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SURVEY AND MANAGEMENT OF AVENUE TREES IN THE PREMISES OF UNIVERSITY OF BENIN CAMPUSES, BENIN, NIGERIA

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ABSTRACT

Urban trees possess a range of social and cultural values, relating to aesthetics, safety, business and history. Trees planted in institutions present great potential for urban tree management; but management strategies for trees may differ due to their structure. These trees are often neglected, without adequate management plans thus limiting the potential of the trees, making these trees to become environmental threats. This study assessed the survey and management of avenue trees in the university of Benin (UNIBEN) campuses. Trees in the study areas were enumerated using walking survey. Data on availability of administrative provisions for management of the avenue trees within the university campuses were collected by administering questionnaires to the officials of tree units on both campuses and the data obtained were analyzed using descriptive statistics. A total number of 1,591 avenue trees were identified along the 20 major roads in UNIBEN Ugbowo campus with 61 different species. Tectona grandis was most abundant in terms of frequency (223) and relative frequency (14.02%). For Ekehuan campus a total of 52 avenue trees were identified along the 8 major roads with 15 different species, with Mangifera indica the most +abundant in terms frequency (10) and relative frequency (19.23%). The study revealed that management activities on both campuses especially that of Ekehuan campus was poor and recommended that there be an update and development of management plan and unit (for Ekehuan campus) if species existence is to be sustained.

Keywords: *Avenue trees, Urban forest structure, Avenue tree Management*

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INTRODUCTION

Trees are an essential part of urban life and have been so throughout the history of human settlements and if successfully planned for properly incorporated, and nurtured, trees have the potential for a long presence at a site and can add a perpendicular arrangement that most other types of green elements lack. (Johnston 2017). One of the principal component of the urban forest are avenue trees and these trees, can also be referred to as trees growing or deliberately planted along public road right-of-way and managed by the concerned authority which accounts for a relatively small fraction of the entire urban forest, but are obvious because of their visual and physical impacts on the quality of urban life (McPherson et al., 2005). Trees on streets and within parks are now recognized as more than just pleasant features, as they represent the backbone of urban forest ecosystems (Oyerinde et al., 2018). The benefits and uses range from intangible psychological, environmental to aesthetic benefits. Despite the various benefits offered by avenue trees, little or no effort has been made to take full advantage of them as this will require the establishment of institutional frameworks and provision of information on all vegetation and other attributes

of the system across the urban landscape (Ajewole and Popoola, 2007).

According to Jim and Liu (2001), avenue tree populations have their own unique structure, and historical data on the development of urban forests can be used with information on current forest structure to better understand key forces of change, current management needs, and future trends in forest health and productivity. Management of avenue trees involves decisions that influences the decision-making related to urban trees governance procedures that help stakeholders govern this collectively owned natural resource (Lemos, and Agrawal 2006). These include stakeholder and policy coordination, as well as community engagement, among others (Newig,*et al.*, 2010), Moreover survey and management of avenue trees is a vital instrument in evaluating the sustainability of the urban forest ecosystem given the rapidly changing urban environments and the increasing demands and expectations placed upon the trees in the urban areas.

Although Trees planted in public spaces present great potential for urban tree management Unfortunately, these trees are often neglected, without proper management plans thus limiting the potential of the trees to offer inherent benefits and inadvertently making the trees to become environmental hazards and threat to lives and properties (Lonsdale, 2000) (Ajewole and Oladipo, 2012). All these aforementioned factors have constrained the benefits derivable from avenue trees as there is a limited knowledge and understanding of tree structure within the University of Benin (UNIBEN) campuses. As avenue trees create serious challenges in their immediate environment where they are located, especially if they are not properly chosen, placed and managed correctly and this is attributed to their proximity to pedestrians, cars, sidewalks and other urban infrastructures.

Hence this study evaluated this urban resource for its sustainable management as they form the major structural and functional basis of the urban ecosystem. Population structure, suitability of avenue trees in the study area and governance framework in terms of administrative, policy and funding frameworks for management of avenue trees in the study site were also appraised and university authority in the view to and university authority manage this urban resource sustainable.

