



Remaking Nigeria's Urbanism: Assessing and Redressing the Dearth of Open Spaces in Benin City

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ABSTRACT

Unplanned land use in most Nigerian cities has meant that all urban land needs are not adequately provided for within their landscapes. Open spaces are either conspicuously missing or inadequate. There is a tendency for existing open spaces to be lost to urban development pressure and a disregard for zoning. This paper identifies available and accessible open spaces in Benin City and assesses their adequacy using as a guide standards established in two selected international jurisdictions, discusses the potential benefits of open space to the city on the one hand and its residents on the other given the incipient impacts of global warming and climate change, and the prospects of mitigation by greening the city even in its already built-up state. Data is sourced from journals, reports, archival records and inspections of the urban environment. The findings confirm a great dearth of open spaces as well as deteriorating urban environmental conditions which have implications for health, well-being and urban sustainability. The recommendations are that future expansions of the city space incorporate adequate provisions for open spaces, whilst within the existing built-up city, solutions be sought in the creation of greenways, green paths, private green spaces, promoting street trees and the conversion of brownfield sites to green areas.

1. Introduction

The urban environment is essentially an adaptation of the natural environment into human settlements with features and facilities designed, developed and managed to support economic, social and developmental activities. Urban planning offers itself as a tool not only for urban development, but also, environmental management, both of which are concerned with human well-being. The nexus between people, their environment and well-being is acknowledged by HPHP (2015) in its definition of urban planning as "a relatively new profession that has arisen from concerns for health and maintaining well-being through averting diseases and illnesses associated with overcrowding, poor sanitation, and exposure to environmental pollution". In the planned environment, comfortable, productive and healthy living is enabled, supported and enhanced by facilities such as open spaces, also synonymous with green spaces, created or designated for specific and vital functions with a bearing on environmental sustainability, public health and well-being. Formal definitions of these important features of urban environments have been variously offered as follows:

"The term 'open space' covers greenspace consisting of any vegetated land or structure, water, path or geological feature within and on the edges of settlements, and civic space consisting of squares, market places and other paved

or hard landscaped areas with a civic function. Some spaces may combine green and civic space elements, but one type or other will usually predominate". (Scottish Government, 2008).

"Green space functions as a generic term for non-built up spaces within the administrative boundaries of a town or city. In this sense urban open space includes all 'outdoor' spaces including streets and squares, woodlands and agricultural areas as well as traditional parks and gardens. More recently the concept has been expanded to include those parts of the built fabric which are open to the sky, including roofs, terraces, balconies etc. and even building facades, where these can be clad with vegetation". (Workshop Tenerife, 2010).

"... any open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public. Open space can include Green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation). Green space includes parks, community gardens, and cemeteries, schoolyards, playgrounds, public seating areas, public plazas, vacant lots". (Environmental Protection Agency of the United States of America, 2016).

"Any area of land or body of water to which the public has physical and/or visual access" (Wellington Regional Strategy as cited in Regional Public Health, 2010)

“Green spaces (or green field developments) such as regional and local parks and reserves, sports fields, and other recreation areas; blue spaces such as the region’s waterways and harbours; grey spaces such as civic squares, streets and transport corridors. It also includes the open vistas and views that surround the city.” (Auckland Regional Growth Forum, as cited in Regional Public Health, 2010).

For the purpose of this study, the essential features of open spaces are that they are urban-located, non-built, vegetated or water-covered, accessible to the public and have a civic function. From these definitions it can be surmised that green space can exist naturally (or be adapted) or can be created deliberately as part of the urban environment in the course of planning towns and cities. Green space is part of open space, but the latter is wider in scope in that it includes paved or hard landscaped (i.e. non-vegetated) areas. However, it should be understood that these terms are interchangeably used hence forth in this paper.

A most important objective of urban land use planning is the achievement of land use equity through the “allocation of sufficient space for all urban needs” (Keeble, 1983). According to Lohmann (2006) “City planning is the effort to control, to guide and to accomplish the physical development of towns and cities and thereby to provide for the people who are living and working in them the best possible environment”. Since all cities do not have the advantage of being designed from scratch, town planning tends to be about deciding in which ways a city should remain as it is and in which ways it should be changed for the better (Keeble, 1983). This is why “the land use planner is characterized by seeking to influence, change and control land use” (Roberts, 1999), the concern being for cities to be designed, developed and managed in ways which would promote a sustainable environment, economic growth, innovation and social development. Urbanization on a global scale which has seen over 54% of the world’s population living in cities and with a prediction that the figure will rise to 66% by 2025, (UN, 2014) has created concern as to the sustainability of urban systems across the world.

