

Assessment of Tree Planting Efforts in Lagos Island Local Government Area of Lagos State, Nigeria

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Abstract

Investigations were carried out to review tree planting activities within the Lagos Island Local Government Area of Nigeria. The city is a center of commercial activity within a hot tropical environment. Efforts have been made by both governmental and private bodies to promote tree planting within the area in mitigating the effects of urbanization on the environment particularly in the area of climate change. However, it became necessary to assess the tree planting activities so as to properly place its achievements and positive contributions to the environment. The review is also to highlight the areas where more efforts are needed. An enumeration of existing trees was carried out with the aim of assessing the distribution, specie types and density of coverage. A handheld GPS device was used to acquire the coordinates of trees which were then mapped. Further analysis using GIS was done. Interviews with tree planting officials and public volunteers were also carried out. A total of 293 trees was identified within the study area which is about 8.7 km² in size. The result indicates a paucity of trees in the area despite the various tree planting efforts. A high mortality rate of trees was observed. Further findings indicated that the public's desire to support, manage and maintain the planted trees was poor. It was observed that the tree planting activities were seen as a curse rather than a blessing by market men and women within the study area. This study suggests more public enlightenment and that edible species should be planted in place of exotic ones being used.

Keywords: tree planting, Lagos, afforestation, green environment, urban forestry

1. Introduction

Urbanization and deforestation are two main activities that have increased the concentration of greenhouse gases in the atmosphere. Man in the bid to meet his basic needs of food, clothing and shelter, exploits the resources of the physical environment which are usually not deliberately replaced. Forests and vegetal cover are prominent among such resources. Through the clearing of forests and the burning of fossil fuels, more carbon is released and at a faster rate than the natural process of terrestrial carbon sequestration. United States Environmental Protection Agency (US EPA, 2012) projected that CO₂ emissions from energy use are to increase between 40 to 110 percent between 2000 and 2030 noting that human activity is directly or indirectly responsible for the release of six to seven billion metric tons of carbon annually. Increases in average global temperature have been linked to this phenomenal rise in atmospheric carbon (National Space Agency [NASA], 2010). Carbon dioxide (CO₂) absorbs energy from the Sun and then releases it back into the atmosphere. This greenhouse effect keeps the Earth warmer than it would be if this process did not occur.

Environmental concern about global warming, urban heat islands, and air pollution has brought attention to the potential of trees to ameliorate climate and conserve energy (McPherson & Rowntree, 1993). Trees play instrumental roles in the greening of the landscape, cleaning the air, reducing energy use and control of run-off. Green plants are important carbon pools which continuously exchange CO₂ in the atmosphere, due to both natural processes and human activities. As a result, afforestation is recognized under the Kyoto Protocol as an eligible activity to help mitigate emissions of greenhouse gases (GHG) primarily carbon dioxide.

Thus, there has been growing interest towards achieving a greener environment through tree planting campaign efforts globally, as trees are purported to provide many benefits such as temperature modification and energy conservation (McPherson & Rowntree, 1993), abatement of air and water pollution (Tyrväinen, Pauleit, Seeland, & deVries, 2005), serve as a wind breaker and recreational parks (Lamers, Michels, & Vandenbeldt, 1994),

enhanced environmental conduciveness in terms of aesthetics and property value mostly in urban areas or cities (Johnson, 2007). Trees and woods are vital to health and well being. Also, there is a strong relationship between the quality of urban green space and people's health and wellbeing (Adekunle, Momoh, & Agbaje, 2008).

Trees ameliorate climate and human comfort through shading, evapotranspiration and air flow modification. Shading reduces the amount of radiant energy absorbed, stored, and radiated by building surfaces while evapotranspiration converts radiant energy into latent energy, thereby reducing sensible heat that warms the air. Air flow modification affects transport and diffusion of energy, water vapor, and pollutants. One cost of not having trees is that air quality is adversely impacted by the urban heat island effect. Trees can reduce air temperature by transpiring water, which consumes heat energy in the surrounding air.