METHODOLOGY

Study Area

The study was conducted at the University of Benin (UNIBEN) Ugbowo and Ekehuan Campuses, Benin, Edo state. UNIBEN is one of Nigeria's federal universities founded in 1970. The university started as an Institute of Technology and was accorded the status of a full-fledged University by National Universities Commission (NUC) on 1st of July 1971. The University started from Ekehuan campus in the year 1970 and later moved to Ugbowo campus in the year 1973 (UNIBEN history handbook 1987). Ugbowo Campus of the university is located at Egor local government area, while the Ekehuan campus of the university is located at Oredo local government area, Benin City, Edo State, Nigeria (Bello, 2015).

The University has two sites, which are site A and site B. Site A houses the two campuses which is located at Ugbowo and Ekehuan parts of Benin City, with a distance of 9.7km apart. Ugbowo campus site A has a land area of 36 1 hectares while Ekehuan campus site A has a land area of 24heactres. Site B which is still under development has a land mass of 1,387ha. UNIBEN Ugbowo campus currently has 15 faculties and colleges with three centers of Excellence and a central library called the John Harris Library with about 86 departments spread across the various faculties. The faculties presently at the campus are the Faculties of Agriculture, Arts, Basic Medical Sciences, Dentistry, Education, Engineering, Environmental Science, Law, Life Science, Management Sciences, Pharmacy, Physical Science, Social Sciences, College Medicine, and Veterinary Medicine. The Ekehuan campus of UNIBEN currently has a center of excellence, two faculties which are the faculty of Arts (Theatre arts, Fine and Applied Arts and Mass communication departments) and Education (Public Health and Adult Education). Ugbowo campus (Fig 1) is between longitudes 5°360

25.200 E and 5°380 24.000 E; and between latitudes 6°230 31.200 and 6°240 28.800 N. Ekehuan campus (Fig 2) on the other hand is between longitudes 5°350 88.800 E and 5°360 24.000 E; and between latitudes 6°190 98.000 N and 6°200 16.000 N.

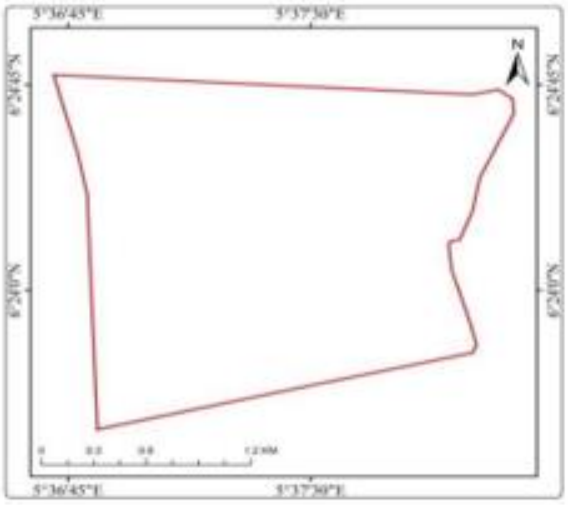

Figure 1:
Map of study area showing Ugbowo Campus

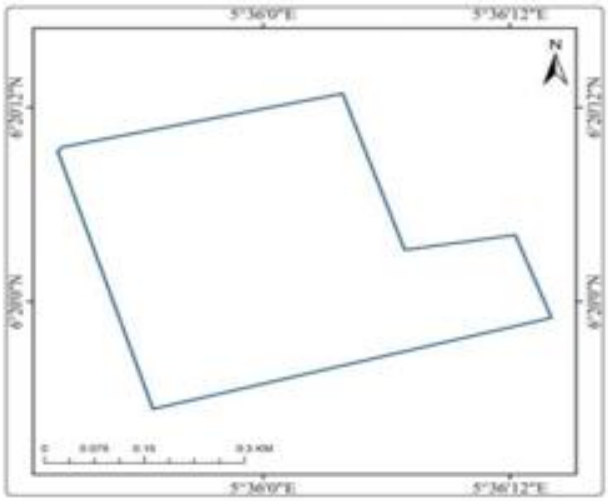

Figure 2:
Map of study area showing Ekehuan campus

Data Collection and analysis

Enumeration of avenue trees was carried out through walking survey in which a complete inventory of tree species on road sides within the premises of the two UNIBEN campuses was carried out. The tree species were identified and their frequencies taken. All tree species were identified to family level using taxonomist and Keay (1989) as guide. Additionally, ecological indices such as species richness and diversity index of tree species were computed for surveyed trees in the area. Species abundance was computed using species relative index (RD) this was undertaken to know how diverse the flora composition is, and trees when counted and identified to species level with their scientific and family names.