Sustainable cities play an economic role as a centers of production, specialization, innovation, and exchange; a social role as places of inclusion, opportunities, greater access to health services and education; and an environmental role as “ecosystems of people, nature and infrastructure”(Urbanoikos,2016).

Urban land use planning involves not only activities which yield economic benefits, but includes many others which are not profit-oriented, but must be catered for in an urban environment so that it can effectively perform its designed functions. Equity in land allocation and use is paramount in any urban system which aspires towards a state of sustainability. In modern city planning, therefore, provision is made for six types of land use: (1) residential land use(2) commercial land use (3) industrial land use (4) land for institutional and public buildings(5) transportation land use and (6) open space and recreational land use. In Nigeria, the effect of unplanned land use in many cities is even adherence to extent regulations as well as weak monitoring and poor enforcement, an equitable land use pattern has not emerged in most cases. This leads Agboola and Agboola (1997) to assert that Nigerian cities have grown in spite of the planning laws. Therefore,(Aluko,2011) doubts the ability of the system to deliver sustainable development given that “The foundation of sustainable urban development must lie in an equitable, rational and efficient land allocation system upon which development can take place with proper monitoring and supervision according to the law”.

2. Perception of Open Spaces in Nigeria

The somewhat laissez faire approach to urban land allocation in Nigeria is dictated by the private sector which displays a bias for residential, commercial and industrial land uses. With the focus on commercialism, land use such as green space receives little or no consideration. Oddly, in some cities where green space (created during the colonial administration of Nigeria) existed, commercial interests either promoted, or acquiesced to, by the state have often led to the loss of such space to commercial or other uses. Four prominent instances of this phenomenon are:

First, the conversion of Ikoyi Park in Lagos: Simon (2015) reports Oyelude as describing the park as “a gift left by the British colonialists after independence in 1960, a very huge and open space, a haven used for picnics and even weddings. It was full most weekends in the 1960s and 1970s, until the military regime started turning it into an estate”. The present reality is that “Ikoyi Park is now Parkview Estate, which resembles a US gated community. Access is restricted by private security guards who work for the tenants, most of whom pay several thousand dollars a month in rent” (Simon, *ibid*). This development financially profits Lagos State but ecologically deprives the city and its residents.

The second is the recent conversion of the Polo Amusement Park in Enugu City in southeastern Nigeria into a shopping mall for the South African supermarket chain, Shoprite: The park was created in the 1950s by the colonial administration. Whilst this conversion has financially profited and continues to profit Enugu State, its capital city has become poorer in environmental terms. Given the dearth of green space in that city, there is little justification for displacing a widely accessible open space with a shopping facility which, considering the high vehicular traffic it generates, would have been better located outside the city-center.

A third example is the incremental disappearance of the buffer zone at the comprehensively planned Festival Town (Festac) residential estate in Lagos. The deliberately designated buffer zone was a natural forest which was left untouched for conservation reasons by the estate’s designers and builders in the mid-1970s. Its disappearance will effectively create a continuous built-up area between the estate proper and the Lagos -Badagry expressway. The loss of the trees, vegetation, the swampy land which performs storm water drainage functions and its animal and plant habitats, will definitely make Lagos ecologically poorer. Blame for this gradual loss of environmental bio-diversity and eco-system services, especially climate regulation functions, should go to the Federal Government of Nigeria (which owns the Festac estate and manages it through the Federal Housing Authority) and also manages Nigeria’s environment through the National Environmental Standards and Regulations Enforcement Agency (NESREA, the successor agency, since 2007, of the Federal Environmental Protection Agency). The agency in this case has failed in its mandated country-wide tasks of “protection and development of the environment, biodiversity conservation and sustainable development” (NESREA,2016). Whilst the loss of the many purpose-built communal recreation parks and playgrounds within that estate to commercial and residential uses, beginning in the mid-1980s during military governance of Nigeria, indirectly goes to the federal government, it is directly the handiwork of the federal managing agency which was complicit in the various acts of contravention by its buckling under pressure from military leaders, government officials and appointees to convert and allocate open spaces to satisfy an

understandable desire either to live in or own property in the first-ever comprehensively planned environment in the country.

There is a justification in asserting that the motive of commercialism is implicated also in the loss of open space as represented by the scenic view of the Lagos Cowrie Creek along the Ozumba Mbadiwe Avenue in Victoria Island. In the 1990s, the Lagos state government sub-divided and allocated all land along that stretch of the Lagos Lagoon to developers (individuals and organizations) whose structures now have obscured the scenic view and blocked access to the waters. Whilst it is possible that the government and developers may have acted out of ignorance as to what technically constitutes open space, it is implausible to argue that both parties did not realize that there is value in scenery, a public resource, which now has been effectively privatized for the benefit of the owners and users of the various structures lining the water's edge. Considering that Lagos is also nicknamed the "state of aquatic splendor", this loss somewhat detracts from its identity as a coastal city serviced by waterways which impression a continuous view of the Lagoon along the 2-kilometre-long avenue should instantly convey to visitors and residents whether driving or walking.

