

RESIDENTS' PERCEPTION OF URBAN FORESTRY IMPACT ON BIODIVERSITY CONSERVATION IN IBADAN METROPOLIS, NIGERIA

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ABSTRACT

Population growth and unregulated settlement pattern impede biodiversity conservation especially in urban areas. This paper investigated the perception of urban residents in Ibadan metropolis, Nigeria on improving the environment through urban greening and renewal. Respondents were drawn from residents of two educational institutions (University of Ibadan and The Polytechnic, Ibadan) and their respective adjoining communities (Agbowo and Apete). Relevant information was obtained from them using a set of questionnaire. Data obtained were analysed using descriptive statistical tools. Results show that level of understanding of the importance of trees was high in University of Ibadan (93.4%) followed by its adjoining community (Agbowo: 63.3%) and lowest in The Polytechnic (8.2%). Respondents expressed desire for tree planting especially around their residence when under progressively longer duration of residency. All the residents have preference for planting fruit trees except in University of Ibadan where preference was highest for planting other economic tree species. The fear of wildlife usually associate with vegetation cover and possible fire outbreak were top constraints expressed by respondents which could limit their active participation in urban forestry programmes. Subsidized and affordable tenancy through public-private partnership, restrictions in slum growth and mandatory fire tracing in residential and business premises were advocated measures for improving urban renewal programmes.

keywords: Residents' perception, Urban greening, Tree planting, Agbowo, Apete, The Polytechnic, University of Ibadan

INTRODUCTION

Over the years, there has been a progressive decline in the capacity of biological resources to provide the needed life support services. The incidence of climate change has further impacted on available resources, which provide food, water and ecosystem services for the growing population. These challenges are further compounded by the rate of population growth, which exceeds the carrying capacity of available resources in Africa and Nigeria in particular. The report by Potts and Graves (2013) revealed that population growth in Nigeria is at the rate of about 2.4% per annum, the highest in West Africa and as reported by Geomatics (1997), Nigeria's undisturbed forests have significantly decreased by more than half between 1976 and 1995 alone. Similarly, studies by Powell (1993) and Loveland *et al.* (2000) suggested that Nigeria could have the highest deforestation rate in the world.

In urban areas where the effect of deforestation is most intense, apart from the increasing demand for agricultural land, the demand for forest products and services call for the review of strategies directed at improving the floral biodiversity outside the forests. This is expected to sufficiently complement declining service delivery from gazetted forest reserves. In areas where there is efficient urban plan/policy for forestry and biodiversity, there are independent

stakeholders who collaborate to enhance forest service delivery at different levels and sector (Amanor, 2005).

In Nigeria, forest reserves are central to most forestry discourses. However, flora outside forest reserves have been reported to have potentials to relieve the pressure on forest resources, conserve arable lands and boost agricultural productivities through increased food supplies (FAO, 2002a). This way, different population groups' especially urban residents are aided to diversify their productivity, adaptation strategies and improve their wellbeing. In some regions, forests in urban area are hidden source of insurance to many residents economically, environmentally and socially (Tyrvaainen, 2001). They also help to minimize shortage of wood supplies and other forest products, which already exists.

Urban forestry covers a carefully articulated plan for establishment and management of urban trees and/or vegetation for the purpose of improving the urban environment (Young, 1995). Young (Op. cit.) advocated trees as playing a critical role in the sustenance of urban infrastructure. But success in urban forestry was observed by Wall and Miller (2006) as leaning heavily on the understanding of attitudes, perceptions and appreciation of forestry by residents. Earlier, Mudrack (1980) reported the assessment of the perceived drivers of change as well as the expressed needs and concerns of populations as integral aspects of urban forestry success. The information and experience gained from the submissions of such assessment is expected to assist in developing a robust and actionable biodiversity conservation plan.

Out of the existing and growing urban centres across Nigeria, Ajewole (2002) reported Ibadan metropolis as having one of the smallest proportions of open spaces (1.38%). The city is home to numerous educational institutions (over 6 in number) including Nigeria's premier university (University of Ibadan). To accommodate the attracted population (comprising indigenes and non-indigenes), residential areas, which are largely unplanned was observed by Amao (2012) to constitute a large portion of the urban infrastructure in Ibadan metropolis. This explains why this study becomes apt as active participation of residents in urban environment development have been advocated as germane to the success of some region's urban greening and renewal programmes (Bryne and Sipe, 2010).

