Journal of Research in Forestry, Wildlife & Environment Vol. 12(3) September, 2020
E-mail: jrfwe2019@gmail.com; jfewr@yahoo.com
http://www.ajol.info/index.php/jrfwe

ISBN: 2141 – 1778
Akinyemi et al., 2020

ABUNDANCE, DENSITY AND NATURAL REGENERATION POTENTIAL OF TREES AT SHASHA FOREST RESERVE, OSUN STATE, SOUTHWESTERN, NIGERIA

Akinyemi, O. D., Akinyemi, G. O., Oloketuyi, A. J., Oyelowo, O. J. and Adeoye O. T.

Forestry Research Institute of Nigeria. PMB. 5054, Jericho, Ibadan, Oyo State, Nigeria
***Corresponding Author E- mail:** *akinoloketuyi@gmail.com*, +2347032569441

ABSTRACT

Three abundance, density and natural regeneration potential of Shasha Forest Reserve were studied to ascertain their individual status within the ecosystems. Cluster Sampling Technique was adopted for plot location in the temporary sampling areas. An area of 200 × 500 m referred to as clusters was partitioned into 200 m ×200 m tracts. The tracts were 100 m apart. Each tract was further divided into plots of 50 m × 50 m. Four of such tracts were selected for tree enumeration Sixty-six (66) tree species above >10cm dbh distributed among 28 Families were encountered. Five most abundant tree species of Strombosia postulata (38 stands), Musanga Cleistopoides (17 stands), Macaranga batteri (16 stands), Myrianthus arboreous (13 stands) and Trichilia monadepha (10 stands) were the most dominant tree species in Shasha Forest Reserve. Rare species with only one stand were 21 in number and accounted for 31.8% of the total composition of the reserve. Five species with highest density were Strombosia postulata (13.44%) followed by Musanga Cleistopoides 5.91%, Macaranga batteri 5.56%, Myrianthus arboreous 4.66% and Trichilia monadepha 3.41% in descending order. Thirty tree species were ~~having~~ had density less than 1 in the ecosystem. The most common families were Apostonaceae, Ebenaceae, Moraceae and Sterculiaceae having 6 species each and this was the most abundant followed by Euphobiaceae and Meliaceae which had 5 tree species each. Rare families within the Reserve comprised of 16 families with one stand each with 57.1% of the total tree families encountered within the Reserve. Out of 66 tree species encountered in the cluster sample, 28 species had the regeneration potential which ranged between 0.07 % and 0.01 % which is regarded as low regeneration potential. There is need to regenerate Shasha Forest Reserve through silvicultural techniques commonly referred to as enrichment planting by which desirable tree species are introduced into the ecosystem to complement the natural regeneration potential for sustainability

Keywords: Checklist, floristic composition, Tree diversity and Regeneration potentials.

INTRODUCTION

There is a general assumption that Forest Reserves in Nigeria and protected forests outside the reserve provide a lot of benefits both tangible and intangible products. Apart from timber products in the forest, plant foods such as leaves, seed nuts, fruits tubers and roots stand as source of income generation. It is also agreed, that species of economic importance such as medicinal and aesthetic values can be kept and utilized sustainably in a well preserved forest (Oduwaiye and Ajibode, 2005). Salami (2011) believed that Nigeria's ever increasing population is a major threat to the nation's forest resources. Threat to Forest Reserves arises due to the need to provide for the food and fibre requirement of the increasing population, also provision for housing which endangers conversion of many forest lands into housing estates. Another threat which is viewed as worrisome is meeting the firewood requirement of the urban poor and rural dwellers. Sustenance of these resources depends on conservation of other management techniques employed. The world forest resources and woodland declined from an estimated 6.2 million hectares to approximately 4.3 million hectares (Adekunle and Akinlemibola, 2008). Over 350,000 ha of forest and natural vegetation are being degraded annually in Nigeria due to desertification, soil erosion, declining soil fertility,

flooding and extinction of important plant species (Nest, 1991; Oduwaiye and Ajibode, 2005). Human kind has over-exploited the forest resources and overloaded the environment which resulted to significant changes such as reduction in vegetative cover, quality, species extinction and reduction in water level, which are collectively disturbed as environmental degradation. The knowledge of the floristic abundance, density and natural regeneration potential of the ecosystem will enhance future conservation and other land use planning efforts.it will further enhance the sustainable utilization of the resources therein (Ojo, 1998; Akinyemi *et al.*, 2002).

