20cm – 29 cm and height class of 10m-19m had the highest number of trees. The structure of the forest showed that majority of the tree species were in Co-dominant, followed by the Intermediate.The distribution of the trees in diameter and total heights in the forest indicates there are no maximum volumes of produce required annually as a result of over-exploitation. Enrichment planting is recommended in order to sustain the forest.

Keyword: Amboi Forest Reserve, composition,structure, diameter, height.

Introduction

Forest and woodlands contribute significantly to the economic development and environmental security. Theysupport many people including farmers, herdsmen, rural dwellers and many others. They provide protection to watershed; constitute a majorsource of income, and employment. The poor depend on forests for their basic needs, such as food, fodders, fiber, fuel wood, timber and medicinal plants. They provide the global community with biological diversity, generic materials and carbon sequestration. Deforestation is the major threat and it occur in forest lands where rapid growing population is driven for their basic needs, it become wasteful when trees essential for watershed protection and biodiversity conservation are removed or cleared for agricultural production. These then led to the eroding away of the forest resource base and environmental

instability. Loss of forests and trees often also affect the poor directly by destroying a valuable asset on which theirlivelihood depends and indirectly, by destroying the biodiversity and ecosystems which are essential for the maintenance of life support systems.

According to Edmond (2005), Nigeria was once covered by wide – spread vegetation comprising of dense tropical forest in the south and Savanna grassland in the North. A great percentage of this luscious vegetation has been cleared by the pressure mounted by human activities. He further pointed out that the forest is being depleted at an annual rate of 3 – 5%. The total change in forest cover from 1900 –2000 stood at about 40 million hectares. Mandie (2003) reported that the Nigeria population is growing at the rate of 2.9% annually. As a result, the forest areas in the country are disappearing at the rate of 2.3% yearly. Amboi Forest Reserve is one of the important biodiversity hotspotsin Taraba State; is surrounded by many communities that themajorities are poor and rely on the forest. Coupled with the poor management of the forest, the forest natural resources are likely to be degraded (World Bank 1990). The reason for the examination of the forest composition and structure is to know the available variety in the reserve and distribution of the stands that form the forest structure.