METHODOLOGY

Study Area

Ibadan is situated between Longitude: 3° 55' 0"E and Latitude 7° 23' 47"N (Wikipedia, 2014). It is one of the largest and ancient cities in Nigeria and West Africa. Ibadan, the capital of Oyo state has population of about 2,550,593 according to 2006 census results, within 11 local government areas. The population of Ibadan metropolis, housing five Local Government Areas (LGAs) is put at 1, 338, 659 (NBS, 2009) and it covered an area of 128 km². The other 6 LGAs, which combined with those in the metropolis to make up Ibadan are in settlements adjoining the metropolis. The study was carried out in four major streets in Ibadan metropolis: two are in the major tertiary institutions in the city: University of Ibadan (Plate 1) and The Polytechnic of Ibadan (Plate 3) while the other two are in Agbowo and Apete (their adjoining settlements, respectively Plates 2 and 4).



Plates 1 & 2: Comparing a major street each in University of Ibadan and Adjoining Agbowo



Plates 3 & 4: Comparing a Major Street each in the Polytechnic, Ibadan and Adjoining Apete

Ibadan is located in the forest zone of the country but close to the boundary between the forest and the savanna. The city ranges in elevation from 150 m in the valley area, to 275 m above sea level on the major north-south ridge which crosses the central part of the city. The principal inhabitants of the city are the Yoruba people (Wikipedia Encyclopaedia, 2009).

Data Collection

Residents of the selected study sites (educational institutions and adjoining communities) constituted the population for the study. The survey employed the use of a set of open-ended and structured questionnaire to obtain information on: residents' socio-economic background including duration of residency in the area, level of understanding about trees in environmental management, previous public/private tree planting exercises in the area, respondents' preferred tree type(s) for urban forestry/greening projects; and constraints to biodiversity in the area.

Sampling Technique

A total of four hundred questionnaires were administered to randomly selected residents in the selected sites. This includes 100 respondents in each of the selected communities under study. The use of simple random sampling for the questionnaire survey is expected to reduce bias due to sampling. However, 337 responses were eventually used for the study (91 from University of Ibadan; 72 from Agbowo; 85 from The Polytechnic; and 82 from Apete) after careful sorting.

Method of Data Analysis

Data obtained were subjected to descriptive statistical analysis viz frequency and percentage distribution.

RESULTS AND DISCUSSION

Respondents' Background

Table 1: Frequency Distribution of Respondents' General Background

	Frequency	Percentage	Mode
Age (Years)			
<15	12	3.6	<15 - 25
<15 – 25	165	48.9	
<26 – 35	103	30.6	
>36 – 45	21	6.2	
>45 – 55	21	6.2	
>55	13	3.9	
No Response	2	0.6	
Gender			
Male	184	54.6	Male
Female	151	44.8	
No Response	2	0.6	
Educational Background			
First School Leaving Certificate	11	3.3	HND/B.Sc./B.A.
Secondary School Certificate	56	16.6	
OND/NCE	98	29.1	
HND/B.Sc./B.A.	109	32.3	
Postgraduate Certificate	48	14.2	
Others	5	1.5	
No Response	10	3.0	

Source: Field Survey, 2009

The proportion of females (44.8%) to males (54.6%) differed by a margin of about 10% (Table 1). The population was also made up of more young and able-bodied persons whose ages were <35 years (52.5%). Thus depending on their perception, this may imply a bright prospect for urban development plan/programme if the perception of this population is positive especially if driven by novel strategies and techniques because urban forestry is a dynamic practice that involves techniques, changing approaches and strategies of operation in line with changing trends of urban transformation (Dwyer *et al.*, 2003). This dynamism could more easily be imbibed and assimilated by younger people than older ones.

The study also revealed that majority of the respondents is educated with frequency of response increasing with increase in level of education (Table 1). Frequency of response however peaked at higher national diploma or first degree level (32.3%) of education before decreasing again at

higher degree level. This trend is similar with the trend observed in respondents' age distribution where frequency of response also increased with age increment only to peak at <26 – 35 years. The population sampled can thus be likened to a knowledge-driven population, the potential of which if effectively harnessed could have positive multiplier effect on local and national transformation drives and policies.

