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Tree species of Lekki Conservation Center, Lagos State, Nigeria

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Abstract

Industrialization and commercialization has resulted in deforestation and reduction of important tree species which are of ecological and economic importance. Based on the aforementioned, this study was carried out to give inventory of the tree flora of Lekki Conservation Centre, Lagos State. The study adopted a survey method using random sampling and concept mapping. Several visits were made to the site and sampling stations mapped out during the study. Tree species encountered were counted and marked for determination of the phyto-sociological characteristics, ethnobotanical information, socioeconomic and cultural uses of tree species encountered were documented. Determination of diameter at breast height (DBH) and percentage occurrence of species were carried out. A total of fifty seven (57) trees were encountered belonging species of twenty six (26) species and eighteen (18) families were encountered. The result showed that *Chrysobalanus icaco* L. was the most occurring species having a total of nine (9) individual trees with a mean diameter at breast height of 8.2m. This was followed by *Elaeis guineensis* Jacq with five (5) individual trees and mean DBH of 17.0m. *Xylopia aethiopica* Dunal and *Vitex doniana* L. occurred four (4) times each with mean DBH of 6.4m and 14.3m. The results of the study showed that tree species within the Lekki Conservation Center are of economic potentials while the conservation center also serves as means of tourist attraction. It is therefore important to encourage the conservation of tree species for sustainability.

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Introduction

Nigerian has the most endowed and biodiversity rich vegetation in Africa, having all types of vegetation evenly distributed across different regions and geopolitical zones in Nigeria (Ogunyebi *et al.,* 2018). The abundance and diversification of these endowment and rich biodiversity of Nigeria is highly due to the climatic condition which varies across different parts of the country making it a host to approximately 7895 plant species, thus ranking Nigeria as one of the richest African country in terms of biodiversity. There is also an estimated record of approximately 560 tree species in Nigeria (Ihenyen *et al.,* 2009) which is also an indication of its rich natural resource necessary for diverse purposes including timber for furniture, building, construction of various kind and paper production. The rapid growth of urban centers in the developing countries as a result of rural-urban migration is alarming. There has been increase in population since 1950 till date and still counting, and this increased populace requires infrastructure and urban development (Fuwape and Onyekwelu, 2011). Activities stemmed from increased population such as logging, urban and infrastructural development results in drastic reduction of natural ecosystem including tree species (Pelemo *et al.,* 2011). Conservation which involves the preservation and management of available resources has not been able to serve its course in the Nigerian scenario as there are rapid anthropogenic activities causing decline in the flora biodiversity due to clearing for the purpose of agricultural and industrial activities (Kabiru, 2008). Despite the importance of growth and yield models in the determination of appropriate forest management strategies, relatively few studies have been undertaken. This may be attributed to the existence of multi-species forests with different ages and a wide range of growth habits and stem sizes that pose special challenges to growth modelers (Aghimien *et al.,* 2016). A measure of the conservation potential of an environment is important in the determination of the abundance and growth rate of tree species. Tree height and diameter at breast height are the two most important factors in surveys, production and management of forest resources and research on forest ecosystems (Liu *et al.,* 2017). They are usually used to calculate the volume, site index, forest growth and yield and to estimate forest volume, biomass and carbon stock. Indeed, the tree species growing in within the Lekki Conservation Center, situated in the most commercial and urbanized city of Nigeria and accommodates a reasonable population of the country are however not spared from the aforementioned threats. The aim of this research was to give an inventory of the tree species of Lekki Conservation Center, Lagos State, Nigeria. Specifically, the objectives are therefore to: i) document the species of trees within the Lekki Conservation Centre; ii) determine the growth indices using tree diameter; and iii) document the social and economic uses of tree species within the Conservation Center.

Materials and methods

Study area

The study was carried out in Lekki Conservation Center, Lagos State, Nigeria. Lekki Conservation Center was established in 1990 by the Nigerian Conservation Foundation (NCF). It is located in the coastal environs covering an approximate land area of 78 hectares, extending from kilometer 19 along the Lagos-Epe Expressway and ends up a very close distance to the Atlantic Ocean near Okun Ibeju Village, Eti-Osa Local Government Area in the Eastern district of Lagos State. LCC can be accessed through the Lagos-Epe Expressway.