Material and methods

The research was carried out in Amboi Forest reserve in Taraba State Nigeria. The area lies between latitude $07^010'N$ and longitude 10^043E (Ministry of land and survey 2009). The area is within the lowland rain forest zone of the state. The study area has an annual rainfall between 1,905 to 2,032mm (Resource inventory and management, 1992). Sample plots of 50m x 50m $(2,500m^2)$ size were lay out in the forest out of which 68 were randomly selected for enumeration.Data collected were species name, total heights and diameter taken at the breast height (dbh) of all woody plants in each plot. Experienced taxonomist and the Nigeria trees Volume 1 and 2 were used for the identification of trees and halga altimeter and diameter tape were used for total height and diametermeasurements respectively. The data were analyzed by grouping the tree species into their taxonomic families, numbers, frequencies, and percentages. They were also analyzed according to their diameter and height classes.
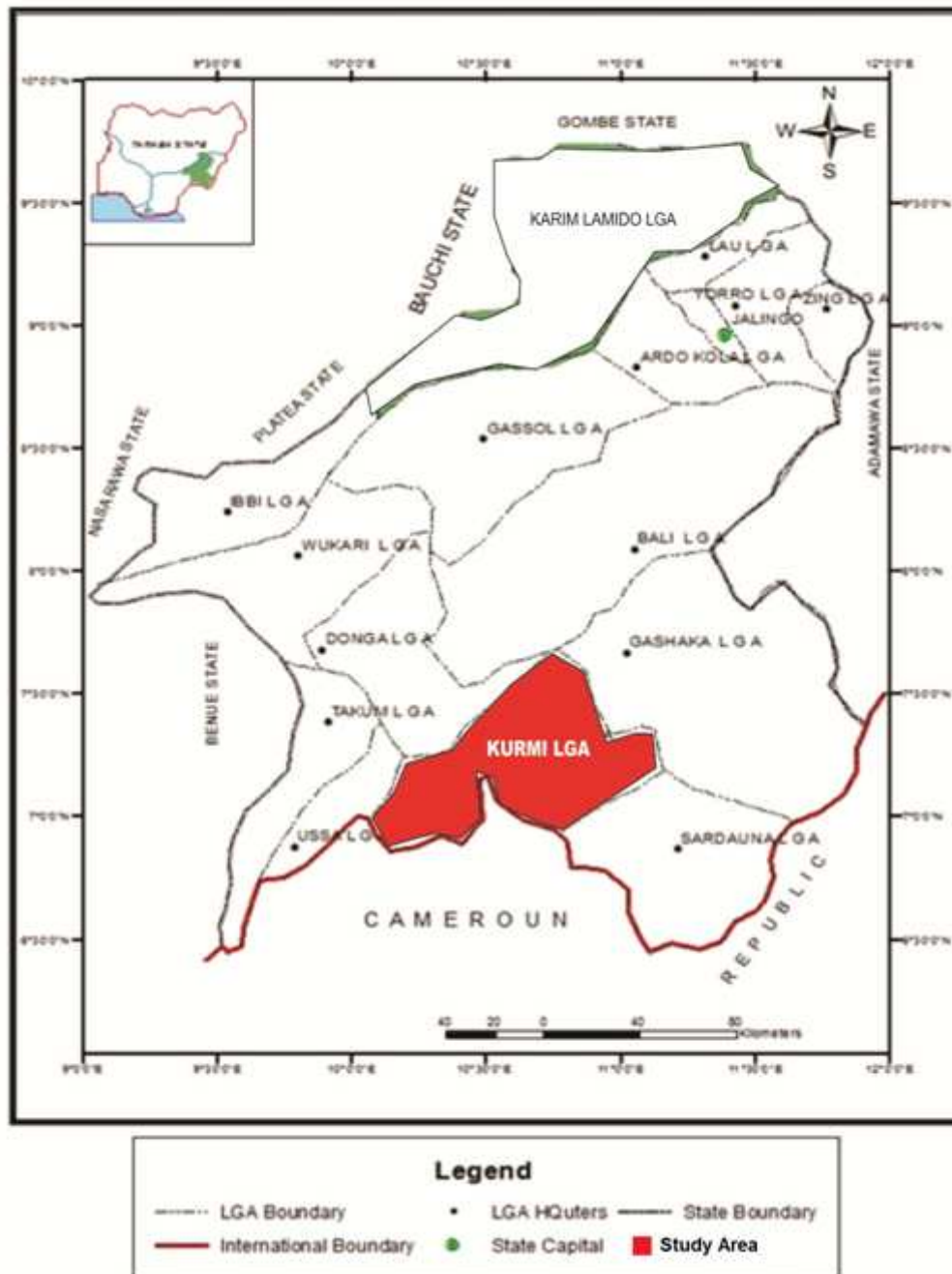
Fig. 1: Map of Taraba State showing Kurmi Local Government Area.
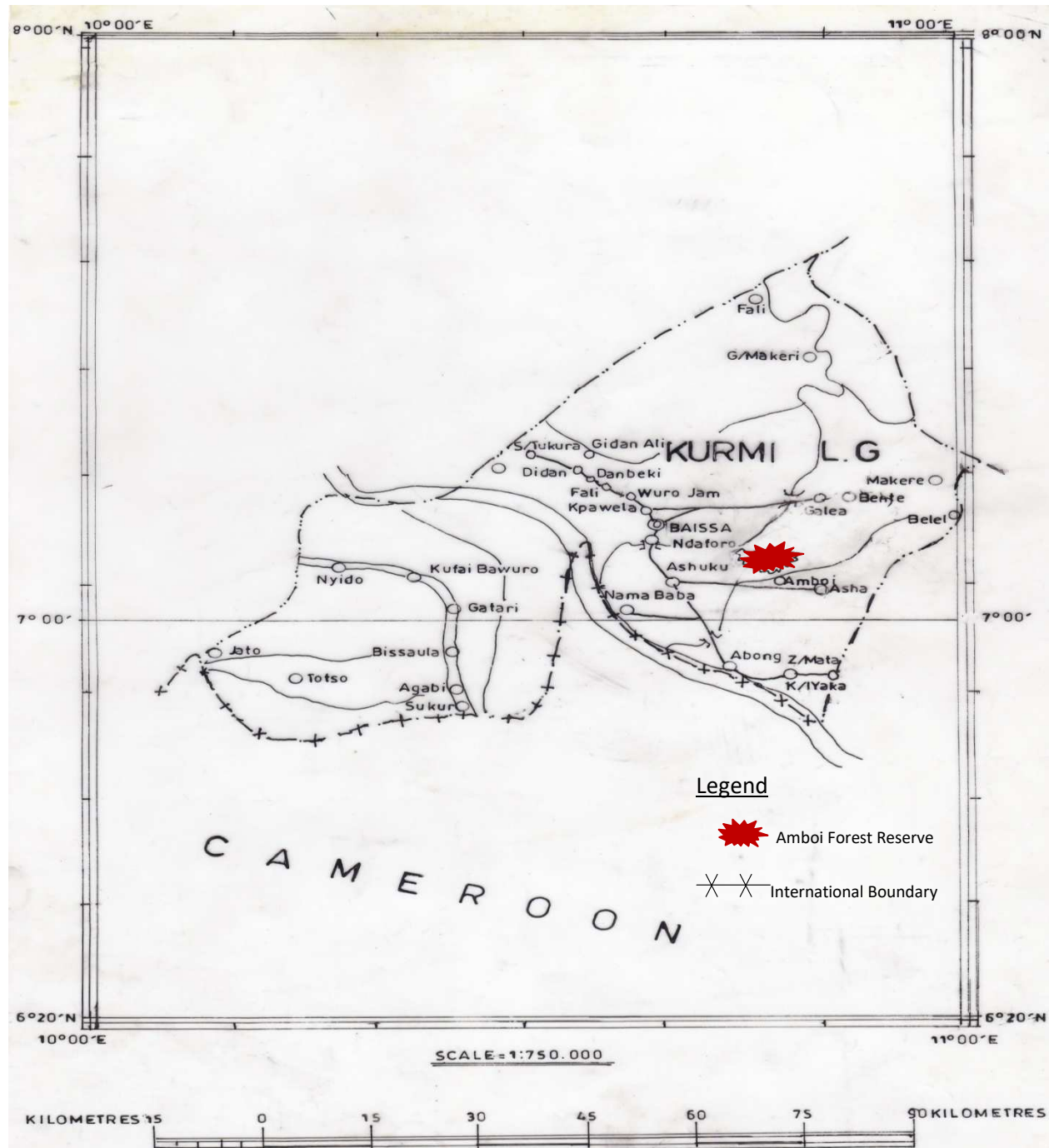
Source: Ministry of Land and Survey (2015)