Other Background Information

Table 2: Other Background Information of the respondents'

	University		The Poly		Agbowo		Apete		Mode
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Duration of Residency (Years)									
5-10	53	58.2	50	58.9	47	59.5	26	31.7	5 – 10
>10 – 15	22	24.2	11	12.9	15	19.0	9	11.0	
>15 – 20	11	12.1	9	10.6	15	19.0	-	-	
>20	5	5.5	7	8.2	-	-	9	11.0	
No Response	-	-	8	9.4	2	2.5	38	46.3	
Marital Status									
Single	54	59.3	71	83.5	45	56.9	57	69.5	Single
Married	32	35.2	14	16.5	25	31.7	20	24.4	
Divorced	5	5.5	0	0.0	0	0.0	5	6.1	
Others	0	0.0	0	0.0	9	11.4	0	0.0	
Respondents' Profession									
Student	53	58.2	50	58.8	36	45.6	18	22.0	Student
Civil Servants	5	5.5	12	14.1	0	0.0	9	11.0	
Self Employed	11	12.1	5	5.9	26	32.9	35	42.6	
Others	5	5.5	5	5.9	0	0.0	9	11.0	
Lecturer	11	12.1	6	7.1	0	0.0	0	0.0	
No Response	6	6.6	7	8.2	17	21.5	11	13.4	

Source: Field Survey, 2009

*NB: Percentage responses are in parentheses

The study population was drawn mostly from those who had resided in the study area for between five and ten years (Table 2) and based on residency, the highest level of experience is expected from The Polytechnic residents where 8.2% of the respondents have resided for more than twenty years (Table 2). Among respondents in Agbowo and Apete, there were observed gaps (breakage) in the duration of residency especially beyond a period of 15 years. Conversely, in the educational institutions, varying proportions of the respondents had resided in the area over the years (up to about >20 years). This will likely impact efficiency in information sharing and thrust (relating to changes in residency rules and regulations in the area, permissible property improvement activities and extent of control of property) among respondents in the educational institutions than in the communities. Duration of residency and understanding of property holding modules had been reposed by Francis (1984) to influence acceptance or otherwise to plant trees. This implies that longer duration of residency could actually increase the desire to plant choice species in an area.

Private and public owned residential properties in the study area are largely occupied by tenants. Where urban renewal and greening activities are a key policy thrust of government, relevant stakeholders are expected to utilize the results of perception studies to harness the manpower and resources being offered by the respondents to step up urban renewal process and by extension, biodiversity improvement by increasing tenancy duration at lower costs. This can be significantly improved by enhancing access to such property especially at owner-occupier basis, making tenancy rates more affordable or relatively subsidized by government. However, in the educational institutions, residency is largely based on service period (years). Where spaces for tree growing are not part of initial plan of individual residential areas, tracts can be gazetted around blocks of residential areas for biodiversity development. Concerned authorities will this way encourage and promote the growing of improved economic tree species that can add value to public property apart from encouraging more vegetation cover.

Also observed from collected data sets was that most of the respondents are single and majority of them are students (Table 2). However, also worthy of note is the appreciable distribution of the self-employed respondents' which was observed to be higher in adjoining communities compared to the educational institutions close to them.

Urban Greening and Biodiversity Conservation

The highest affirmation on residents' prior knowledge about urban greening (Table 3) was recorded in University of Ibadan (93.4%), followed by the response of those in the adjoining Agbowo community (63.3%). But, response on prior knowledge about urban greening among residents in The Polytechnic and the adjoining Apete community (Table 3) are abysmally low (8.2% and 8.5%, respectively).

However, very high percentages of the respondents' from Apete (87.8%) and Agbowo (78.5%) communities consented to having planted trees in their environment in recent years. But, although equally high, respondents consents to planting trees was not comparable in the educational institutions. Such consent was lowest (48.2%) in The Polytechnic, Ibadan and slightly higher (68.1%) in University of Ibadan (Table 2). This is surprising judging from the abysmally low knowledge about urban greening observed among residents' in the adjoining communities compared to that of their counterparts in the educational institutions.