These occurrences can be said to offer a basis to concur with Pearce (1992, p7) that: "in the rich world and poor world, politicians and their advisors are engaged in the activity of trading off environment against economic activity". Nevertheless, as Nigeria seeks to grow its tourism industry and its constituent states buy in into this ambition; as Lagos builds the Eko Atlantic City and pursues its megacity status whilst advertising its potentials as a global investment destination, policy executors would do well to take the counsel of Asadi (2006) that: "The quality of green spaces helps to define the identity of towns and cities, which can enhance their attraction for living, working, investment and tourism". In pursuit of its renewal policy and in planning for mega-city status, the Lagos Metropolis has in recent years been making efforts to green its environment by planting street trees and gardens and the creation of pocket parks out of spaces previously in use as scrap yards and abandoned to poor environmental practices. This responsibility is being executed by the Lagos State Parks Authority. Although the continuous built-up state of the environment does not permit larger size open spaces, the overall impact of the present policy has been an improvement of the vista along major routes. Abuja, the federal capital city, being a planned environment, is provided with parks and open spaces which perform their designed functions. Other Nigerian cities, having evolved under weak public sector management, have the disadvantage of land allocation inequity, the major feature of which is the dearth of open spaces.

The thesis of this paper is that Nigeria's cities are deficient in open spaces and there are compelling reasons why this situation should be redressed. Adequate concern for this deficiency is yet to be shown either in official circles or in research work, not the least in expressly quantifying needs against existing and available provision, and promoting the benefits of open spaces for the sustainability of the urban system. An argument for greater attention to green space provision in Nigeria's cities is essentially an argument for more habitable and sustainable environments. Nigeria's cityscapes often appear like a monotony of buildings and structures which trend, Balogun (2007) observes, seems to suggest that "the authorities abhor open spaces. Every available piece of land, especially along major roads, is soon sold and developed into a 'shopping complex' without the least regard for urban planning". Consequently, the typical Nigerian cityscape is a continuous built-up zone, unrelieved by greenery, often without a clear demarcation between residential and commercial land uses as residential areas harbor

shops and petrol stations are found.

Against the given background, this study addresses the dearth of open spaces in Benin City, a typical Nigerian urban centre in which there is an apparent deficiency of provision. To achieve this objective, the paper identifies and compiles the sizes of available and accessible public open spaces in the city, determines their adequacy for the present population using as a guide standards in selected international jurisdictions, and discusses the advantages of open space to the city itself and the potential benefits to its residents especially in the light of changing environmental conditions driven by climate change, global warming, rapid urbanization and spatial expansion.

3. Methodology

The design is exploratory and involves the collection and collation of data from primary and secondary sources. Primary data was collected from inspections of existing open spaces and major streets of the study area, including the measurement of street lengths and a census of street trees. Secondary data is obtained from literature, archival records and published data. Data collected is presented in tables with the objective of comparing *needs with actual provision* on the one hand, and *actual provision with the adopted standard*, on the other.

3.1 The Study Area

Benin City is the capital of Edo state, a sub-national unit of the Federal Republic of Nigeria (Figure 1). It is geographically located in the tropical equatorial zone with an average temperature of 27 degrees centigrade, a wet season lasting from March to October and a dry season (with dry, dusty and cold *Harmattan* winds) from November to February. The vegetation is thick rainforest, rich in hardwoods such as the Iroko and Obeche, which is the source of raw material for the thriving carving and furniture industries which, together with bronze casting, ivory-carving, weaving and hunting constitute important traditional occupations. Other occupations and economic activities are primary, secondary, tertiary and quaternary in category. Within this



Figure 1: Map of Nigeria

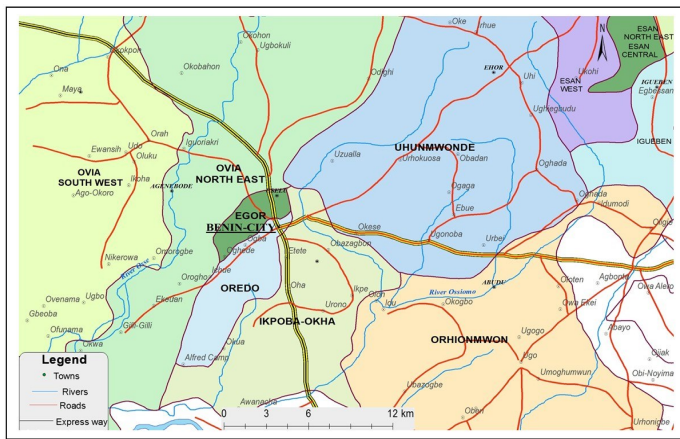


Figure 2: Benin City and its Environment

general environment of the city, the study focuses on: (a) The major open spaces which are available for recreational and social activities in the entire city, and (b) the major streets which radially connect from the Ring road at the city center and other connected streets which together comprise the lengthiest and therefore, the most important in the city. A total number of 10 streets are selected for the study.