Sampling techniques

Random visits and counting was employed to determine the phyto-sociological characteristics of the tree flora within the Lekki Conservation Center, Lagos State. Trees encountered on each visit were marked as sampled and information recorded of the plant, including measurement of diameter at breast height. Stratified sampling technique was used to determine the point of measurement. And measurement was obtained using measuring tape.

Tree species identification and classification

The botanical name of all trees encountered in each

sample point was recorded for each of the study area. Trees were identified using textbooks and herbarium in the Department of Botany, Delta State University, Abraka, Nigeria. Further classification was done using the approach of Lawal andAdekunle (2013). The woody vegetation was classified into species and distributed into families.

Determination of diameter at breast height

The diameter at breast height (DBH) was obtained by measuring about 4 – ½ feet of the tree above ground level, a measuring tape was wrapped around the trunk and the value obtained recorded and divided by 3.14 to obtain the DBH of individual tree.

Collection of ethnobotanical data

Ethnobotanical information such as local names of the trees encountered, social, economic and cultural uses of the plants. This information were obtained from the locals and indigenes doling in the community. The information of the trees and their uses were documented on an exercise note book.

$$\frac{\text{No. of Individual Species}}{\text{No. of Total Species}} \times \frac{100}{1}$$

Statistical analysis

The results obtained where subjected to analysis for the determination of diameter at breast height (DBH) simple percentage was used to calculate the percentage occurrence of species. Percentage Occurrence =

Results and discussion

From the results (Table 1.), a total of fifty seven (57) trees were encountered belonging species of twenty six (26) species and eighteen (18) families were encountered.

Table 1. Summary of the result of diversity and growth indices.

S/N	Indices	Values
1	No. of Individual Trees	57
2	No. of Species	26
3	No. of Family	18
4	Minimum DBH (m)	7.0
5	Maximum DBH (m)	24.6

The frequency of occurrence and diameter at breast height of trees encountered during the study are presented in Table 2. The result showed that *Chrysobalanus icaco* L. was the most occurring species having a total of nine (9) individual trees with a mean diameter at breast height of 8.2m. This was followed by *Elaeis guineensis* Jacq with five (5) individual trees and mean DBH of 17.0m. *Xylopia aethiopica* Dunal and *Vitex doniana* L. occurred four (4) times each with mean DBH of 6.4m and 14.3m.

The results obtained from the diameter at breast height showed higher values from the trees sampled with values as high as 24.6 m for *Casuarinas equisetifolia* L. and 20.4m for *Anacardium occidentalis* L a commonly consumed fruit. This is an indication that the conservation center is a historic place where urbanization has not resulted in exploitation and deforestation. It has been stated that logging, mining, population growth and agricultural expansion are the main driver of deforestation (Olakunle *et al.,* 2011). The conservative nature of the Lekki Conservation Center is a means of environmental conservation and economic development, being an ecotourism center, taking into consideration the need to safeguard the environment and making it beneficial (Slinger-Friedman, 2009). Availability of trees with diameter at breast height as reported is important is determining the growth model and dynamics of forest stands (Aghimien *et al.,* 2016). Although, the frequency of trees encountered in the study were low, the results of diameter at breast height showed that the trees have been in existence for a long period, this is an indication of the biodiversity conservative nature of the center (Ogunyebi *et al.,* 2018).

Table 2. Mean Diameter at Breast Height of trees.