The respondents in Agbowo and Apete respectively had comparatively higher desire for planting trees around their residence compared to their counterparts in the adjoining educational institutions (University of Ibadan: 74.7%; The Polytechnic: 80.5%). This may however, be due to the enforcement of physical planning regulations by the units responsible in each of the educational institutions, which will not allow for planting trees at whim by residents. This observation was reposed by Roth and Gnnis (2012) who observed that property holding and operational regulations in different areas influence property development in such areas. This will determine the relative extent of control on property in different environments irrespective of length of residency.

Table 3: Respondents' Perception about Urban Greening and Biodiversity Conservation

Category	Locations				Mode
	University	The Poly	Agbowo	Apete	
Level of understanding of importance of trees in environmental improvement					
High	85(93.4)	7(8.2)	50(63.3)	7(8.5)	High
Low	-	6(7.1)	27(34.2)	8(9.8)	
No Response	6(6.6)	72(84.7)	2(2.5)	67(81.7)	
Have you ever planted trees within the area over the years					
Yes	62(68.1)	41(48.2)	62(78.5)	72(87.8)	Yes
No	-	5(5.9)	-	-	
No Response	29(31.9)	39(45.9)	17(21.5)	10(12.2)	
Desire for planting trees around residence					
Yes	68(74.7)	66(80.5)	71(89.9)	74(87.1)	Yes
No	23(25.3)	16(19.5)	-	7(19.5)	
No Response	-	-	8(10.1)	4(4.7)	
Level of participation in past tree planting campaigns					
High	38(41.8)	17(20.0)	9(11.4)	25(30.5)	Low
Low	53(58.2)	66(77.6)	53(67.1)	47(57.3)	
No Response	-	2(2.4)	17(21.5)	10(12.2)	
Appreciation of avenues and streets planted with trees					
Yes	79(86.8)	72(84.7)	45(57.0)	52(63.4)	Yes
No	12(13.2)	7(8.2)	-	20(24.4)	
No Response	-	6(7.1)	34(43.0)	10(12.2)	
Most preferred species for avenue and/or residential area					
a. Fruit trees	12(13.2)	41(48.2)	26(32.9)	35(42.7)	Fruit trees
b. Medicinal shrubs	-	2(2.4)	5(6.3)	9(11.0)	
c. Economic trees	29(31.9)	9(10.6)	10(12.7)	9(11.0)	
d. Ornamental flowers	23(25.3)	21(24.7)	26(32.9)	17(20.7)	
e. a and b	21(23.1)	8(9.4)	-	-	
No Response	6(6.6)	4(4.7)	12(15.2)	12(14.6)	
Total	91 (100)	85(100)	79(100)	82(100)	

Source: Field Survey, 2009

*NB: Percentage responses are in parentheses

Examining species preference for urban greening exercise among respondents (Table 3), different kinds of species were observed as preference, the highest of which is fruit trees. However, while fruit trees were more popular in The Polytechnic and adjoining Apete community, economic and ornamental trees were more preferred in University of Ibadan and the adjoining Agbowo community. Also worthy of note is the equally popular preference of fruit and ornamental trees in Agbowo community. This will not be unconnected with adornment of the University of Ibadan community with fruit trees already, thus reducing the felt need for more of them within particular community compared to the other study sites. This notwithstanding, the importance of fruits to the socio-economic and health of residents cannot be overstressed. For example, fruits were reported by Alabi *et al.* (2012) to be traded on in different markets in southwest Nigeria including Ibadan. Some subsistent fruit sellers depend on the sales of fruit tree products, which they gather in different areas and sell in urban markets for their livelihood (Asinwa *et al.*, 2012). Apart from this, fruits are sources of vitamins and minerals which are

necessary for normal growth. When lined along major and minor streets in any area, they can attract visitors and increase longer economic transactions (buying and selling activities) around such areas. Such an avenue planting is a source of revenue and a resource which can promote tourism. More so, residents within areas covered with fruits and other tree species tend to live longer and happier (Faculty of Public Health, 2012). This may inform the choice of fruit trees by majority of residents in Ibadan. Past studies (Ajayi and Babalola, 2010; Amusa *et al.*, 2003) have reposed the choice of citrus, *Cocos nulifera*, *Annona muricata* in Ibadan and other neighbouring areas.

