Survey of benefits and constraints of urban trees in Kaduna Metropolis

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ABSTRACT

This study was used to assess public opinion of the economic and ecological importance of various tree species in Kaduna Metropolis, Kaduna state. A total of one hundred (100) questionnaires were randomly administered among four purposively selected towns (Angwa-Rimi and Kawo new extension in Kaduna North and Bar'nawa and Sabo in Kaduna South) within the two major local governments in the study area. Twenty-five (25) questionnaires were randomly distributed across age and sex in each of the four (4) selected towns. Of these, ninety were retrieved for analysis. Data analysis was achieved through descriptive analysis. This included frequency distribution tables, percentages and charts. The results show that the majority of the respondents were aged between (21-30) and (31-40) years, these figures representing (44.4%) and (30.0%), respectively, of the entire study population. In addition, most had secondary education (53.3%). In the stated opinions, *Meliaceae* occur most often. Other trees species identified in the study area include *Eucalyptus* spp, *Azadiracta indica, Psidium guajava, Terminalia catapa, Mangifera indica, Anacardium occidentalis, Khaya senegalensis, Gmelina arboria, pinus* spp, *Carica papaya, Moringa olifera, Gliricidia sepium, Ficus* spp, *Afzelia* spp, *Balanite eagyptiaca, Borassus aethiopum*, *Persae americana, Polyantha longifolia* etc. The following characteristics mark these tree species out as being economically and ecologically important: fast growth, deep rooting pattern, coppicing ability, ability to produce large crown size, tolerance to adverse weather condition, ability of trees to produce broad leaves for shade production, erosion protection, ability to provide fruits, aesthetics and beautification values. In conclusion, urban tree planting is a potential strategy to ameliorate ecological and economic concerns; thus, there is need for the dwellers in the study area to intensify efforts towards planting trees around their houses. Without this, the influx of people, urbanization and industrialization will create deleterious

environmental conditions in the study area. It is recommended that efforts to make the populace aware of the economic and ecological significance of urban trees be intensified.

*Keywords***:** tree species, environment, benefits, constraints, characteristics

1. INTRODUCTION

Urban forestry is one of the promising strategies to address the multifaceted problems associated with urbanization, although the planting of trees have been an integral and important part of human settlements in Nigeria and most importantly in Northern region where there is extreme temperature during the dry season. Trees provide enormous benefits locally in terms of provision of fruits, seeds, leaves, fodder and plank for furniture making and designs it also serve micro-climate and global environmental functions. This is why indigenous people plant trees or leave trees on their on their farmland to providing shade during hot weather, fuel wood provision, fruits and nuts etc. They also plant trees along rivers and stream banks to reduce its rate of evaporation due to excessive sunlight radiation, and along major path. Therefore, tree planting and management around settlements in Nigeria particularly in the study area is functions of many factors which include their environmental, nutritional, social, and beautification or aesthetic importance.

Urbanization and growing urban population necessitate urban forestry practices to cushion the negative effects of urbanization, industrialization and enhance the benefits of tree planting even in highly industrialized cities like Kaduna metropolis in order to providing essential goods and services. The current urban forestry practices are services and amenity oriented. Urban green spaces with trees are important roles player for healthy, livable and sustainable cities. Trees and green spaces help keep cities cool, act as natural purifier and noise absorbers, improve microclimates, conserve biodiversity, protect and improve the quality of natural resources, including soil, water, vegetation and wildlife. Trees contribute significantly to the aesthetic appeal of cities, thereby helping to maintain the psychological health of their inhabitants. Consequently, urban forestry management is an important strategy to improve urban living and working environments. Thus, this necessitates the following objectives:

To study assessed development of urban forestry, identified different urban trees species in the study area, to identify the Urban tree species, their benefits, and negatives of urban trees in the study area.

2. METHODOLOGY

The study area

The study was carried out in Kaduna metropolis consist of Kaduna-north, Kaduna South, part of Chikun and Igabi local government area of Kaduna state. The state is located between 9° and 2' north of the equation and longitude 6° and 9' east of the prime meridian. The state shares boundary with Abuja in south east, Katsina, Kano, and Zamfara state in the North West. The mean annual temperature varies between 24 °C and 25 °C. The length of the rainfall varies from 150 days to190 days with an annual rainfall ranging between 1500 mm

and 2000 mm north and south respectively, relative humidity is low ranging between 20 and 40 percent in July. The vegetation is divided into the northern guinea savannah in the north and southern guinea savannah in the south.

Data collection

Majorly, primary data was used for this study, these data was generated through the use of well-structured questionnaires. These questionnaires were distributed among the dwellers of the selected communities.