S/N	Scientific Name	Frequency	Mean DBH
1	*Hura crepitans* L.	1	23.3
2	*Terminalia catappa* L	1	18.7
3	*Polyalthia longifolia* Sonn	2	14.9
4	*Elaeis guineensis* Jacq	5	17.0
5	*Mangifera indica* L	2	16.1
6	*Cocos nucifera* L	3	9.7
7	*Casuarinas equisetifolia* L.	1	24.6
8	*Anacardium occidentalis* L	2	20.4
9	*Xylopia aethiopica* Dunal	4	6.4
10	*Syagrus romanzoffiana* Cham	1	14.0
11	*Anthocleista vogelli* Planch	3	14.9
12	*Chrysobalanus icaco* L.	9	8.2
13	*Napolleonaea vogelli* Hook & Planch	3	7.3
14	*Alstonia boonei* De Wild	1	16.1
15	*Triplesium* madagascariensis	2	10.6
16	*Cleistophilos patens* Benth	2	9.4
17	*Cola pachycarpa* K. Schum	1	17.0
18	*Zanthoxylum zanthoxyliodes* Lam	1	8.5
19	*Spondias mombin* L.	1	7.0
20	*Symphonia globulifera* L.f	2	7.6
21	*Vitex doniana* L.	4	14.3
22	*Suzygium* guineense R.Br.	2	15.5
23	*Parkia biglobosa* Jacq	1	13.4
24	*Raphia hookeri* P.Beauv	1	8.8
25	*Pterocarpus santalinoides* DC.	1	16.1
26	*Khaya senegalensis* A. Juss	1	7.0

This examines the efficacy of natural reserves and conservation centers as biodiversity conservation. The results obtained from the classification of the plants based on scientific names and families as well as their economic uses are presented in Table 3 and Table 4. From the result in Table 3, a total of twenty six (26) plants belonging to eighteen (18) families were encountered. From the families documented, the family Arecaceae was the most dominant with four (4) representative members; this was followed by the family Anacardiaceae and Annonaceae with three (3) representatives each while Fabaceae family had two representative.

Table 3. Scientific classification of tree flora in the study area.

S/N	Scientific name	Family	Common name
1	*Hura crepitans* L.	Euphorbiaceae	Sandbox tree
2	*Terminalia catappa* L	Combretaceae	Indian almond
3	*Polyalthia longifolia* Sonn	Annonaceae	False ashoka
4	*Elaeis guineensis* Jacq	Arecaceae	Palm oil tree
5	*Mangifera indica* L	Anacardiaceae	Mango
6	*Cocos nucifera* L	Arecaceae	Coconut
7	*Casuarinas equisetifolia* L.	Casuarinaceae	Australian Pine Tree
8	*Anacardium occidentalis* L	Anacardiaceae	Cashew
9	*Xylopia aethiopica* Dunal	Annonaceae	Negro pepper
10	*Syagrus romanzoffiana* Cham	Aracaceae	Queen palm
11	*Anthocleista vogelli* Planch	Loganiaceae	Cabbage tree
12	*Chrysobalanus icaco* L.	Chrysobalanaceae	Cocoplum
13	*Napolleonaea vogelli* Hook & Planch	Lecythidaceae	Wallia
14	*Alstonia boonei* De Wild	Apocynaceae	Stool wood
15	*Triplesium* madagascariensis	Moraceae	Madagascar ragwort
16	*Cleistophilos patens* Benth	Annonaceae	English salt & oil tree
17	*Cola pachycarpa* K. Schum	Sterculiaceae	Monkey cola
18	*Zanthoxylum zanthoxyliodes* Lam	Rutaceae	Artar root
19	*Spondias mombin* L.	Anacardiaceae	Hug plum
20	*Symphonia globulifera* L.f	Clusiaceae	Hig gum
21	*Vitex doniana* L.	Lamiaceae	Chaste tree
22	*Suzygium* guineense R.Br.	Myrtaceae	Brush cherries
23	*Parkia biglobosa* Jacq	Fabaceae	African locust bean
24	*Raphia hookeri* P.Beauv	Aracaceae	Raffia palm
25	*Pterocarpus santalinoides* DC.	Fabaceae	Mututi
26	*Khaya senegalensis* A. Juss	Meliaceae	African mahogany

Other families recorded single member respectively. The implication of this results is important for ecologist to document rare and common tree species alike which could be the basis for the management of habitat as well as provide cultural resource values for trees, the qualitative characters related with density, dominance and diversity of these trees could well act as indicators of changes and susceptibility to anthropogenic stressors among various vegetation categories and their formations, which could be further interpreted as distinct flora habitats.

Table 4. Local names and economic uses of tree species encountered.