According to FAO (2002b) practical demonstrations on tree planting and other forestry activities using economic species has prospects to improve livelihood of the people through their products in addition to other attributes which include environmental functions and services. Such activities had been ongoing in partnership with the Department of Forest Resources Management, University of Ibadan and may have improved the knowledge and awareness about tree planting by residents and by extension account for the choice of economic species by residents in the university and even in the surrounding Agbowo community. This was reposed by Olajuyigbe *et. al.* (2013) who reported successfully establishment of fast growing economic species like *Eucalyptus* Spp, *Gmelina* Spp, *Milicia* Spp and *Kyaya* Spp in the University and other locations in Ibadan.

On participation in public tree planting exercise the frequency of response from The Polytechnic residents' was the lowest (11.4%) while that of those residing in the University of Ibadan was the highest (41.8%). This will explain the discrepancy in the level of greening observed in these two educational institutions and their surrounding communities (Plates 1, 2, 3 and 4). As submitted by Pathfinder International (2000) and reposed by Cheema (2011), the mandate, capacity and spectrum of outreach of an institution or organisation can stimulate/foster linkages and support towards achieving desired goal. This assertion played out in the varying rates of understanding of the importance of trees in urban environmental management particularly in communities surrounding the educational institutions considered in the study.

Some reports indicated that programmes of government on urban forestry through the State Department of Forestry (SDF) have not been strongly based on demonstration, outreach and collaboration. More so, people now tend to have less confidence in the government than in private individuals and organisations that are more purposeful. Thus, collaboration between the government agencies and departments with private result-driven institutions and organisations (most especially those with requisite manpower, capacity and drive) on development and environment is imperative for sustainable urban forestry drive. Different organisations and institutions have differing mandates, for instance, government institutions and agencies are better equipped in terms of scope, thrust and services to handle local and national development initiatives. The scope of academic and development programmes undertaken in different educational institutions is instrumental to building capacity for driving such programmes and initiatives, which can improve environmental sustainability.

Table 4: Constraints to Biodiversity Conservation and Urban Greening

Identified Constraints	Locations				Total	%
	University	The Poly	Agbowo	Apete		
Harbours dangerous animals	79 (42.7)	33 (38.8)	47 (45.2)	35 (42.7)	194	43.6
Natural fire	51 (27.6)	12 (14.1)	47 (45.2)	8 (9.8)	118	26.5
Lack of awareness	17 (9.2)	11 (12.9)	-	9 (10.9)	37	8.3
Landlessness and operational tenure	21 (11.3)	14 (16.5)	5 (4.8)	9 (10.9)	39	8.8
Trees are associated with evil spirit	-	2 (2.4)	-	-	2	0.5
Low incentives	17 (9.2)	-	5 (4.8)	-	22	4.9
No response	-	13 (15.3)	-	21 (25.6)	33	7.4
Total	185 (100.0)	85 (100.0)	104 (100)	82 (100)	445	100

Source: Field Survey, 2009

*NB: This is a multiple response question and Percentage responses are in parentheses

The topmost constraints identified by respondents to effective urban greening and biodiversity improvement were their phobia for wild animals (43.6%) and the menace of natural fires (26.5%). Ibadan as stated earlier is a densely populated area. The proportion of open spaces within Ibadan metropolis is put at 1.38%. Thus relevant authorities in government responsible for the regulation of urban slum and settlement patterns are expected to fashion minimizing the risk of both urban fire incidence and dangerous wild animals into their urban greening plans. Experiences of residence (Table 4) have shown that residential areas situated close to fringes and agricultural lands attract snakes especially at night. Similarly, bush burning and fire incidence are more rampant in dry seasons in Ibadan city. Urban forestry planners and extension workers should demonstrate the use of wildlife repellent plant species in addition to carrying out fire tracing in business and residential areas to check the above perceived constraints by respondents. Landlessness and tenure constrain was more associated with academic institutions (University of Ibadan and The Polytechnic) than in their adjoining communities perhaps because of perceived indigene-visitor dichotomy in the educational institution. As observed by Lowe (1986), the status of a given resident in an area (indigenes and visitors) influences development and improvement activities on lands accessible to such residents.