3.2 Identification of Available and Accessible Open Spaces in Benin City

Going by the definitions of open space in, which is discussed in earlier section, Table 1 presents the main open spaces available in Benin City. A most important consideration in assessing the availability of open space is its accessibility to those who may need to use it. Prospective users of available open space logically consist of the entire public. Availability requires that space be accessible. The spaces listed in Table 1 consist of institutionally-owned assets which can be made available to the public on request, so they can also be seen as being accessible. From the table, the total estimate for accessible open space in the city amounts to 94.02 hectares.

Table 1: The Major Open Spaces in Benin City

No	Name of Place	Location	Area (ha)	Owner
1	Samuel Ogbemudia Stadium	Stadium Road	1.50	Edo State
2	Benin Golf Course	Reservation Road	16.36	Benin Club
3	Benin Museum Compound	Ring Road	3.79	Edo State
4	UBTH Golf Course	Ugbowo	25.14	UBTH Staff Club
5	University of Benin Sports Complex	Ugbowo	1.80	University of Benin
6	Ogba Zoological Gardens	Ogba	42.30	Edo State
7	Ramat Park	Ikpoba hill	3.13	Edo State
TOTAL			94.02	

3.2 Determining Adequacy of Existing Open Spaces

In order to have a basis for assessing adequacy, reference was made to the standards published by Fenland District Council (Fenland District Council,2013) Existing open spaces in British municipal councils are based on a standard of between 0.4 hectare to 1.7 hectares per 1000 persons or residents of an environment whilst the revised standard as recommended by (Accessible Natural Greenspace Standard (2008);Nature Nearby(2010);Fields In Trust(2008) can be summed into 1.6 hectare per 1000 persons. Using these as a guide, standard of 1.7 hectares per 100 persons was adopted for the study.

4. Results and Discussion

The discussion comes in two parts. First, the adequacy of the requirements for open space by comparing needs with the actual; and comparing the actual with international standards. For the purpose of this study, the adopted British standard serves as international standard. Second, the adequacy of street trees in the environment of the major streets of the city.

4.1 Adequacy of Open Space

A comparison of open space requirements for Benin City as at the year 2015 at that year's population of 1,563,387 residents indicates a need of 26.57 km² (2657.75 hectares) whereas existing open space in the city stands at 94.02 hectares. This represents a great deficit of 2563.73 hectares (25.63km² and confirms that there is a serious dearth of open spaces in Benin City.

Expressed as a percentage of the city's 1,195 hectares (11.95 km²) land area as at 2008 as established by the use of remotely sensed data from Landsat TM and Landsat ETM with ground truth also carried out to corroborate the data from satellite images (Olayiwola and Igbavboa, 2014), the reality is that the size of the city as a whole (1195 hectares) is just 44.94% of its current open spaces requirement (2657.75 hectares) rather than being far larger. Put another way, the existing provision (2015) for open space (94.02 hectares) is 0.035% of need (2657.75 hectares). The implications of this level of projected open space requirements up to 2050 is that future expansions of the city must be controlled and planned to overcome the current shortfall and to ensure the incorporation of open space needs. Rapid urbanization and loss of land cover has been a feature of the city for years (Olayiwola and Igbavboa, 2014; Odjugo, Enarubve and Isibor, 2015).The latter's

Table 2: Open Space Needs of Benin City (2015-2050)

Year	Population*	Total Space Requirement** (hectare)	Deficit*** (hectare)	Provision as (%)
2015	1,563,387	2,657.75	2,563.73	0.036
2020	2,130,583	3,621.99	3,527.97	0.025
2030	2,903,558	4,936.04	4,842.02	0.019
2040	3,956,968	6,726.84	6,632.82	0.013
2050	5,392,555	9,167.34	9,073.32	0.010

NOTES:

*2015 population projections based upon on the 2006 Census (1,147,188) and the National Population Commission official growth rate of 3.5 % pa.