S/N	Scientific name	Local name	Economic importance
1	*Hura crepitans* L.	-	it is used for timber products
2	*Terminalia catappa* L	Ofio	The fruits and seeds are edible. It is used as ornamental plant and as wind breaker. Treatment of hypertension and other related ailments
3	*Polyalthia longifolia* Sonn	-	The plant is used as an ornamental plant
4	*Elaeis guineensis* Jacq	Ope	It is the major source for palm oil and palm kernel oil. The who part of the plant are useful for broom, thatch, palm wine
5	*Mangifera indica* L	Mangoro	The fruits are edible and the leaves form part of the traditional agbo medicine
6	*Cocos nucifera* L	Igi Agbon	The seeds are edible and the fronds are used for beautification and broom. The seed contains water which is highly nutritious. Used for treatment of some health ailments including dysentery.
7	*Casuarinas equisetifolia* L.	-	It is used for timber products
8	*Anacardium occidentalis* L	Kaju	The fruits are edible and the seeds are source of nuts. Used in folk medicine and the traditional Nigerian agbo
9	*Xylopia aethiopica* Dunal	Eruu	The fruit used as spices and flavoring agent. The tree is used as timber product
10	*Syagrus romanzoffiana* Cham	Ayapa Ope	It is used for beautification as an ornamental plant
11	*Anthocleista vogelli* Planch	Sapo, Apa Oro	It is used for timber and wood work
12	*Chrysobalanus icaco* L.	Abajeru	It is used as spices and food seasoning
13	*Napolleonaea vogelli* Hook & Planch	-	The tree serves as source of timber product
14	*Alstonia boonei* De Wild	Ahun	It is used for timber products
15	*Triplesium* madagascariensis	-	It is used for timber products
16	*Cleistophilos patens* Benth	-	The plant is a source of some oil and produce edible substances
17	*Cola pachycarpa* K. Schum	Obi-Edun	The seeds are edible and the plant is used for timber product
18	*Zanthoxylum zanthoxyliodes* Lam	Orin ata	It is used for timber product
19	*Spondias mombin* L.	Akika / okika	The seeds are edible, the leaves are medicinal in the treatment of rheumatism
20	*Symphonia globulifera* L.f	Agbengbedi	It is used as local chewing stick
21	*Vitex doniana* L.	Oori – nla	It produce edible seeds and the plant is used for timber product
22	*Suzygium* guineense R.Br.	Adere tabi, Igi-aro	It is used for timber products
23	*Parkia biglobosa* Jacq	Igi igba / Abata	It produces edible seeds and the tree is also used for furniture making
24	*Raphia hookeri* P.Beauv	Igi ogoro	It is used for the production of palm wine and the leaves are used in broom and thatch. The plant is ornamental
25	*Pterocarpus santalinoides* DC.	Gbengbe	It is medicinal
26	*Khaya senegalensis* A. Juss	Oganwo	The tree is used for timber product and furniture making

Tree structure and diversity could play an important role in climate regulation as both could influence forest biomass production and hence determine the forest' capacity for carbon storage. Findings in this study could help rationalize the need for an ecologically sound fallow period; this will ensure renewal of at least some tree species and some fauna habitat element (Kumar *et al.,* 2006).Economically, the tree species reported has great potentials for both medicinal and food values as well as ornamental and timber product uses. The use of plant such as *Anacardium occidentalis* as a part of traditional drug for the treatment of fever has been reported by Monier and El-Ghani (2016) as well as the use of *Mangifera indica* in the treatment of ailment such as malaria, worm infections, high blood pressure and skin infections among others.Also, the use of plant such as *Spondias mombin* as edible fruit and in the treatment and management of some health ailment has previously been reported by Erhenhi (2016), who state that the leaves and bark of the plant are used in preparation of drugs for the treatment of rheumatism.

Similarly, Idu *et al.* (2010) has also reported the use of plant such as *Alstonia boonei, Terminalia catappa* and *Cocos nucifera* for the treatment of different ailments as reported in this study.

Conclusion

The results of the study showed that tree species within the Lekki Conservation Center are of economic potentials while the conservation center also serves as means of tourist attraction and conservation. It is therefore, expected that measures to sustain the continuity of the conservation site be ensured to protect plants from exploitation as this site apart from its ecotourism service, it is a biodiversity hotspot which could be harnessed for economic purposes.

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