Past studies agreed that the preserved Forest Reserves are capable to regenerate themselves through effective regeneration programmes as reported on Onigambari and Ribako forest reserves, revealed that the natural forest reserves are capable to regenerate themselves if necessary silvicultural strategies are applied (Blanc, *et al*., 2000, Oduwaiye and Ajibode, 2005, Akinyemi *et al.*, 2002.) This study investigated abundance, density and na **86** regeneration potential of Shasha Forest Reserve ın Osun state and also shows the current status of the reserve and its possibility to regenerate itself after disturbances.

MATERIALS AND METHODS

Study Area

The study was carried out at Shasha Forest Reserve situated between latitudes 7^{o} and 7 ^{o} 30'N and longitudes 4^{o} and 5^{o} E. The Forest Reserve is located in Ife South Local Government Area in Osun State, Nigeria. The Reserve is on altitude 122 m above sea level with a mean annual rainfall of 1421mm and with double maxima rainfall coming in July and September respectively. The mean annual temperature is 26.5^{o}C. The terrain of the Reserve is generally undulating with occasional flat terrain. The geology of the reserve has been described as composing of undifferentiated crystalline rocks of basement complex origin. The vegetation is mainly of the high forest type.

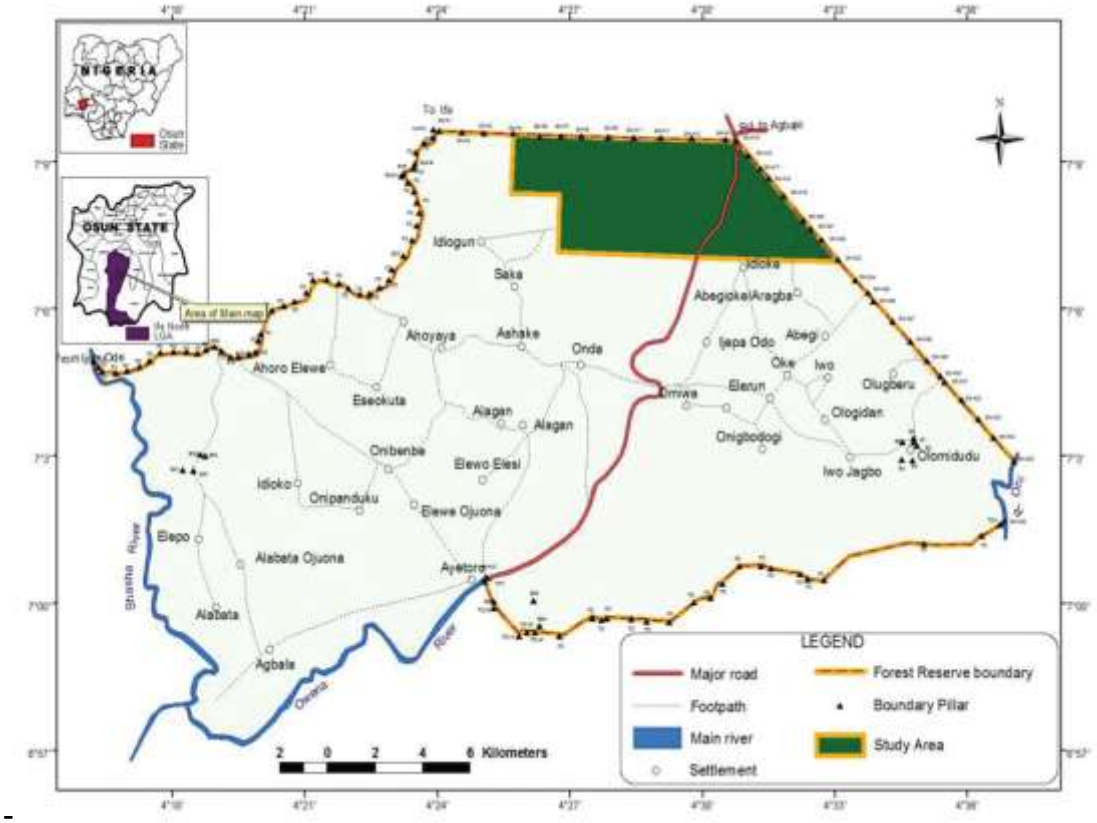

Figure1: Map of Shasha Forest Reserve.