Sampling Techniques

Multi stage sampling techniques was used for this study. The choice of the study area was due to the concentration of urban trees in the selected locations, this resulted from the recognizance survey prior data collection. On this criterion, two (2) LGA (Kaduna North and Kaduna south) were selected out of the four (4) local governments (LG) within the study area. Two towns (2) each were purposively selected within each LGA based concentration of urban trees, making a total of four (4) towns. One-hundred (100) questionnaires were randomly distributed for the study, such that twenty-five (25) questionnaires each were randomly distributed across age and sex in each of the four (4) selected towns.

Data analysis

Data were analyzed through descriptive analysis which includes frequency distribution table, percentage.

3. RESULTS AND DISCUSSIONS

Socio-economic characteristic

Some socio-economic characteristic influencing the use of environmental tree species in Kaduna Metropolis include: gender, age education and marital status.

Table 1. Socio-economic characteristics of sample respondents.

S/N	Variable Gender	Frequency	Percentage (%)
1	Male	52	57.8
	Female	38	42.2
2	**Age**		
	10 – 20	06	6.7
	21 – 30	40	44.4
	31 – 40	27	30.0
	41 – 50	14	15.6
	50 – Above	03	3.3

3	**Education**			
	Primary		15	16.7
	Secondary		48	53.3
	Tertiary		18	20.0
	No formal education		09	10.0
4	**Marital status**			
	Married		60	66.7
	Single		25	27.8
	Widow		03	3.3
	Divorce		02	2.2
	Total		**90**	**100.0**

Sources: field Survey, 2015

Table 1 revealed that 44.4% of sampled respondents were between the age brackets of 21 – 30years. This implies that they were at middle and economically active age. 57.8% are male and 42.2% are Female. The result shows that those male counterparts are more with respect to the planting of tree around their houses in Kaduna metropolis. 53.3% of sampled respondents had secondary education and 20% had tertiary education while 10% had no formal education. This implies that, educational level have direct relationship with the planting of environmental tree in Kaduna metropolis. (66.7%) of the sample respondents are married and 27.8% are single. This implies that majority of the sampled respondents in are married.

Environmental Tree Species and their Families

Various tree species of urban trees were identified in the study area, these species were the directly planted and the well managed naturally existing species. However, the table below shows the major environmental tree species and families in the study area.

Table 2. Identified Tree species in the Study area and their families.

S/N	Tree species	Family	Frequency	Percentage %
1	*Azadirachta indica*	*Meliaceae*	10	3.58
2	*Gmelina arborea*	*Meliaceae*	28	10.04
3	*Mangifera indica*	*Anacardiaceae*	10	3.58
4	*Khaya senegalensis*	*Meliaceae*	04	1.43
5	*Tectona gradis*	*Bignoniaceae*	02	0.72
6	*Psidium guayava*	*Dipterocarpaceae*	07	2.51
7	*Parkia biglobosa*	*Mimosaceae*	05	1.79
8	*Anacardium occidentalis*	*Anacardiaeceae*	09	3.23

9	*Eucalytptus* sp	*Myrtaceae*	08	2.87
10	*Terminalia catapa*	Combretaceae	20	7.17
11	*pinus* spp	Pinaceae	15	5.38
12	*Carica papaya*	Caricaceae	20	7.17
13	*Moringa olifera*	Moringaceae	18	6.45
14	*Gliricidia sepium*	Leguminosae	10	3.58
15	*Callotropis procera*	Asclepiadaceae	08	2.87
16	*Afzelia* spp	Fabaceae	15	5.38
17	*Balanite eagyptiaca*	Zygophyllaceae	07	2.51
18	*Citrus sinensis*	Rutaceae	07	2.51
19	*Borassus aethiopum*	Arecidae	10	3.58.
20	*Persae americana*	Lauraceae	17	6.09
21	*Polyantha longifolia*	Annonaceae	20	7.17
22	*Ficus pilota*	Moraceae	19	6.81
23	*Tamarindus indica*	Meliaceae	07	2.51
24	*Delonix regia*	Fabaceae	10	3.58
25	*Jatrova caucus*	Euphorbiaceae	7	2.51
26	*Citrus limon*	Rutaceae	08	2.87
	Total		**279**	**100.00**

Multiple responses**

Table 2, revealed that majority (10.04%) of the respondents' plant *Gmelina arborea* around their resident, (7.17%) of the respondents also plant *Terminalia catapa, Carica papaya, Polyantha longifolia* in their surrounding, (6.81%) of them grow trees like *Ficus pilota*, (6.45%) plant *Moringa oleifera,* which belong to the family Moringaceae, (5.38%) of the respondents plant *Afzelia* spp around their houses. Other species identified by the respondents in the study area includes: *Tamarindus indica* (2.51%), (3.58%) of the respondents plants *Borassus aethiopum, Mangifera indicia, Delonix regia , Gliricidia sepium, Azadirachta indica. Khaya senegalensis, Tectona gradis, Psidium guayava, Parkia biglobosa, Anacardium occidentalis, pinus* spp etc. Though, majority of the respondents plant these trees together that is, in combination of two or three in their compound. The choice of species is determined by house owner objective and desires.