**Based upon the standard of 1.7 hectare per 1000 residents or 17 m² per resident.

***Deficit is based on the assumption that no significant increments will occur up to 2050.

Table 3: Provision of Street Trees on Major Roads in Benin City

Existing Situation of Street Trees on Major Streets (A)					Assessment of Street Tree Needs on Major Streets (B)			
No	Street Name	Street Length (km)	Land Use Type	No. of Street Trees	Street Name	*No. of Trees Needed	Current Shortfall in Trees	
							Number	As % of Existing
1	Akpakpava	2.0	Mixed	Nil	Akpakpava	133	113	100.00
2	East Circular 1	2.8	Mixed	5	East Circular 1	187	182	97.32
3	East Circular 11	3.6	Mixed	Nil	East Circular 11	313	313	100.00
4	East Circular III	4.7	Mixed	6	East Circular III	180	174	96.66
5	Ekehuan	4.0	Mixed	Nil	Ekehuan	267	267	100
6	Mission	1.9	Mixed	Nil	Mission	127	127	100
7	New Lagos	2.7	Mixed	Nil	New Lagos	180	180	100
8	Sapele	3.0	Mixed	10	Sapele	200	190	95.00
9	Sakponba	1.7	Mixed	Nil	Sakponba	113	113	100.00
10	Uselu	1.5	Mixed	Nil	Uselu	100	100	100.00

NOTE: *Standards for street trees are as follows (a) A public right of way extending from 2.5 feet to a maximum of 4feet in width.(b) the linear spacing standard adopted to allow for “ vision clear zones” at intersections, street lights, traffic and regulatory is averagely 30 metres(100 feet) (c) Although there are 3 categories of trees (small, medium and large), only small and medium trees which respectively grow up to a maximum height of 9metres (35ft) and 18metres (60 ft) are chosen for this analysis to give adequate clearance from buildings and ensure that mature canopies do not overlap. (d) Both sides of each street/road are taken into account. Assumptions are adopted from the New York City Tree Planting Guide.

research reports the size of the city as being 359km² as at 2013.

4.2 Adequacy of Street Trees on the Major Streets of Benin City

The concern of urban planning with “wellbeing through averting diseases and illnesses associated with overcrowding, poor sanitation, and exposure to environmental pollution” (Hphp, 2015) is especially demonstrated in the importance attached to greening of urban landscapes.

A vital component of urban greening are street trees which are trees specially planted along urban streets, on the public right of way, to perform *inter alia* the functions of giving shade from the heat of the sun, cooling the environment in hot weather and providing fresh air all the time. The availability of street trees is an important aspect of open space needs with which this study is concerned. It is important to note that street trees exclude ornamental trees such as the *ashoka* tree and the *royal and queen* palms which feature along some recently reconstructed routes.

Table 3 displays, on the one hand, data on the present situation of street trees on the major streets of the city and calculates the potential shortfall in the number of trees which ought to have been provided. The assumptions for this calculation are indicated at the foot of Table 4 using as a guide, the street tree planting guide of New York City, where street greening standards are well-established. Regarding the present situation (Section A), the lengths of the streets in kilometers are shown with the number of existing trees and the dominant land use type in the areas, which all comprise mixed use: commercial, residential, institutional (churches, schools, offices) which are all high-traffic-generating activities. It is very clear that the streets are bare of trees. Another observation from the inspection is that even though the

roads have pavements or sidewalks, they are designed and built without any space provision for a set back or right of way between the pavement and the frontage of plots of land, where naturally, street trees should be planted. Section B assesses the needs of street trees per street and shows the great extent of the deficiency. The cumulative deficiency is 1,759 trees which, if provided, would in effect mean an increase of 98.9% (nearly 100%) in the street tree population. This indicates that there are virtually no street trees in the study area. Considering research findings on the benefits of street trees as collated and expatiated upon by Sherer (2006), the availability of 1,759 more street trees in the centre of Benin City than what presently exists, would deliver incalculable benefits to the eco-system and help to promote biodiversity. Improved aesthetics and a more attractive city environment are the other potential benefits to be enjoyed.

4.3 Redressing the Dearth of Open Spaces

A discernible feature of Benin is that it is already a built-up space where economic activities are most widespread and the attendant problems of congestion, pollution, sanitation and waste most pronounced. The best residential district, the colonially-inherited Government Reserved Area (GRA) is also located in this old part of the city which is now surrounded by activities of a non-residential nature. The compact nature of the old city suggests that new large-size open spaces cannot be easily provided without incurring the very significant financial costs of compensation for private property which must have to be acquired to create space. It is important to add that there would be significant political costs in undertaking such a venture. With the prospect of large-scale acquisition of land foreclosed, other options can be pursued.

4.3.1 Justifications for Redress

This is succinctly presented in the declaration of The Trust for Public

Land(2006) that “City parks and open space improve our physical and psychological health, strengthen our communities, and make our cities and neighborhoods more attractive places to live and work... Green space in urban areas provides substantial environmental benefits”.