Species Relative Index (RD): this is an index for assessing species relative distribution (Brashears, et al., 2004)

$$RD = \left(\frac{n_i}{N}\right) \times 100 \text{ …..... (1.0)}$$

Where:

RD (%) = species relative distribution;

n_i = number of occurrence of a particular tree species i;

N = total number of the observed trees species in the entire community.

Also account was taken of actual and potential risks, hazard, damages (such as cracking of roads, pavement, dropping branches, messy fruits etc.) The appropriateness of identified trees for planting in the urban area was evaluated by collating from different tree data base of desirable and non-desirable traits of trees identified. Furthermore, the data on avenue tree management were collected with the aid of well-structured questionnaires that were administered to staff of the department of parks and garden Ugbowo campus and the office of the Deputy Vice-chancellor Ekehuan campus. Tree governance elements such as legislation, funding and administrative mechanisms, urban forest policy, participatory urban development and urban forest management plans were appraised. Data collected were analyzed with descriptive statistics such as percentages and frequency distribution.

RESULTS

POPULATION OF TREES SPECIES IN UGBOWO CAMPUS

The Ugbowo campus of University of Benin (UNIBEN) is made up of 8 roads and the summary of the names of the roads with the total number of trees in each road are presented in Table I below Results from Table 1 reveal a total number of 1,591 avenue trees were identified along the 20 major roads in the University of Benin Ugbowo campus. Furthermore, it was observed that VC lodge Road had the highest street lined with trees having 291 different trees species, followed by River Ethiopie Road having 246 tree species, Abuja Road having 186 different tree species, Ikpoba River Road having 155 different tree species, and Akin Deko Lane/ central Admin road having 147 different tree species. The images of two street lined with trees can be seen below in Plate 1 and Plate 2. Also it was observed that Exam and Record Drive had the lowest street line with trees having 5 tree species followed by Kashim Ibrahim Drive having 9 tree species.

According to Sagar et al., (2003) and Babalola and Raji (2016) trees are easy to find and count and are also relatively being known taxonomically as a dominant life form. The results from the survey of trees on the campus showed that the university has different tree species. It was also revealed from this study that street lined with more trees tenders to be cooler than those with few trees due to the presence of tree shade. It was also observed from the study that street lined with more trees enchances visual relief beautifying the landscape. This in accordance with Nagendra and Gopal, (2010) which reported that where viewed from an aesthetic perspective, tree-lined streets are frequently regarded as important in providing "visual relief in concretized city settings".

Table 1: Population of Trees Species in each Street of Ugbowo Campus of UNIBEN

S/No.	Name of Street	Number of Trees	Relative Frequency
1.	Ransom Kuti Road	45	2.82%
2.	Rev Dr. Matthew, Okepeobhlo Avenue	37	2.32%
3.	PLOT 4 Lane	19	1.19%
4.	Obaseki of Benin Lane	18	1.13%
5.	River Ethiopie Road	246	15.46%
6.	Kashim Ibrahim Drive	9	0.57%
7.	Oba Akenzua Road	91	5.72%
8.	Computer Science Lane	19	1.19%
9.	Edaieken of Uselu Road	74	4.65%
10.	Dennsis Osadebe Road	30	1.89%
11.	Exam and Record Drive	5	0.31%
12.	Ikpoba River Road	155	9.74%
13.	VC lodge Road	291	18.29%
14.	Ekosodin Road	19	1.19%
15.	Hospital lane	17	**1.07%**
16.	Abuja Road	186	11.69%
17.	Akin Deko Lane	147	9.24%
18.	Engineering Lane	53	3.33%
19.	Physical/Life Sciences Road	66	4.15%
20.	Main Gate Lane	64	4.02%
	TOTAL	**1,591**	**100**

Population of Trees Species in Ekehuan Campus

The Ekehuan campus of University of Benin (UNIBEN) is made up of & major road networks and the summary of the names of the roads with the total number of trees in each road are presented in Table 2 below. Results from Table 2 reveal a total number of 58 avenue trees were identified along the 8 major roads in the University of Benin Ekehuan campus. It was observed that USS school lane had the highest number of trees followed by the PG hostel road

making these areas cool and full of activities as compared to the other streets with fewer trees.The presence of trees in an area provides shades for sitting and relaxation, protection against intense sunshine, easy of walking for pedestrians and adds to the beautification of the landscape. In a research carried out by Nagendra and Gopal, (2010) trees are also very beneficial through the provision of shade, providing some protection against extreme weather conditions such as sun and rain. Also due to the reduction of green, the landscape of the campus premises looks unattractive from an environment perspective. Trees regardless of the ecosystem services they provide also help to improve the appearance of commercial areas by their presence (Anderson and Cordell, 1988).