The planting of trees in human settlement and as an integral part of the landscape is not new. Its roots can be traced to ancient Chinese, Western Asian and Greek civilization (Jellicoe, 1985). Tree planting activity in cities is popular all over the world but not yet so in the developing countries of Africa. In the traditional African setting, trees are part of the visible features of villages and settlements. Past and even present deforestation activities in such countries has led to the removal of a large proportion of vegetal cover so much that deliberate steps need now to be taken to forestall further damage to the physical environment. At the same time, there is an increase in urbanization in developing countries. Urban centers in such countries are vast areas of tar and concrete without the green component of vegetal cover. This loss of green areas can aggravate the urban heat island effect (Bochaca & Puliafito, 2007). Thus, if any area has a need for tree planting, it should be the cities and towns of the tropical area of Africa with characteristic high temperatures. This indicates the need for the promotion of greening activities in the environment. Efforts in greening activities have increased in developing countries such as the case in Kenya and Ethiopia.

Nigeria is not left out in the drive for a green environment. Governmental bodies at the federal, state and local government levels have endeavored to arrest deforestation activities in rural areas while promoting tree planting within urban centers. Tree planting program started in Lagos in July, 2009 as a joint activity of the state government, local government authorities and local council development areas with the participation of corporate organizations, non-governmental agencies and others. It was tagged 'Plant a Tree Today' and to be observed annually on the 14th of July. From government records, a total of three million, five hundred and twenty-five thousand (3,525,000) trees have been planted in the whole of Lagos State since inception of the tree planting program.

The aim of this study is to assess the tree planting activities within the Lagos Island Local Government Area. The objectives to be achieved are to:

- i. Identify and map planted trees in the study area;
- ii. Examine the level of management of the planted trees;
- iii. Study the perceptions of local populations with regard to tree planting.

It is expected that findings from this study will help in identifying shortcomings in tree planting activities not only within the study area but also in other areas where similar practices and perceptions are upheld.

2. Materials and Methods

2.1 Study Area

Lagos State is located in the southwestern coast of Nigeria approximately between latitudes 6°22'N and 6°52'N and longitudes 2°42'E and 3°42'E. It has a total area of 3,577 km² about 22 percent of which is water (Figure 1). The area is characterized by a wet equatorial climate with mean annual rainfall above 1800 mm. Flooding is an annual occurrence in Lagos. The high rainfall experienced in the area coupled with the prevalence of high water table and flat terrain make it prone to flooding. An important part of the land resource in the state comprises of saltwater and freshwater wetlands. The former covers the mangrove swamps along the coast of the study area.

Lagos is the most urbanized state in Nigeria with about 70% of the land area covered with towns and cities. The Lagos metropolis alone have about 17,500 hectares of built up area (Oduwaiye, 2007). The most disturbing aspects of the land-use changes are the disappearance of virgin forests with the high rate of urbanization. It is apparent that undisturbed forest has virtually disappeared in the area. Large hectares of mangrove swamps and other exotic vegetation have been lost to city development (Lagos State Ministry of Economic Planning and Budget, 2004). The natural land cover of the Lagos area has witnessed a dramatic shift as a result of massive urban development. Vegetation and water cover have given way to an artificial urban landscape of concrete and tar.

This study has focused on Lagos Island Local Government Area which is one of the 20 local authority areas in Lagos State. It is a small fragment of the bigger metropolitan Lagos. It covers the western half of the Lagos Island and occupies an area of about 8.7 km² (Figure 1). The land area is shared largely between residential and commercial land uses. However, the spatial extent of the commercial area far outweighs that of residential use. From the 2006 National Population Census figures, the local government area (LGA) has a population of 209,437. The small land area means that its large population has to be crowded in a small space, resulting in high population density. The area is characterized by an uncoordinated growth which has resulted in a mosaic of slums in many older parts of the LGA.

2.2 Data Collection

In assessing the tree planting efforts in the study area, an enumeration process was carried-out to determine the number of trees in existence within the area. The number of trees was counted and the actual location of each tree within the study area was determined. This was done with the use of a Garmin 72 Global Positioning System (GPS). The GPS device was used to take coordinates of each standing tree. The coordinates were then plotted on the map of the local government area.

Five (5) tree planting officers in the Department of Agriculture, Rural and Social Development of Lagos Island Local Government, were interviewed. Also, questionnaires were administered to 50 residents and workers/business men and women within the local government. A purposive random sampling method was adopted in the selection of respondents.

To assess the financial commitment of the state and local government authority in the tree planting effort, data on funding was collected from the records of the Lagos State Ministry of Environment and the Lagos Island Local Government Authority respectively. The period covered was from inception of the tree planting program in 2009 till date.