The compelling argument for an increased provision of open spaces in Nigeria’s cities, with special reference to Benin City, is presented in four stages. First, in the form of the impact and implications of the present inadequate level of provision; second, the benefits to the city of an increased provision; third, the benefits to the residents of the city and finally the possible ways in which green space can be promoted given the constraint posed by an already built up city with little or no place within it for large scale green infrastructure.

4.3.2 Impact and Implications of Present Level of Open Space Provision

Prima facie, low provision of open space in any community is bound to affect the community and its residents, the former mainly in physical terms and the latter in terms of well-being. Expectedly, the high deficiency in open space requirement in Benin City has been impacting upon the city and its residents in the following ways.

(a) Climate Change Effects (Temperatures, Rainfall and Flooding)

Nigeria, as part of the global system is susceptible to climate change which has been impacting upon global temperatures, water resources, ecosystems, agriculture and health. Climate change is known to have anthropogenic as well as natural causes. In the case of Benin City which has been rapidly urbanizing, heightened human activities which are contributory to climate change include urbanization, transportation, industrialization, burning of fossil fuel, agriculture, water pollution, deforestation and changes in land cover. Amongst the findings by Olayiwola and Igbavboa(2014,p2515) are the high rate of loss of land cover in Benin City which has implications for the carbon content of the atmosphere and for rainfall and temperature patterns. Findings by Odjugo(2011,p14-15) confirm that Nigeria’s mean temperature between 1971 and 2008 increased by about 1.78 degrees centigrade, a rate higher than the global increase of 0.74 degrees centigrade and therefore indicative that Nigeria’s is experiencing a higher rate of global warming than the rest of the world. Over the same period, Nigeria’s mean rainfall declined by 91mm (though not in the coastal areas) with a change in the timing of the short-dry season (August break) from August to July. The now frequent flooding and incidents of erosion in both coastal and inland cities of Nigeria, leading to loss of life, farms and livestock constitute further evidence of the urban impact of climate change.

These developments which have potential effects on the environment and well-being call for mitigating measures to protect eco-systems, wetlands and aquatic and animal habitats. Benin City has to develop as well as continuously improve its capacity to adapt to the effects and threats of climate change.

(b) Air Pollution

It is a fact of life in the Nigerian environment that the perennially unreliable public electricity supply has meant the resort to the widespread and regular use of generators which use environment-polluting fossil fuels. The combined emissions resulting from day and night use of petrol and diesel-powered generators for residences, businesses, industries, hospitals, schools and so on, coupled with the

widespread use of aged vehicles and motorcycles imported mainly from the western world are factors which create excessive air pollution and which the World Health Organization cited in its 2016 report listing four Nigerian cities as being amongst the most polluted in the world by air quality. Even though Benin City was not cited amongst the worst, the causative factors are very present, including the burning of waste. Verere and Oluwagbenga (2015,p14) observe that “Particulate matter emission from air polluting land use activities (such as commercial and industrial land uses) have been known to cause various health and environmental problems. Human exposure to air pollution has been linked to a number of different health effects, ranging from modest transient changes in the respiratory tract, impaired pulmonary function, to restricted activity or reduced performance, emergency room visits, hospital admissions and to mortality” Research in Benin City by Verere and Oluwagbenga (op cit,p15) reveal higher concentrations of pollutants (particulate matter and carbon dioxide) in air samples from commercial and industrial areas of the city than in residential and agricultural areas which is attributable to the density of human and vehicular traffic, the incineration of waste and the burning of fossil fuels.

Under this condition of significant and persistent air pollution which increases daily as urbanization increases, electricity supply remains unreliable and the generators in use multiply, the number of vehicles on the road increase, the eco-system advantages which greening offers should ordinarily help to mitigate the effect of the carbon in the atmosphere, but the city suffers a deficiency in this regard. Indeed, it is mainly in the old, colonially designed and built Government Reservation Area that mature street and compound trees and vegetated space of note can be observed.

4.4 Benefits of Open Space to Benin City Landscape

Whilst it is true to say that the availability and quality of green space in an urban environment is an important measure of its potential for sustainable habitation, it is true also to posit that the three common dimensions of sustainable development, the economic, the environmental and social are all impacted upon by open space.

(a) A Sustainable Environment

In the economic dimension, the availability of open space, especially green space, portrays a city as a good place for working and living both for the business owner and his workforce; boosts its chances of attracting new investment; and offers businesses the opportunity for sustainable management by leveraging on available urban infrastructure and services. In the environmental dimension, a city adequately equipped with green infrastructure is better poised to minimize the carbon footprint of the present generation residents for the benefit of future generations. Finally, in the social dimension, the city with adequate open space provision enables the social development of its residents, both present and future, with the opportunity to benefit maximally from social and cultural interaction, cultural exchanges, information and knowledge-sharing and the effective provision of services, particularly health and education, all of which are indicative of well-being.