Table 2: Population of Trees in each Street of Ekehuan Campus of UNIBEN

S/No	Name of Street	Number of Trees	Relative Frequency (%)
1.	Administrative Unit Road	5	9.62
2.	USS school Lane	13	25.0
3.	Staff Club Road	4	7.69
4.	Central Library Road	7	13.46
5.	Institute of public health Road	7	13.46
6.	Female Hostel Road	4	7.69
7.	Prof Lilan Salami Drive	4	7.69
8.	PG Hostel Road	8	15.38
	TOTAL	**52**	**100**

Relative Abundance of Tree Species in Ugbowo Campus of UNIBEN

Results from Table 3 reveal that the campus had a total of 61 different species spread across 26 families with *Fabaceae* having the highest representatives of 10 species. In terms of the species abundance, *Tectona grandis* which belongs to the family *Verbenaceae* accounted for the majority of the avenue trees identified in terms of frequency and relative frequency of 223 and (14.02%) respectively. This is followed by *Terminalia mentalis* belonging to the family *Combertaceae* with 146 (9.18%), *Delonix regia* 128 (8.05%), *Nauclea diderrichii* 113 (7.10%), *Terminalia catappa* 111 (6.98%), *Citrus senesis* 89 (5.59%) and *Terminalia ivorensis* 87 (5.47%). However, *Albizia zygia, Anacardium occidentale, Anitiaris Africana, Anthocleista microphylla, Bauhinia morandra ,Chrysophylum albida ,Dacryodes edulisDialium quincense, Eucalyptu torreliana Irvingia grandifolia, Kandela obovata, Pentaclethra macrophylla Persea Americana, Piscidia piscipula, senna pistulata Tretrapleura tetrapetra, and Fitex doniana* all had 1 and 0.06% each in frequency and abundance respectively.

Table 3: Frequency and Relative Abundance of Tree Species in Ugbowo Campus of UNIBEN

S/No.	Species	Family Name	Frequency	Relative Frequency
1	*Abarema sp*	Fabaceae	3	0.19
2	*Acacia mangium*	Fabaceae	29	1.82
3	*Albizia zygia*	Fabaceae	1	0.06
4	*Albizia lebbeck*	Fabaceae	12	0.75
5	*Alstonia boonei*	Apocynaceae	8	0.50
6	*Anacardium occidentale*	Anacardiaceae	1	0.06
7	*Anitiaris Africana*	Moraceae	1	0.06
8	*Anthocleista microphylla*	Gentianaceae	1	0.06
9	*Artocarpus altilis*	Moraceae	2	0.13
10	*Azadirachta indica*	Meliaceae	70	4.40