Table 5: Respondents' view about Factors Militating against Planting of Trees

Responses	Study Sites				Total
	University	The Poly	Agbowo	Apete	
Lack of awareness	17 (18.7)	11 (12.9)	-	9 (10.9)	37 (10.9)
Landlessness	5 (5.5)	11 (12.9)	5 (6.3)	9 (10.9)	30 (8.9)
Industrialisation	6 (6.6)	-	10 (12.6)	9 (10.9)	25 (7.4)
Deforestation	-	6 (7.1)	-	-	6 (1.8)
land tenure	16 (17.6)	3 (3.5)	-	-	19 (5.6)
Climatic condition	-	-	5 (6.3)	-	5 (1.5)
Trees harbour evil spirit	-	2 (2.4)	-	-	2 (0.6)
Tree causing darkness	-	2 (2.4)	-	8 (9.8)	10 (2.9)
Poor government policies	17 (18.7)	-	5 (6.3)	-	22 (6.5)
No Response	30 (32.9)	43 (50.6)	54 (68.4)	47 (57.3)	174 (51.6)
Total	91 (100.0)	85 (100.0)	79 (100.0)	82 (100.0)	337 (100.0)

Source: Field Survey, 2009

*NB: Percentage responses are in parentheses

Examining respondents' view on the factors militating against tree planting in the study area (Table 5), the lack of awareness about the possibility of private involvement in tree planting was the most subscribed among them (18.7% in the University, 12.9% in the Polytechnic and 11.9% in Apete). Again, the non-awareness of possible private involvement in tree planting was more popular in the public institution compared to the communities surrounding them that had more private residents. This could be ascribed to the structure already in place in the public institutions, which enshrined greening in the estate management structure compared to the surrounding communities where owners design their surroundings to their taste. Other factors perceived militating against tree planting include landlessness, industrialisation, land tenure and poor government policy on greening (Table 5).

Table 6: Identified Solutions to Factors Militating against Tree Planting

Responses	Study Sites				Total
	University	Poly	Agbowo	Apete	
Awareness creation	17(18.7)	15 (17.5)	10 (12.7)	9 (11.0)	51 (15.1)
Enactment of laws	11(12.1)	6 (7.1)	-	-	17 (5.0)
Space creation for forest	11(12.1)	3 (3.5)	5 (6.3)	8(9.7)	27 (8.0)
Afforestation	5(5.5)	-	-	-	5 (1.5)
Proper orientation	-	3(3.5)	-	-	3 (0.9)
Tree planting campaign	-	2(2.4)	-	-	2 (0.6)
Proper planning	-	2(2.4)	-	-	2 (0.6)
Others	6(6.5)	6(7.1)	5 (6.3)	9 (11.0)	26 (7.7)
No Response	41 (45.1)	48 (56.5)	59 (74.7)	56 (68.3)	204 (60.5)
Total	91 (100.0)	85 (100.0)	79 (100.0)	82 (100.0)	337 (100.0)

Source: Field Survey, 2009

*NB: Percentage responses are in parentheses

Table 6 itemised the identified solutions to factors militating against urban greening and awareness creation was the most subscribed (15.1% in the University, 17.5% in the Polytechnic, 12.7% in Agbowo and 11.0% in Apete). This was followed by creation of space for forest establishment (12.1% in the University, 3.5% in the Polytechnic, 6.3% in Agbowo and 9.7% in Apete). Other suggested solution was the making of incentives available towards encouragement of tree planting.

CONCLUSION

Although situate in the same ecological environment and subjected to similar climatic vagaries biological diversities differ in the four study locations in the study and so is the perception of residents about urban greening in the study sites. These may be attributed to different socio-economic circumstances within which residents in these sites are operating. However, one thing is clear; despite the discrepancies in residents' awareness about urban forestry, the importance of trees to urban greening is very popular among them. The role of the Department of Forest Resources Management, University of Ibadan, in biodiversity conservation within the university community played a major role in awareness creation among residents and those in the adjoining Agbowo community. The public property effect also played a big role in biodiversity

conservation in these two institutions and also impacted on the residents' appreciation of a green environment. Mostly noticeable is the poor existing policy instrument in the study area, which is negatively impacting interest in tree planting viz-a-viz non-favourable existing land tenure system and the hitherto non-competitiveness of tree planting as a land use system.

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