(b) Recreation

It is a fact that Benin City does not have in its environment many quality public open spaces which are always available and accessible to the public such as public playgrounds, public seating areas, public plazas,

vacant lots. The environment, in notable city locations which house public infrastructure and, therefore, attract visitors such as the Kings Square, Oba's market, the Secretariat Buildings which ought to have facilities of this nature, are bereft of such. In addition, such areas are congested with passing vehicular traffic, stationary vehicles and commuters thus making it difficult for visitors as well as tourists to appreciate the various sculptures and landmarks.

The contribution of the dearth of adequate open spaces to the unsustainable state of most Nigerian cities is captured by Balogun (2007) as follows: "In our thoughtlessly built-up, barely inhabitable cities children hardly find space for play and recreation leading to heightening juvenile delinquency. There's hardly any open space left for people to assemble in cases of disasters such as a fire outbreak or take a leisurely walk without the fear of being run down by a car or the omnipresent motorbike. And in a country where electricity supply is abysmal there's no place to seek refuge from the blazing sun during the sweltering hot season". Indeed, such open spaces with green infrastructure and sitting areas are useful for seeking refuge from the hustle and bustle of a busy city whether during lunch breaks from work, whilst shopping, to rest or even while away time. Such space should be provided in close proximity to work places, residences, in business, shopping districts and residential districts where they can be most useful so that people do not have to go far to gain access to them.

(c) Tourism

Benin City has tourism potentials founded upon its history, culture, arts, craft and sculpture which have earned world-wide fame and appreciation. However, this potential is not being very effectively exploited and there is a need for new thinking on the sustainable exploitation of this prospect. There is a great potential in using open space to promote Bini arts in a purpose-built tourist village setting. Since a successful tourism experience involves engaging visitors in interesting activities, an integrated open space policy incorporating arts and craft would yield greater dividends than the present near restriction of craft workers to their traditional enclave at Igun Street. This need not be a purely public sector venture and should incorporate private investors in order to keep focus on costs and revenue. If combined with tourism, open spaces would serve to promote the city better as a convention center. It is pertinent here to repeat the observation of Asadi (2006) that: "The quality of green spaces helps to define the identity of towns and cities, which can enhance their attraction for living, working, investment and tourism".

Tourism needs not only places, but also spaces. The tourist visits not to remain cooped up in the hotels room, but to explore, see, visit record, experience, participate, relax and have an enjoyable, mentally relieving and, therefore, a totally rewarding experience. Open spaces constitute the vital infrastructure which help to make for a rewarding tourist experience. According to the City of London Corporation (2013, p1), London's 35,000 acres of green, equivalent to 40% of its surface area, is a significant attraction for tourists.

(d) Storm Water/Flood Management

A situation of intense and sustained rainfall which produces discharge beyond the infiltration capacity of soil is the main cause of flooding in the city. However, the infiltration rate of the soil depends on topography and whether built-up areas have adequate provision for drainage and infiltration of rain water into the soil. Government efforts to control flooding by constructing storm water channels have met

with some success. However, the threats of climate change means that such efforts should be holistically tackled and not focused on drainage provision only. Trees are important components of a storm water drainage policy not only because they stabilize soils, but also, intercept rainfall with their branches, reducing the velocity of surface runoffs and flow towards storm water channels, thus preventing overflows which may otherwise cause flooding during very heavy rain falls. In addition, open spaces can be designed as basins to receive or divert flood waters at their peak and attenuate flow.

(e) Erosion

Runoff-induced soil erosion has been a long-standing problem in the city. Flooding serves to accentuate erosion in vulnerable soil. This is a problem which is accentuated by deforestation, excavation activities, sand digging and the loss of vegetation cover in unstable soils. Trees possess the ability to stabilize soils and serve as shelter against wind, rain as well as the weathering effects of the sun. Green spaces are able to absorb high volumes of rainwater without any significant run off. Thus, trees are effective in checking erosion.

5.5 Benefits of Open Space to Benin City Residents

This section considers ways in which the people who live in a Benin City stand to benefit if there is an adequate provision for open spaces.