S/No.	Species	Family Name	Frequency	Relative Frequency
11	*Bauhinia morandra*	Fabaceae	1	0.06
12	*Bombax buonopozense*	Bombacaceae	5	0.31
13	*Brachystegia eurycoma*	Caesalpinioideae	21	1.32
14	*Cedrela odorata*	Meliaceae	2	0.13
15	*Ceiba pentandra*	Bombacaceae	4	0.25
16	*Chrysophylum albida*	Sapotaceae	1	0.06
17	*Citrus senesis*	Rutaceae	89	5.59
18	*Cordia millenii*	Boraginaceae	29	1.82
19	*Dacryodes edulis*	Burseraceae	1	0.06
20	*Delonix regia*	Fabaceae	128	8.05
21	*Dialium guineense*	Fabaceae	1	0.06
22	*Entandrophragma angolense*	Meliaceae	7	0.44
23	*Entandrophragma utile*	Meliaceae	2	0.13
24	*Eucalyptus camaldulensis*	Myrtaceae	4	0.25
25	*Eucalyptus citriodora*	Myrtaceae	33	2.07
26	*Eucalyptus torreliana*	Myrtaceae	1	0.06
27	*Ficus benjamina*	Moraceae	30	1.89
28	*Ficus exasperate*	Moraceae	3	0.19
29	*Ficus microcarpa*	Moraceae	4	0.25
30	*Ficus umbellate*	Moraceae	10	0.63
31	*Gmelina arobera*	Verbenaceae	4	0.25
32	*Harungana madagascariensis*	Guttiferae	3	0.19
33	*Hevea brasiliensis*	Euphorbiaceae	2	0.13
34	*Hura crepitans*	Euphorbiaceae	12	0.75
35	*Irvingia grandifolia*	Irvingiaceae	1	0.06
36	*Irvingia wombulu*	Irvingiaceae	5	0.31
37	*Jacaranda mimosifolia*	Bignoniaceae	3	0.19
38	*Kandela obovata*	Rhizophoraceae	1	0.06
39	*Khaya grandifoliola*	Meliaceae	23	1.45
40	*Khaya senegalensis*	Meliaceae	82	5.15
41	*Leucaena leucocephala*	Fabaceae	9	0.57
42	*Mangifera indica*	Anacardiaceae	36	2.26
43	*Mansonia altissima*	Malvaceae	4	0.25
44	*Nauclea diderrichii*	Rubiaceae	113	7.10
45	*Newbouldia laevis*	Bignoniaceae	2	0.13
46	*Pentaclethra macrophylla*	Mimosoideae	1	0.06
47	*Persea Americana*	Lauraceae	1	0.06
48	*Pinus caribaea*	Myristicaceae	60	3.77
49	*Piscidia piscipula*	Fabaceae	1	0.06
50	*Polyalthia longifolia*	Annonaceae	82	5.15
51	*Psidium guajava*	Annonaceae	12	0.75
52	*Ricinodendron heudeloti*	Euphorbiaceae	2	0.13
53	*senna pistulata*	Fabaceae	1	0.06
54	*Spondias mombin*	Apocynaceae	9	0.57
55	*Tectona grandis*	Verbenaceae	223	14.02
56	*Terminalia catappa*	Combertaceae	111	6.98
57	*Terminalia mentalis*	Combertaceae	146	9.18
58	*Terminalia ivorensis*	Combertaceae	87	5.47
59	*Terminalia superb*	Combertaceae	49	3.08
60	*Tretrapleura tetrapetra*	Fabaceae	1	0.06
61	*Vitex doniana*	Verbenaceae	1	0.06
	TOTAL		1,591	100

Relative Abundance of Tree Species in Ekehuan Campus of UNIBEN

Results from table 4 below reveals that Ekehuan campus had a total of 52 avenue trees spread across 15 different species falling under 12 families with *Anacardiaceae Fabaceae Irvingiaceae Combertaceae* families having the highest representatives of 2 species each. In the family terms of the species abundance, *Mangifera indica* which belongs to *Anacardiaceae* accounted for the majority of the avenue trees identified with in terms of frequency and relative frequency with 10(19.23%), followed by *Azadirachta indica, Terminalia catappa, Terminalia mentalis* which all had 7 and 13.46% each in frequency and abundance respectively. However, *Anacardium occidentale, Cola acuminate Newbouldia laevis Persea Americana Pericopsis alata* all had 1 and 1.92% each in frequency and abundance respectively

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Table 4: Frequency and Relative Abundance of Tree Species in Ekehuan Campus of UNIBEN

S/No.	Species	Family Name	Frequency	Relative Frequency
1	*Alstonia boonei*	Apocynaceae	4	7.69
2	*Anacardium occidentale*	Anacardiaceae	1	1.92
3	*Azadirachta indica*	Meliaceae	7	13.46
4	*Cola acuminate*	Sterculiaceae	1	1.92
5	*Delonix regia*	Fabaceae	3	5.77
6	*Hura crepitans*	Euphorbiaceae	1	1.92
7	*Irvingia gabonesis*	Irvingiaceae	3	5.77
8	*Irvingia wombulu*	Irvingiaceae	2	3.85
9	*Mangifera indica*	Anacardiaceae	10	19.23
10	*Newbouldia laevis*	Bignoniaceae	1	1.92
11	*Persea Americana*	Lauraceae	1	1.92
12	*Pericopsis alata*	Fabaceae	1	1.92
13	*Psidium guajava*	Annonaceae	3	5.77
14	*Terminalia catappa*	Combertaceae	7	13.46
15	*Terminalia mentalis*	Combertaceae	7	13.46
	TOTAL		52	100