2.3 Data Analysis

Descriptive statistic (percentages) was used to present data acquired from interviews conducted. Analysis of point pattern was carried out with the use of ArcGIS tool. Nearest Neighbour Index, z-score and p-value were calculated in order to assess the spatial distribution of trees within the study area.

3. Results and Discussion

3.1 Enumeration of Trees

A total of 293 trees was identified through the enumeration process carried out in this study. The locations of the trees are shown in Figure 1. From the figure, all the planted trees are located around the periphery of the LGA particularly on the western axis of the island where the trees were laid out along the Ring Road. Another major clustering of trees was found close to the Adeniji Adele Road in the northern section of the study area. A smaller nucleus is located along Tapa/Oshodi Street and Alfred Rewane Road towards the north-west.

3.2 Ownership and Pattern of Distribution of Trees Within the Study Area

Out of the 293 trees located in the study area, 118 were planted by the Ministry of Environment and other state agencies such as Lagos State Waste Management Authority (LAWMA), Lagos State Advertising Agency (LASAA). The local government authority planted 82 while corporate organizations such as 7UP Bottling Company and United Bank for Africa, planted 91.

The 82 trees which were identified to have been planted by the LGA is a far cry from the 1,090 trees that were recorded to have been planted by them. The difference can be traced to damage of plant seedlings caused by human activities. Human traffic within the LGA is high and seedlings could be easily trampled on without notice particularly in cases where such seedlings were not barricaded. The low survival rate indicates a lack of management of trees. According to Costello and Jones (2003), the concept of tree planting encompasses the planning, design, establishment and management of tree and forest stands with amenity values situated in or near the urban area. It is not sufficient to plant trees but the trees must be cared for.

On further investigation, it was discovered that the tree planting activities of the various participating bodies were concentrated in the different areas mentioned above. The trees along the Ring Road were planted by the state Ministry of Environment while the LGA planted around Tokunbo/Tapa streets, Ebute-Ero, Apongbon and Alfred Rewane Road. The Adeniji Adele nucleus is owned by the corporate organizations.

Also from the figure, the inner locations of the study area are devoid of trees. These are largely residential areas and market zones. It was also observed that the trees were planted in open-spaces that were once illegal market locations and hideouts for hoodlums. In this way, the trees have helped in the beautification of the area. Policy

makers should aim at planting trees in residential areas where trees are needed most for cooling purpose.

GIS tool was used to analyze the point pattern. The result is given as:

Nearest Neighbor Ratio: 0.236077

Z Score: -24.454527

p-value: 0.000000

The point analysis has shown that the distribution pattern is clustered in areas where they are located. The points are unevenly distributed and the number of planted trees is still far from being adequate. It can be concluded that the tree planting exercises have been concentrated along major roads as shown by the pattern of tree distribution. For the planting to be effective, it has to be evenly distributed particularly in the areas within the LGA.

3.3 Characteristics of Planted Trees

From the tree enumeration carried out, seven species were observed to have been planted in the study area. These include *Azadirachta indica* A. Juss. (Neem), *Eucalyptus globulus* Labill (gum tree), *Polyalthia longifolia* (Sonn.) Thwaites (Masquerade), *Archontophoenix cunninghamiana* H.Wendl. & Drude (King Palm), *Syagrus romanzoffiana* (Charm.) Glassman (Queen Palm), *Gmelina arborea* Roxb. (Beechwood) and *Butea monosperma* (Lam.) Taub. (Flame of the Forest).

None of these tree species are indigenous to the Nigerian environment. *Azadirachta indica* (Neem), *Asoca* (Masquerade), *Butea monosperma* (Flame of the Forest) and *Gmelina arborea*, (Beechwood) are natives of India and the Asian continent in general. *Syagrus romanzoffiana* (Queen Palm) is from Central and South America while *Eucalyptus* (gum tree) is from Australia.