Fig. 2: Map of Kurmi Local Government Area showing Amboi Forest Reserve.

Results and Discussion

A total of 111 tree species representing 32 taxonomic families were identified in the forest during the study (Table 1). The family of Caesalpiniaceae had the highest (12) number of trees represented in the forest with total frequenciesof (235) and 12.4% of the total tree species enumerated, followed by the family of Moraceae with 11, with a total frequencies of 160 and8.4%,while the least were the families of Simaroubaceae and Agavaceae represented by one tree each with one (0.1%) frequency.The purpose of this finding is to know whether the forest is rich in species diversity. The number of tree species encountered in the reserve was in agreement with chapman (2001) who reported that Amboi forest reserve highlights its botanical significance and that it was vital the area was conserved for its floristic composition and habitat for fauna.*Cola digitata* in the family of Sterculiaceae had the highest (75)3.9% of individual tree species distribution in the forest, followed by *Myrianthusarboreus* in the family of Moraceae with 60 (3.1%).The species composition in the forest cannot be compared with any previous record because no such study has ever been carry out in the forest. However, the forest is composed with enough tree species, except that human disturbances are high which is bringing the development of the forest backward. This is in agreement with O'Hara (1996) who opined that human disturbances to the forest can move the forest development forward or backward.

Table 2 shows diameter distribution of treespecies in the forest. A total of 529 (28.0%) of the trees were in diameter class of 10cm – 19cm, followed by diameter class of 30cm – 39cm with 492 (26.1%),while the least was in diameter class of ≥90cm with 3(0.1%). Table 3 shows the trees total height distribution in the study area.The result revealed that majority (768) 40.7% of the trees were in the height class of 10m – 19m, followed by 505 (26.8%) in 30m – 39m height, while the least was in ≥ 40m with 7 (0.3%) . This shows that the forest is not a normal forest that which is with ideal growing stock, ideal distribution of age - classes of component crop and putting in an ideal increment. The result further indicated that highernumbers of tree species diameter and total heights were recorded in the low classes. This is an indication that the forest treeswere dominated by young ones which may take a long period of time before they will reach maturity. The Co-dominant (29m-39m) in Table 4, had the highest (850) 45.1% number of trees, followed by Intermediate (11m-28m) with 768 (40.8%), the least was the Dominant (>40m) with 7 (0.4%) trees. The purpose of the findings is to determinewhether the forest structure is characterized as one on progression or not. This is in line with O'Hara (1996) who reported that forest structure is characterized as a progression through stage towards older forest.

Table 1: Summary of forest stands composition in Amboi Forest Reserve

S/n	Family	No. of species	Frequency	Percentage
1.	Caesalpiniaceae	12	235	12.4
2.	Moraceae	11	160	8.4
3.	Rubiaceae	9	84	4.4
4.	Euphorbiaceae	9	229	12.1
5.	Sterculiaceae	7	118	6.2
6.	Mimosaceae	7	116	6.1
7.	Apocynaceae	7	130	6.9
8.	Meliaceae	5	105	5.5
9.	Papilionaceae	4	28	1.4
10.	Combacaceae	4	124	6.5
11.	Ulmaceae	3	39	2.0
12.	Bombacaceae	3	40	2.1
13.	Annonaceae	3	30	1.5
14.	Palmae	2	43	2.2
15.	Irvingiaceae	2	46	2.4
16.	Balanitaceae	2	6	0.3
17.	Sapotaceae	2	16	0.8
18.	Longaniaceae	2	34	1.8
19.	Verbenaceae	2	60	3.1
20.	Burseraceae	2	13	0.6
21.	Ebenaceae	2	22	1.1
22.	Guttiferae	1	30	1.5
23.	Olacaceae	1	34	1.8
24.	Simaroubaceae	1	1	0.1
25.	Myristiceae	1	30	1.5
26.	Biognoniaceae	1	1	0.1
27.	Myrtaceae	1	20	1.0
28.	Dipterocarpaceae	1	26	1.3
29.	Agavaceae	1	1	0.1
30.	Ochinaceae	1	3	0.2
31.	Pandanceae	1	42	2.2
32.	Anacardiaceaeae	1	2	0.2
Total	111	1883	100	

Source: Field Survey (2015).

Table 2: Summary of Forest Stand Distribution in Diameter (cm)

Class	Total	Percentage (%)
<10	26	1.3
10 – 19	492	26.1
20 – 29	529	28.0
30 – 39	453	24.0
40 – 49	237	12.5
50 – 59	56	2.9
60 – 69	72	3.8
70 – 79	10	0.5
80 – 89	5	0.2
>90	3	0.1
Total	1883	100

Sources: Field Survey (2015)

Table 3: Summary of height distribution of tree species in Amboi Forest Reserve

Height class(m)	Total no. of trees	Percentage (%)
<10	258	13.3
10 – 19	768	40.7
20 – 29	345	18.3
30 – 39	505	27.0
>40	7	0.3
Total	1883	100

Source: Field survey, (2015)

Table 4: Amobi Forest Structure

Class	Height	No. of trees	Percentage
Dominant	>40m	7	0.4
Co-dominant	29-39	850	45.1
Intermediate	11-20m	768	40.8
Ground floor	<10m	258	13.7
Total		1883	100

Sources: Field survey (2015).

Conclusion and Recommendation

AmboiForest Reserve is composed of 111 tree species, however, there is no previous record to compare whether some tree species have gone extinct or have emerged in the forest. However, the result shows the forest is well composed with tree species. The high number of trees in diameter class of 20-29 cm and height class of 10m-19m shows high level of over-exploitation in the forest. It is therefore recommended that felling for whatsoever purpose should be suspended and the managers of the forest should embark on enrichment planting of the forest with fast growing exotic and indigenous tree species in order to sustain the forest.

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