Management Activities Observed By UNIBEN Populace

Results for Ugbowo campus, UNIBEN revealed that 56.8% of the respondents iterated that management activities were occasional, followed by 27% who never witnessed management activities on the avenue trees. This implies that the avenue trees are not under any serious management regime. Furthermore 39.4% of the respondents witnessed watering activities occasionally followed by 31.8% who never witnessed such activity within the campus premises. More so for tree pruning activities within the campus 45.5% of the respondents stated that pruning activities were occasional, followed by 26.3%, who have never saw such an activity and 21.2% who noticed this same activity regularly. Also 55.8%, noticed tree felling activities occasionally followed by 13.1%, who never saw such an activity and, 21.2% who witnessed tree felling regularly. From the results it can be implied that management efforts towards avenue tree care management has to be improved as an effective tree care management system can only produce healthy trees within the campus premises.

For Ekehuan campus the results showed that, 51.2%, of the respondents have occasionally noticed management within the campus engage in tree planting activities while 41.5%, never witnessed tree planting exercise. For watering of trees within the campus premises 46.3%. noticed this activity followed by 30.9% who never witnessed such activity. For trees pruning activities 36.6% noticed this same activity occasionally within the campus and 31.7 never witnessed this activity. Also 37.8% respondents

noticed tree felling activity occasionally while 32.9%, noticed tree felling activities regularly, within the campus. This implies that the avenue trees are not under any serious management schedule as trees are been felled without adequate replacement and old existing trees are not well maintained leading to sparse tree species within the Ekehuan campus premises.

Table 5 Frequency distribution of respondent; observed Management activities

Location/	Never		Occasionally		Regularly		Monthly		Weekly		Daily	
Mgt activities	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Ugbowo												
Tree planting	107	27.0	225	56.8	48	12.1	8	2.0	1	0.3	7	1.8
Tree watering	126	31.8	156	39.4	96	24.2	5	1.3	4	1.0	9	2.3
Tree pruning	104	26.3	180	45.5	84	21.2	16	4.0	8	2.0	4	1.0
Tree felling	52	13.1	221	55.8	84	21.2	32	8.1	2	0.5	5	1.3
Ekehuan												
Tree planting	34	41.5	42	51.2	6	7.3	0	0.0	0	0.0	0	0.0
Tree watering	25	30.5	38	46.3	17	20.7	2	2.4	0	0.0	0	0.0
Tree pruning	26	31.7	30	36.6	23	28.0	2	2.4	1	1.2	0	0.0
Tree felling	16	19.5	31	37.8	27	32.9	7	8.5	1	1.2	0	0.0

Damages, Risks and Hazards

If avenue trees are not well managed, they tend to cause damages and hazards to people, infrastructures and the environment in which they are located. Inappropriate or wrong selection choice of tree species in a particular environment causes damages due to aggressive rooting systems, overhanging branches, non-erect or leaning bole, thorns or sharp protrusions etc. all these are as a result of inadequate management. Results in table 4.9 for both campuses revealed that 64.3% (Ugbowo campus) and 54.8 %,(Ekehuan campus) stated that trees falling on the road because of windstorm occurs occasionally. It also showed that 50.7%, (Ugbowo campus) and 48.8%, (Ekehuan campus) of stated that trees falling on houses because of windstorm occur occasionally. The results further showed that 53.5%, (Ugbowo campus) and 50% (Ekehuan campus) stated that branches of trees falling and breaking cars windscreen occurs occasionally.

For Ugbowo campus 45.5% revealed that seeds of trees falling and breaking cars windscreen never occurs, while for Ekehuan campus 44% stated that fruits and seeds of trees falling and breaking cars windscreen occurs occasionally. Furthermore 46.8% for Ugbowo campus stated that tree roots breaking infrastructures such as sewage pipes, roads, culverts etc. never occurs while, 50% for Ekehuan campus equally stated that tree roots breaking infrastructures such as sewage pipes, roads, culverts etc. never occurs. Also 63.7% for Ugbowo campus and 71.4% for Ekehuan campus stated that fruits and leaves littering the environment occurs on a regular basis. All these challenges mentioned above can be addressed by proper choice of tree species and appropriate and adequate management practices. Reduction in tree hazards requires appropriate species selection and effective governance. Appropriate tree selection requires a good understanding of the desirable and undesirable traits of the trees and purpose for trees. Thus, the main tree hazard of trees littering the environment with leaves and fruits can be minimized by good species choice and regular cleaning of the litters. Although other tree hazards such as tree falling as a result of windstorm, fruits of trees breaking windscreen of vehicles, tree roots damaging infrastructures were reported to occur occasionally, however due to influence of age, trees gradually become susceptible to wind-throws, thus it is important that management have contingency plans that will ensure routine health checks of trees, regularly to identify potentially dangerous, well, old diseased one (Ellison, 2005) Such trees should be managed and replaced when necessary to ensure sustained provision of environmental services and avoid accidents as a result of tree fall, branch breakage and disease infestation of old trees.