Experimental Design

This study adopted Cluster Sampling Technique for plot location in the temporary sampling areas. An

area of 200 × 500 m, referred to as clusters was partitioned into 200 m ×200 m tracts. The tracts were 100 m apart. Each tract was further divided into plots of 50 m × 50 m. Four of such tracts were selected for tree enumeration (Akinyemi, 2017). Within each plot, diameter at breast height (dbh) at ≥10cm of all living trees was identified by their botanical name. Five subplots of 5 m × 5 m each were laid within each of the cluster plots and tree seedlings and samplings (≤10cm dbh) were identified and counted. The data collected were sorted into species, families and frequencies using descriptive statistics. The results were presented in form of tables.

Relative density

Relative density (%) of each species was computed following Brashears *et al.*, 2004 method

RD = ni/N × 100 ……. (1)

Where:

Where, RD = relative density, ni = number of individuals of species and N = total number of individuals in the entire population.

Natural Regeneration Potential

$$RP = \frac{Nw}{Dw} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

RP = Regeneration Potential, Nw = No of wilding of individual species, Dw = Density of the wc stem as used by Oduwaiye *et al*., 2002.

RESULTS

Detailed description of tree species composition, abundance, relative density and density rank at Shasha Forest Reserve are presented in Table 1. 68 species were distributed among 29 families, *Hildergardia barterii* had 48 stands with relative density value of 10.69%, and can be regarded as the most dominant species which rank first. Followed in descending order by *Sterculia rhinopetala which had* 29 stands with relative density value of 6.46 and ranked second, *Cola gigantean* with density value of 5.57 and ranked fourth, *Mansonia altissima* with 23 stands, relative density of 5.12, and ranked fifth and *Ricinodeudron heudelotii* with 22 stands with relative density value of 4.90 and also ranked sixth. They formed the most dominant tree species within the reserve. Also, the rare species with less than 1% in relative density value are about 56% of the total population and they have less 5 stands/ha within the reserve. It was as a result of unsustainable harvest (overexploitation) of tree species within the study site (Adekunle *et al.*, 2002, Akinyemi *et al.*, 2019).

Table 1: Checklist of tree species composition, density and density rank of Shasha Forest Reserve, Nigeria

S/No.	Name of Species	No. Species/ ha	Relative Density	Density Rank
1	*Anthonotha macrophylla*	3	1.08	29
2	*Alstonia boonii*	3	0.89	32
3	*Cussonia bancoensis*	1	0.36	53
4	*Lanea wehontschii*	1	0.36	53
5	*Cleistopholic Pateus*	4	1.43	20
6	*Hexalobus crispiflorus*	6	1.97	15
7	*Fumtumia elastic*	8	2.69	10
8	*Holarrhena florimbunda*	4	1.43	20
9	*Hunteria unbellata*	4	1.25	24
10	*Ranvoffia vomitoria*	1	0.18	65
11	*Voacanga Africana*	1	0.18	65
12	*Spathodea companulata*	4	1.25	24
13	*Cordia millenii*	3	0.90	31
14	*Hylodendron gabunense*	4	1.43	20
15	*Buchholzia coriacea*	3	1.08	29
16	*Terminalia seperba*	6	1.97	15
17	*Octolobus augustus*	1	0.22	55
18	*Sterculia rhinopetala*	29	6.46	2