Reported that urban forestry goals most be suited to their city's social, economic and geographical context. Documented in his report that the respondents in Okitipupa do not just want trees of any kind in their environment, but have specific preference for the trees. The diversity, stability, and functionality of urban forests are directly influenced by the type of trees selected to plant. Such individual desire or objectives include: shade provision, erosion control, aesthetic value medicinal and fruits production, and some non timber forest products of paramount importance among others. *Gmelina arborea, Terminalia catapa, Carica papaya, Polyantha longifolia* are the most preferred which might be due to their ability to satisfy their objective of establishment. Documented in his summation that urban forestry includes the management of individual as well as groups of trees and is not restricted to

planted trees alone, but also includes naturally grown trees within urban areas for their multiple benefits

Characteristics of the identified urban tree species in the Study Area

The preference of tree species by respondents is determines by the characteristics exhibited by such tree in terms of their physical and chemical composition. This however depends on the utilization objectives of the tree species. The result reveals some of the characteristic exhibited by the tree species in the study area.

Table 3. Characteristic of tree species in the study area.

S/N	Characteristic exhibited	Frequency	Percentage (%)
1	Rooting system	25	20.83
2	Fast growing	30	25.00
3	Coppicing ability	15	12.50
4	large crown size	10	8.33
5	Evergreen ability	10	8.33
6	Aesthetic Characteristics	22	18.33
7	Non-poisonous exudates	08	6.67
	Total	**120**	**100.00**

Multiple responses**

Table 3, revealed that the major characteristic exhibited by the trees species used in the study area is their fast growing ability (25.00%), this represent characteristic which is closely followed by rooting system (20.83%), Coppice ability (12.50%) while the evergreen ability and large crown size are the least (8.33% each) characteristic.

These characteristics support the reason for the choice of *Gmelina arborea* as the most preferred urban tree species in the study area. This is because the species possess partially all the characteristic in the table. This agrees with (Faleyimu, 2014) who reported that the respondents in Okitipupa do not just want trees of any kind in their environment, but have specific preference for the trees.

Benefit derived from urban tree species in the study area

Environmental trees perform several functions. These functions are beneficial to human and environment, some of the identified benefits of environmental plants include: provision of fruits and seeds, medicine, poles, fuel wood, micro-climate amelioration, aesthetic and beautification, erosion control etc. The figure below reveals the level of benefits derived from urban trees in the study area.
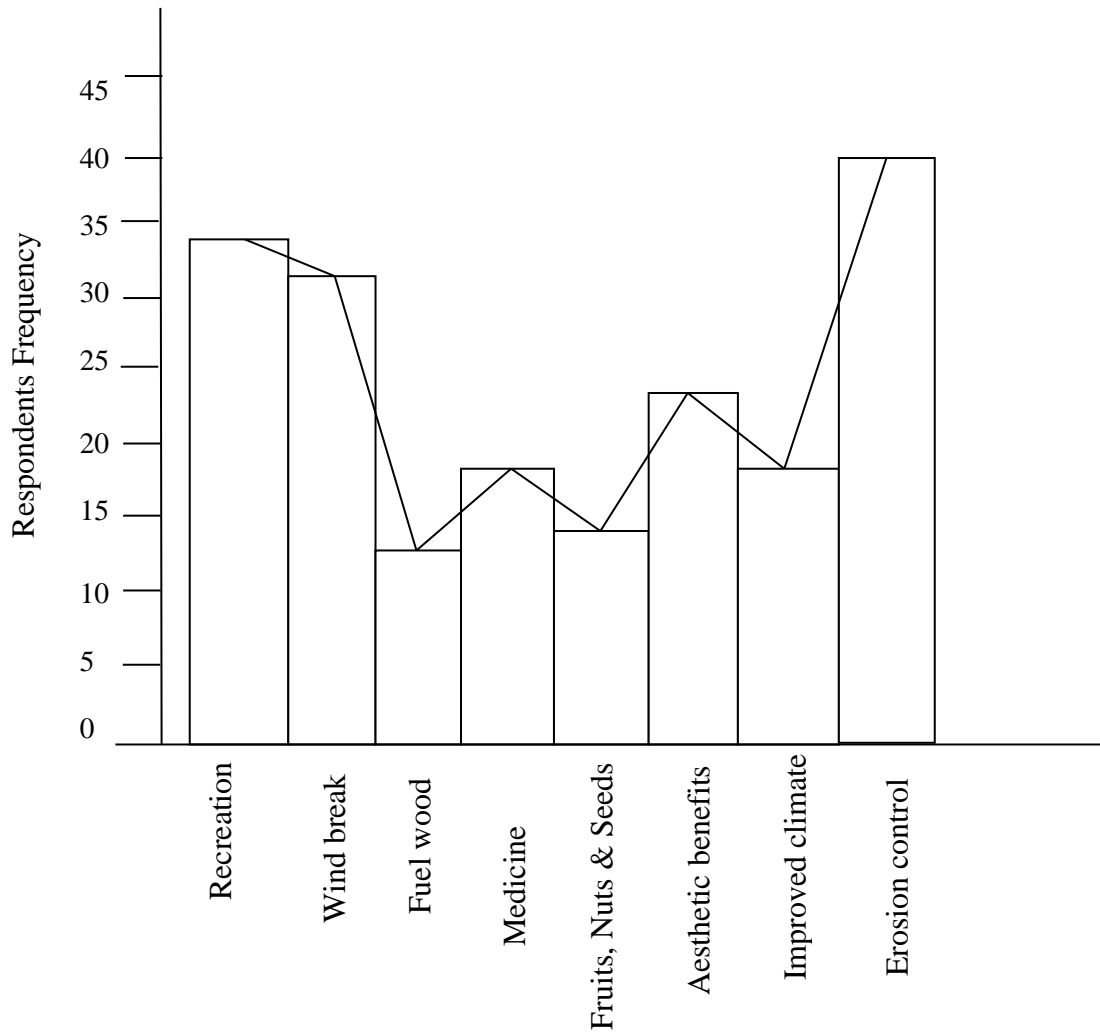
Figure 1. Benefits derived from the tree species