Table 6: Frequency distribution of respondent's view on regularity of Hazards caused by Avenue Trees in the study areas

Location	Hazards	Never		Occasionally		Regularly	
		N	%	N	%	N	%
Ugbowo	Trees falling on the road because of windstorm	91	22.8	257	64.3	52	13.0
	Trees falling on houses because of windstorm	180	45.0	203	50.7	17	4.3
	Branches of trees falling	166	41.5	214	53.5	20	5.0
	Fruits and seeds of trees falling and breaking cars windscreen	182	45.5	170	42.5	48	12.0
	Tree roots breaking infrastructures such as sewage pipes, roads, culverts etc.	187	46.8	177	44.3	36	9.0
	Fruits and leaves littering the environment	23	5.8	122	30.5	255	63.7
Ekehuan	Tress falling on the road because of windstorm	22	26.2	46	54.8	16	19.0
	Trees falling on houses because of windstorm	36	42.9	41	48.8	7	8.3
	Branches of trees falling and breaking cars windscreen	34	40.5	42	50.0	8	9.5
	Fruits and seeds of trees falling and breaking cars windscreen	33	39.3	37	44.0	14	16.7
	Tree roots breaking infrastructures	42	50.0	35	41.7	7	8.3
	Fruits and leaves littering the environment	6	7.1	18	21.4	60	71.4

DISCUSSION

Management of Avenue trees in UNIBEN Ugbowo campus

Administrative Framework in the University of Benin Ugbowo Campus

The department of parks and garden Ugbowo campus, UNIBEN division is the unit responsible for the management of avenue trees in the campus premises. Information gathered revealed that the department has as an external director with a tree management committee charged with the responsibility of overseeing the affairs of the parks and garden Unit in better managing the campus streetscape. A tree management plan includes a document that provides the comprehensive survey on the health and safety of the tree. It also lists additional works that might be required. planned routine maintenance, future tree removals and planting locations. It also shows the present condition of trees in terms of its physical resource and management practices, the proposed vision for these trees with an outline of strategic framework and key actions to achieve these visions.

Data gathered revealed that the Department of Parks and gardens has no documented management plan to aid the smooth and effective management of the trees on the campus premises. With areas on the campus premises covered with avenue trees managing without a plan becomes less effectual, more costly to manage, and less organised, in terms of planting, watering, pruning, Trimming of trees root, tree packing, routine disease monitoring etc. Regardless the non-availability of a documented management plan the department operates by a policy known as the tree management order which is more or less oral/verbal and often in a written form stating tree management activities to be carried out within a particular period

within the campus premises. It is worth mentioning that even without a documented management plan the supervisors under each section of the various units under the department is charged with the mandate of training their staff, monitoring their staffs alongside carrying out other departmental duties. Regardless staff training the success of tree management within the campus premises is hindered due to lack of management plan. It is also worthy of stating the fact that there is the lack of inventory of avenue trees in the university of Benin.

Policy and legal Framework

Policy specifies rules, principles, and provides framework for making planned organized consistent and environmentally sound management decisions. Policy guides management objectives providing strategic information to evaluate management goals and objectives.

From the research findings, the department of Parks and garden has been in existence since 1980. It was formerly under the department of Estate management since the creation of the university in 1970. Investigation also showed that the objective and purpose for the establishment of this department is for the management of the campus trees with the aim of environment beautification, provision of shade for pedestrians. Provide sitting place for relaxation, Mitigate climate change, Provide edible fruits and Provide medicinal plants. One of their major functions is the formulation of rules and regulation (policy) protecting streetscapes from vandalism, erroneous perception by humans etc. Though there was no document that clearly states these rules in University of Benin, however there is a general practice preventing tree felling. packing of trees, tree planting exercise and general routine management by outsiders expect the by the authority of the parks and Gardens department which are solely in charge of trees within the campus premises.