S/No.	Name of Species	No. Species/ ha	Relative Density	Density Rank
19	*Sterculia tragacantha*	2	0.44	50
20	*Triplochiton scleroxylon*	18	4.01	8
21	*Celtis floribunda*	1	0.22	55
22	*Desplatsia dewveri*	5	1.11	26
23	*Celtis meldbraedii*	25	5.57	4
24	*Celtis zenkeri*	20	4.45	7
25	*Strombosia pustulata*	7	1.56	17
26	*Trichilia prieuriana*	1	0.22	55
27	*Pentadethra macrophylla*	1	0.22	55
28	*Samara eleptophylla*	4	0.89	32
29	*Antaria toxicaria*	2	0.44	50
30	*Bosquea angolense*	15	3.34	9
31	*Ficus mucuso*	2	0.44	50
32	*Ficus sp.*	2	0.45	41
33	*Musanga barteri*	1	0.22	55
34	*Myrianthus arborea*	2	0.45	41
35	*Treculia tragacantha*	1	0.22	55
36	*Pycnanthus angolense*	2	0.45	41
37	*Baphia nitida*	1	0.22	55
38	*Barteria fistulosa*	1	0.22	55
39	*Zanthoxylum zanthoxyloides*	2	0.45	41
40	*Allophylus africanus*	2	0.44	50
41	*Bliglua sapida*	4	0.89	32
42	*Malacantha alnuifolia*	2	0.45	41
43	*Cola gigantean*	28	6.23	3
44	*Cola nigerica*	7	1.56	17
45	*Hildergardia barterii*	48	10.69	1
46	*Mansonia altissima*	23	5.12	5
47	*Nesogordonia pappaverifera*	3	0.67	40
48	*Staudtia stipitata*	2	0.45	41
49	*Terminalia ivorensis*	1	0.22	55
50	*Diospyros canaliculata*	4	0.89	32
51	*Diospyros dendo*	11	2.45	11
52	*Diospyros mespiliformis*	3	0.69	39
53	*Drypetes floribunda*	10	2.23	13
54	*Drypetes gilgiana*	7	1.56	17
55	*Drypetes swelleri*	11	2.45	11
56	*Macaranga barteri*	5	1.11	26
57	*Maesopsis eminii*	2	0.45	41
58	*Magritaria dascoides*	4	0.89	32
59	*Ricinodeudron heudelotii*	22	4.90	6
60	*Afzelia bipondensis*	1	0.22	55
61	*Albizia zygia*	2	0.45	41
62	*Brachystegia emyloma*	9	2.00	14
63	*Brachystegia nigerica*	5	1.11	26
64	*Memecylon camdidum*	7	1.55	23
65	*Trichilia monadilpha*	4	0.89	32
66	*Ekebergia senegalense*	1	0.22	55
67	*Entandrophragma angolense*	4	0.89	32
68	*Trichilia megalantha*	2	0.45	41

Table 2 revealed families composition and their individual occurrence in the study site. Among these 29 families, 5 families found to be most dominant include *Apoxynaecae*, *Ebenaceae*, *Moraceae*, *Sterculiaceae* having 6 species each and closely followed by *Euphobiaceae* with 5 species. Rare families represented with 1 species constituted 52% of the total family composition. The family with the highest representative per hectare is *Urticaceae* while only 4 families were represented with 1 stand/ha.

Table 2: Family distribution of Shasha Forest Reserve, Nigeria

S/No.	Name of Family	No. of species	No. of stems/ ha
1	Alangiaceae	1	1
2	Anacardiaceae	1	1
3	Amonaceae	2	14
4	Apoxynaceae	6	18
5	Bignonaceae	1	4
6	Boraginaceae	1	3
7	Caesalpinioideae	2	7
8	Capparaceae	1	3
9	Combretaceae	1	6
10	Compositae	1	2
11	Ebenaceae	6	23
12	Euphorbiaceae	5	25
13	Flacourtiaceae	1	2
14	Melastomataceae	1	1
15	Meliaceae	5	2
16	Mimosoideae	1	1
17	Moraceae	6	6
18	Myristicaceae	1	7
19	Olacaceae	1	28
20	Papilionoidea	1	3
21	Passifloraceae	1	3
22	Rubiaceae	3	10
23	Rutaceae	1	2
24	Sapindaceae	2	2
25	Sapotaceae	4	12
26	Sterculiaceae	6	16
27	Ulmaceae	3	11
28	Urticaceae	2	30
29	Malvaceae	3	13
	Total		**272**