Figure 1, shows that erosion is highest benefits derived from urban trees followed by recreational benefits, windbreak, aesthetic benefits, improve climate, medicinal benefits, fruits & seeds, while fuel wood is the least benefits of urban trees in the study area. All these benefits are attribute of urban trees, though majority of the respondents identified the highest benefits of urban trees as serving the purpose of recreation and this is followed by windbreak, aesthetic benefits.

This is in line with who see urban forestry as an integrated citywide approach to the planting, care, and management of trees in the city to secure multiple environmental and social benefits for urban dwellers. Viewed urban forestry as the management of trees for their contribution to the physiological, sociological and economic well being of the urban society. According a prime focus in the past for developed countries was the management of urban forest for aesthetic purposes, whereas now, as urban population have grown, intensified, and expanded, it has shifted to management for enhancing ecosystem services. In developing countries, a more important focus may be managing vegetation to provide materials such as

firewood, fruits and timber at local scale. Over time, each city and region may manage its urban forest for an increasingly broader and more inclusive range of benefits.

Identified Constrain Associated with Urban trees in the study Area

The constrains of urban trees as identified by the respondents in Kaduna metropolis includes: harbors pest and diseases, harbors dangerous animals, expensive to maintain, difficult to get desired species, Seasonal variation (Weather), they constitute threat later in life, they serve as hide out to thieve, and their litters constitute dirt to the environment.

Table 4. Identified Constrain Associated with Urban trees in the study Area.

S/n	Constraints	Frequency	Percentage %
1	Harbors pest and diseases	30	16.13
2	Harbors dangerous animals	24	12.90
3	Expensive to maintain	32	17.20
4	Difficult to get desired species	10	5.38
5	Seasonal variation(Weather)	28	15.05
6	They constitute threat later in life	20	10.75
7	They serve as hide out to thieve	12	6.45
8	Their litters constitute dirt to the environment	30	16.13
	TOTAL	**186**	**100**

The table above shows that (16.13%) stated that urban trees harbors pests and diseases, (12.90%) of respondents identified that urban trees harbors dangerous animals, (17.20%) of them said that urban trees are expensive to manage and maintain, (15.05%) of the respondents attributed the problems of urban trees their seasonal variation (weather), (10.75%) of the respondents attributed the constraint of urban trees to constitution of threat to life and properties later, (16.13%) of the respondents said that urban trees produces litters or dirt to the environment, (6.45%) traced the problems of urban trees to serving as hide out to thieve.

Hence, from the result, it was observed that majority of the respondents relate the constraints of urban tree to harbors pests and diseases, it harbors dangerous animals, expensive to manage and maintain, seasonal variation (weather), and that urban trees produces litters or dirt to the environment.

4. CONCLUSIONS

Tree planting in urban cities is a prospective strategy to check soil, wind erosion and other ecological problems of possible deleterious effects such as: desertification, erosion,

flooding, wind storm etc. on the inhabitant of such community. Thus, there is need for the dwellers in the study area to intensify efforts towards tree planting around their houses, without this, the rate of influx of people, urbanization as well as industrialization will create deleterious environmental hazard in the study area. It is recommended that shelter belt should be established in area where the menace erosion and other environmental problems are identified, sensitization of the populace on the importance of urban trees particularly in combating environmental problems must be intensified.

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