Funding

Funds for the management of avenue trees in the campus, is mainly provided by the University Management and these funds are released as the need arises and it is usually determined by the governing council/ current administration of the university which is also greatly determined by the projects outlined by the department for a particular period. Planting is majorly carried out by the department during the start of the rainy season for each session and this is directive is usually in line with the university governing council. Other management activities such as wedding, pruning etc. are carried out as the need arises or on a routine basis under the directive of the Director and Head of department. It is worth mentioning that this current university administration is very much interested in making the campus a green environment. Old trees are been felled and new trees *(Terminalia mentalis* and *Delonix regia* are the major forest tree been planted by the department and this is due to their fast growth rate/growth form and they also provide shade and beautify the environment) and ornamental plants are been planted to replace felled trees.

It is worth mentioning that there is little or no financial support from corporate bodies or private individuals. Funding is very necessary for the smooth running of urban landscape and this therefore presents challenges in terms of appropriate equipment as well as shortage of manpower. It is worth mentioning that the department of forest resources and wildlife management (FRMW) UNIBEN is actively involved in the greening of the campus environment. This project embarked on by the department started June 2011. The department aids funding of green activities of the campus premises by providing free seedlings from departmental nursery where with forest timber and fruit trees are been planted. Planting is carried out by students under the supervision of staff's of the department. This planting exercise is done a minimum of three times' yearly and it usually coincides with special occasions like the world environment day, UNIBEN Founders day etc. in honor of these events.

Management of Avenue Trees at UNIBEN Ekehuan Campus

Administrative Framework in the University of Benin Ekehuan Campus

The university of Benin Ekehuan campus has no department responsible for the management of

avenue trees. Information gathered revealed that the management of green in the campus is done on a contract basis under the directive of the office of the deputy vice Chancellor (DVC) Ekehuan Campus. With the lack of a management unit to focus on avenue trees on the campus there is no management plan for the smooth and effective management of trees on the campus. Due to the absence of such a department and subsequently a lack of management plan in the campus the extent of avenue tree coverage is sparse. The few existing trees on campus are not well managed, as management activities such as planting, pruning and routine disease check etc. aren't carried out as it should be as there is unit set aside for this purpose.

Policy and legal Framework

Policy provide framework for making planned and smooth environmental friendly management resolutions. Investigation showed that there is no concrete laid down rules and regulations protecting and managing trees on campus and this can be attributed majorly to the lack of a unit charged with the responsibility of taking care of the campus landscape.

Funding

Funds for the management of avenue trees in the campus, is mainly provided by the university of Benin management. There is little or no financial support from corporate bodies or private individuals. Funding is very necessary for the smooth running of urban landscape and this therefore presents challenges in terms of appropriate equipment as well as shortage of manpower

CONCLUSION

This study has been able to show the different avenue tree species identified per street/lane/road in the University of Benin (UNIBEN) Ugbowo and Ekehuan campuses. Having adequate species diversity and balanced species is important in a street tree population as it ensures continuous benefits. The result from this identification will to a great extent help in solving the problems of tree identification of both indigenous and exotic trees, if naming or tagging of the avenue trees on campus is to be carried out as this would go a long way in creating an increased awareness of trees on campus. The results also from the suitability of trees to a particular environment would better help management by increasing their knowledge on the choice of species to be planted each tree species. This study equally revealed that management activities of these avenue trees at the campuses are not religiously been carried out especially at the Ekehuan campus as it has no unit/working tree management committee. This fact has contributed greatly to the reduced population of avenue trees at the Ekehuan campus as the few existing trees are now very old, unmaintained and unhealthy. For Ugbowo campus the tree management advisory board set up to assist the department has become inactive over the years Although, the department of parks and gardens Ugbowo have tried it best in effectively managing the avenue trees through various tree management activities that are done on a daily weekly monthly yearly and as the need arises hence there are still more management activities to be carried out if the sustainability of these avenue trees is to be achieved with little or no hazards to the environment.

Recommendations

Based on this study the following recommendations are made:

i. A comprehensive data base that will contain the total number of avenue trees, the present conditions, their age and status etc. should be developed.
ii. A comprehensive management plan should be designed to effectively help direct the daily, weekly, monthly, yearly, and long terms streetscape design.
iii. Setting of tree department and a management advisory board comprised of urban forester and other professionals for campus tree management.
iv. It should be known that success in urban greening should not be determined by the number of trees planted but evaluated by the number of planted health and well maintained mature trees.

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