Table 3 revealed the natural regeneration potential and relative frequency of tree species in the study site. Generally, The Regeneration value ranges between 0.07 and 0.003. The tree species with highest regeneration potential includes *Strombosia pustulata* having 0.07 and 20 wildlings/ha. Followed by *Mansonia altissima* with 0.05 and 16 wildlings/ha, *Cola gigantea* with 0.01 and 9wildlings /ha, *Anthonota macrophylla* with 0.02 and 6 wildlings/ha, *Macaranga barteri* with 0.014 and 4 wildlings/ha and *Baphia nitida* with 0.01 and 3 wildlings/ha.

Table 3: Regeneration potential and Relative Frequency of wildlings in the Shasha Forest Reserve

S/No.	Species	Family	No. of wildlings	Relative Frequency (%)	Regeneration potential
1	*Anthonolta macrophylla*	Leguminosae	6	5.94	0.02
2	*Baphia nitida*	Papiloniaceae	3	2.97	0.01
3	*Blighia unijugata*	Sapindaceae	1	0.99	0.003
4	*Buchholzia coviacaea*	Moringaceae	3	2.97	0.01
5	*Celtis zenkeri*	Ulmaceae	2	1.98	0.003
6	*Cola gigantean*	Sterculiaceae	9	8.91	0.01
7	*Cordia millenii*	Compositae	3	2.97	0.003
8	*Diospyros camaliculata*	Ebenaceae	1	0.99	0.003
9	*Diospyros mespiliformis*	Ebenaceae	3	2.97	0.01
10	*Diospyros suaverteus*	Ebenaceae	1	0.99	0.003
11	*Drypetes gilgiana*	Euphorbiaceae	1	0.99	0.003
12	*Entandrophragma angolense*	Meliaceae	2	1.98	0.007
13	*Holarrheua floribunda*	Apocynaceae	9	8.9	0.031
14	*Hunteria unbellata*	Apocynaceae	2	1.98	0.007
15	*Lanea welwitschii*	Anacardiaceae	1	0.99	0.003
16	*Macaranga barteri*	Euphorbiaceae	4	5.55	0.014
17	*Maesopsis lininii*	Rhamaceae	1	0.99	0.003
18	*Mansonia altissima*	Sterculiaceae	16	15.84	0.054
19	*Monodora myristia*	Annonaceae	1	0.99	0.003
20	*Myrianthus arborea*	Moraceae	3	4.16	0.01
21	*Piptademastrum africanum*	Leguminosae	1	0.99	0.003
22	*Pycnanthus angolense*	Myristicaceae	1	0.99	0.003
23	*Rinorea sp*	Violaceae	1	0.99	0.003
24	*Strombosia pustulata*	Olacaceae	20	19.8	0.07
25	*Tabemaemontana pachysiphon*	Apocynaceae	2	1.98	0.01
26	*Trema orientalis*	Olmaceae	1	0.99	0.003
27	*Voacanga Africana*	Apocynaceae	1	0.99	0.003

DISCUSSION

Generally, it was observed that the tree species within the Reserve recorded low regeneration potentials. Strombosia *pustulata, Mansonia altissima, Cola gigantia, Anthonota macrophylla and Macaranga barteri* would become dominant species in the study site base on their regeneration potential. The likely rare species in the future are the ones with only 1wildlings /ha which may likely go into extinction if the reserve is not properly managed. The reserve is having low regeneration potential due to uncontrolled anthropogenic activities which fails to take into consideration the sustainability of the reserve (Oduwaiye and Ajibode 2005, Akinyemi, 2002, 2017, and 2019). It was observed that none of the trees species was fruiting during the study period which can also result to low regeneration potential of the individual tree species in the ecosystem. Species classified as economic importance by Adekunle *et al.* (2002) such as *Khaya grandifiola, Triplochiton scleroxylon, Albizia ferruginea, Pterocarpus osun, Pycnanthus angolense, Amphimas pterocarpoides, Celtis zenkerii, Cola gigantean, Alstonia boonii, Diospyros sp., Fagara sp. and Ricinodeudron hendaloti were* no longer common in the reserve and those with representatives are very low in frequency and regeneration potential.