Each of the trees has its peculiar characteristic features. *Azadirachta indica* (Neem) is a fast-growing tree that can reach a height of 15–20 meters. It is characterized by a fairly dense crown which is roundish in shape. *Butea monosperma* (Flame of the Forest) is a medium sized deciduous tree, growing to 15 m tall. *Gmelina arborea*, (Beechwood), is a fast growing deciduous tree. *Syagrus romanzoffiana* (Queen Palm) is a medium-sized palm, which can reach up to a height of 15 meters. It is popular as an ornamental garden tree. *Archontophoenix Cunninghamiana* (King Palm) can grow up to 50 ft. tall, 15 ft. spread.

3.4 Governmental Funding of the Tree Planting Program

Essentially, the tree planting activities within the state have been mainly done by governmental bodies and so government spending is important in the assessment of the tree planting program. Data collected from the Ministry of Environment shows that government spending is not adequate. Details of the Nigerian Naira value and approximate US dollar equivalents (in brackets) are shown in Table 1. The total amount disbursed by the state government for the planting of trees in the whole of Lagos State is -N- 560,000 (\$3,589.7) since the inception of the program in 2009.

Table 1. Funding of tree planting program by the Lagos State Government

S/N	Year	Annual project fund (Naira)	Fund released (Naira)	%
1	2009	1,120,000 (\$7,179.5)	200,000 (\$1,282)	35.7
2	2010	896,000 (\$5,743.6)	160,000 (\$1,025.6)	28.6
3	2011	562,000 (\$3,602.6)	100,000 (\$641)	17.9
4	2012	560,000 (\$3,589.7)	100,000 (\$641)	17.8

Source: Lagos State Ministry of Environment, Tree Planting Unit

Also, the monetary input of the Lagos Island local government authority was considered and from records a total sum of -N- 2,050,000 (approximately \$13,142) has been expended so far. The breakdown over the years is shown in Table 2. Instead of the funds to be increased by the local authorities, the amount spent on tree planting is on the decrease annually. This may imply a lack of commitment to the program.

It appears the main responsibility for tree planting in Lagos is vested in the local authorities as more funds has been expended from that source. However, this amount is negligible particularly when compared with what is being done in different parts of the world. For instance, New York City unveiled PlaNYC in 2007, a plan to create “a greener, greater New York”, that contains a number of tree-related strategies. Under this plan, the city

aims to fill every possible street tree spot by 2030 by planting a total of one million trees. To supplement this, the city government was to plant 12,500 trees at an annual cost of \$17 million (Brown University Center for Environmental Studies, 2010).

Though it is obvious that governmental agencies in developing countries such as Nigeria are faced with severe financial challenges, alternative sources of funding could be sought particularly via the private sector. Businesses and NGOs could be encouraged to make definite commitments on tree planting. For instance, manufacturing companies could be made to plant and maintain trees within their premises before commencement of operations and such policies could be enforced by agencies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA).

Table 2. Lagos Island Local Government Funding of tree planting program and number of trees planted

S/N	Number of trees planted	Year	Amount expended (Naira)
1	400	2009	550,000.00 (\$3,525.6)
2.	300	2010	505,000.00 (\$3,237.2)
3.	200	2011	500,000.00 (\$3,205.1)
4.	190	2012	495,000.00 (\$3,173.1)
TOTAL	1,090		2,050,000.00 (\$13,141)

Source: Department of Agriculture, Rural and Social Development, Lagos Island Local Government Authority.