CONCLUSION

The result obtained showed that most of the tree species observed were not regenerating themselves, there were cases when mother trees of the wildlings observed were absent from the plot. This situation constitutes a great hindrance to conservation of the tree species in Shasha Forest Reserve. To obtain good result on sustainability of the reserve, it's necessary to understand the phenology of the forest

trees as well as study seed and fruit qualities produced under adequate physiological conditions to germinate and grow into wildlings for regeneration purpose. Without that, it will be necessary to apply sivilcultural techniques for regenerating the reserve through artificial or natural means and this commonly refer to as enrichment planting which gives opportunity to introduce the desirable tree species with minimal disturbance to the ecosystems. Due to other benefits derived from natural forest, Such as fruits, leaves, bark for medicinal purposes, watershed and soil protection. Other means of regenerating the forest with desirable tree species of economic values should be adopted, and so, application of enrichment planting with silviculture methods appropriate for now.

REFERENCE

Adekunle, V.A.J (2002). Inventory Techniques and Models for Yield and tree species. Assessment in Ala and Omo Forest Reserves, Ph.D Thesis, Federal University of Technology, Akure, 170p.

Adekunle, V. A. J. and Akinlemibola O. (2008). Effect of deforestation on climate change and global warming in Nigeria. *Proceedings of the 32nd Annual Conference of the Forestry Association of Nigeria held at Umuahia, Abia –State, Nigeria* 170-182 pp.

Akinyemi, O. D. Ugbogu, O. A., Adedokun, D., Sefiu, H., Odewo, T.K., Odofin, B.T and Ibidapo, V. (2002). A floristic study of Onigambari lowland rainforest reserve. *Proceedings of the 28th Annual Conference of the Forestry Association of Nigeria* held in Akure, Ondo State 4th - 8th Nov, 2002 346-357pp.

Akinyemi, O. D. (2017). Population and structure of trees in selected lowland rainforest reserves in South Western, Nigeria. Unpublished a Ph.D Thesis, Departmentof Forest Resources management, University of Ibadan. 144p.

Akinyemi, O.D., Oyelowo, O.J. and Oloketuyi, A.J. 2019. Population, Diversity and Structure of Trees in Omo Biosphere Reserves Ogun State, Southwestern Nigeria. *Australian Journal of Science and Technology***,** 3(4)154 - 160. ISSN 2208 - 6404.

Blanc, L., Maury – Lechon and Pascal, J. P. (2000). Structure, floristic composition and natural regeneration in the forests of CatTien National Park, Vietnam an analysis of the successional trend. *Journal of Biogeography* 27: 141-157.

Brashears, M. B., Faniyan, M. A. and Schuler, T. M. (2004). An assessment of canopy stratification and tree species diversity following clear cutting in Central Appalachian hardwoods. *Forest Science* 50:54-64.

NEST (1991). Nigerian Threatened Environment. Nigeria Environmental Action / Study Team,Ibadan, Nigeria.

Oduwaiye, E. A and Ajibode, M. O. (2005). Composition of tree species and regeneration otentialof Onigambari Forest Reserve. *Journal of Raw Material Research*, 2 (1): 1-13

Oduwaiye, E. A., Oyeleye, B. and Oguntala, A. B. (2002). Species diversity and potentiality forforest regeneration in Okomu permanent sample plot. *Forestry Association of Nigeria Proceedings, 28th Annual Conference* held in Akure, Ondo State 4th -8th Nov, 2002. 4th - 8th Nov, 2002. 264-271.

Ojo, L. O. (1998). A Floristic Study of a disturbed forest at the University of Agriculture, Abeokuta, *Nigeria Journal of Forestry* 14 (1) 48 – 66.

Salami, A. T. (2011). A forest: Nature at your service. *A paper presented at the 4th Annual Conference on the Environment.* Organized by the Institute of Ecology and Environmental studies,

Obafemi Awolowo University, Ile- Ife and the National Park service, Abuja in commemoration of the (2011). World Enivronmental Day Held 28 - 30th June, 2011. 23- 37p.