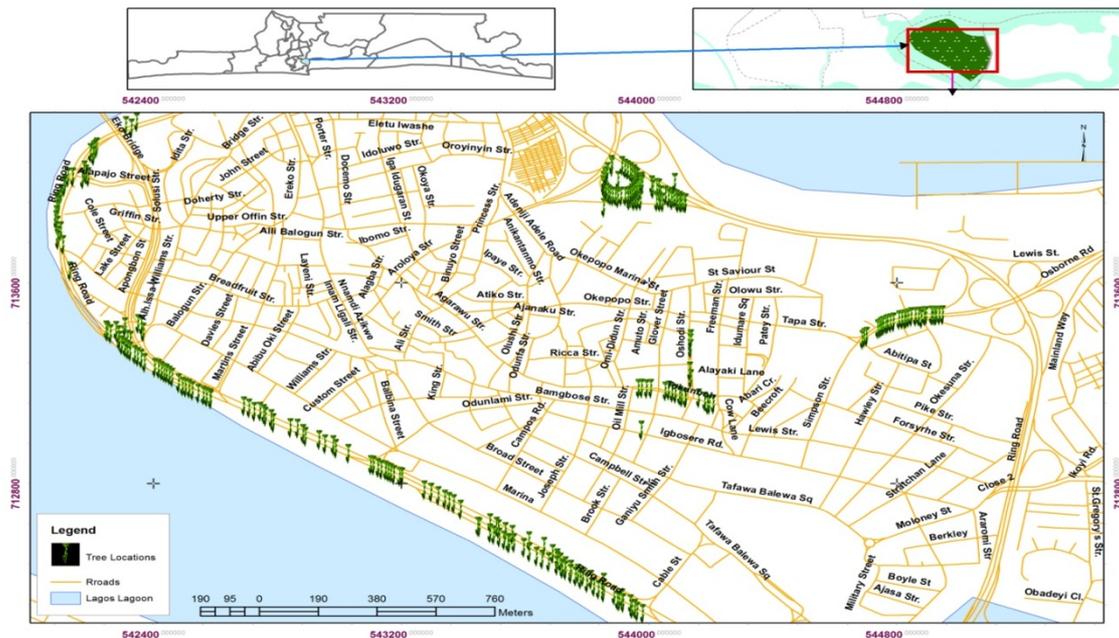


Figure 1. Map of study area showing tree locations

Source: Authors' fieldwork

3.5 Activities of Tree Planting Officers

Discussions were held in the form of interviews with tree planting officers in the study area. It was revealed that the activities of the officials were mainly to plant trees and monitor the plants on site. The monitoring activities include visiting the site at least twice a week, preventing the plants from being vandalized by barricading with wire guards and writing a weekly situation report which is forwarded to the Lagos State Ministry of Environment. Conspicuously missing in the responsibilities of the field officers is the management and care for the trees. Activities such as regular wetting of seedlings, weeding around the plant and enriching of the soil are not carried out. During the dry season, wetting of plants is done occasionally. The effect of this lack of care of the trees is that

the seedlings wither and die. Interest in the trees is shown annually when the tree planting campaign day is approaching. On the tree planting day, the dead plants are replaced by new seedlings which are also subjected to the same treatment and the same result is produced.

It was observed that no formal training was given to the field officers on tree planting and management. However, there are quarterly meetings organized by the Ministry of Environment where the officers update on tree planting activities. Problems encountered in the field are referred to the ministry and responses are usually delayed.

3.6 Perceptions of Trees and Tree Planting by Local Populations

From the questionnaire survey, 93% of respondents were of the view that trees were beneficial for aesthetic purpose. It was accepted that the planting of trees adds beauty to the environment and transforms the drab look of slums.

Though it was accepted that tree planting is beneficial to the society, 82% of respondents were of the view that they were not benefiting directly from it. Arguments put forward include the fact that the trees were not fruit bearing therefore not edible neither are they large enough to provide shade from the hot sun. The trees were seen to be encroaching on the available little space that could have been used for more beneficial purposes like trading. As a result, the respondents placed little value on the trees. The general view is that trees belong to the forests while flowers and shrubs were for a higher social class.

When asked about the environmental benefits of tree planting, responses indicate a high level of ignorance on environmental matters and a general lack of awareness of the implications of tree planting. A large majority (72%) admitted they have not heard of climate change before. Another majority view (81%) was that the trees were planted there to simply add beauty to the area.

The respondents were asked to identify the reasons for the loss of the planted trees. Responses (71%) were mainly vandalism and lack of maintenance of such trees by the government. None of the respondents (0%) saw the trees as their own and so felt no need to care for them. To them, it was all a government affair.

4. Conclusion

From the findings above, it is evident that the tree planting program within the Lagos Island LGA is still at its infancy. For the four years of its existence, the program is yet to gain much ground. A few trees have been planted and out of this, only 27% are surviving. The choice of exotic species for the tree planting program is not a good decision. Nurturing and management of such trees to maturity requires a lot of care. The tree planting program was also poorly funded and so planting activities have been limited. The more governmental bodies are ready to invest in the environment, the better the outcome of the struggles against the rash and negative impacts of climate change. Public awareness is low and attitude is negative. This has reduced the basic support of the people which is necessary for the success of the program. For the program to succeed and make an impact, there is the need to carry the people along. Efforts should be made to educate and enlighten the citizens on environmental matters particularly with reference to climate change.

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