(a) Life Expectancy

According to the WHO (2015) life expectancy in Nigeria is 54.5 years (Male:53.4 and Female:55.6). What should be troubling is that although life expectancy in the world has risen by about 5 years over the last 15 years and Nigeria's from 51 years in 2000 to 52.11 years in 2012 to the present level, the mortality rate has risen from 26 to 32 per 100 populations over the same period. Muanya (2016) reporting on the WHO findings states that : " Despite worldwide increase by five years in life expectancy with Africa seeing the biggest improvement, Nigeria is among the seven countries with the lowest scores with the average of 54.5 years for both men and women". The importance of regular exercise on health and longevity has been documented by research across the world. For instance, "A comprehensive 1996 report by the U.S. Surgeon General found that people who engage in regular physical activity benefit from a reduced risk of premature death; a reduced risk of coronary heart disease, hypertension, colon cancer, and non-insulin-dependent diabetes; improved maintenance of muscle strength, joint structure, and joint function; weight loss and favorable redistribution of body fat; improved physical functioning in persons suffering from poor health; and healthier cardiovascular, respiratory, and endocrine systems (CDC, Surgeon General as cited in Sherer,2006).

(b) Well-Being

No doubt, increasing the provision and accessibility of open space will have the potential of increasing physical and sporting activities across the population. In this way many more people would be able to take up sports on a regular basis. A healthier populace means a reduction in healthcare and other costs. According to Hphp (op cit) "...green space must be a key consideration in urban planning if the health of a city and its people are both considered important". It has been well documented that recreation parks offer mental health benefits by bringing people closer to nature. Green spaces which feature the biodiversity of nature are able to serve as calming and recuperative oases in stressful urban environments characterised by noise, heat and congestion.

(c) Pollution Control and Cleaner Air from Oxygen Release

Trees serve to reduce air and water pollution. Regarding air pollution, "In urban areas with 100% tree cover (i.e., contiguous forest stands), trees can remove from the air as much as 15 percent of the ozone, 14 percent of the sulfur dioxide, 13 percent of the particulate matter, 8 percent of the nitrogen dioxide, and 0.05 percent of the carbon monoxide (Nowak, 2002). Trees get this done by purifying and trapping particulate matter such as dust and soil which can be sources of irritation of the respiratory tract. Greening should have a salutary effect on the high levels of pollution in our environment arising from the reliance on the burning of fossil fuels, waste and gas flaring. Trees also filter particulate matter from storm waters and potential pollutants from human activity which get into soils thus preventing their access to water bodies. Additionally, greenery release lots of life-sustaining oxygen into the environment through photosynthesis after having absorbed from the atmosphere carbon compounds which are eventually incorporated into plants and sequestered later in soil.

(d) Environmental Temperature Regulation

The major constructional materials (concrete, cement and glass) which are commonly used in the city tend to make urban built-up environments hotter and creating the heat island effect (i.e. hotter temperatures in built-up areas as compared to the countryside) Coupled with the fact that average temperatures in Nigeria are on the increase due to global warming, the natural cooling impact and function of trees which comes about through their absorption of heat in the environment and the evaporation of water (evapotranspiration) is an invaluable benefit which would make the city a more livable place.

(e) Engaging Idle Youth

The long subsisting high rates of unemployment among the youth who comprise not less than 60% of the population means that youths of the city need to be engaged in order to keep their mental balance and stay out of trouble such as crime and juvenile delinquency. The role of open space in this regard cannot be doubted as research by Witt and Crompton as cited in Sherer (2006) has shown that "Recreational facilities keep at-risk youth off the streets, give them a safe environment to interact with their peers, and fill up time within which they could otherwise get into trouble".

(f) Facilitating and Promoting Urban Governance

According to the World Bank (1992) "Governance is "the manner in which power is exercised in the management of a country's economic and social resources for development." For a city, governance is the exercise of power to manage its economic and social development. Governance involves more than government and includes civil society (citizens, civic institutions, NGOs and so on). Good governance requires a sound public - private partnership and effective government and citizen interaction.

One of the most vital requirements for good governance at the local government level is to involve communities in identifying their wants and needs - this implies that city government should uphold democratic processes and be accountable to the people. The availability of open spaces which allow for citizen interaction and social cohesion makes this task easier to achieve. Open spaces strategically provided in the different quarters, wards or communities of the city, and which are

made to function as neighborhood meeting and greeting places for residents who live in close proximity to each other would make it easier for social cohesion to be built, social capital accumulated and for the governed to be able to be consulted by those who govern, an important requirement for effective urban governance.

(g) Promotion of Urban Policy

Another benefit of open spaces to a city, as captured by Hphp (2015,op cit) is that they are "valuable contributors to larger urban policy objectives, such as job opportunities, youth development, public health, and community building".

5.6 Approaches to Making Redress

Redressing the dearth of open spaces has to be approached from two angles. First, from within the existing built up city, and second, in the planning of future spatial expansions.

5.6.1 Dealing with the Existing City Space

For the existing city space where there exists an inadequate provision, what is needed now is the promotion of green space in every way in which that objective can be pursued. This approach is advised by the fact that the city is already shaped in a particular way. So, there is a limit to the extent of maneuver to create large green spaces within the built-up area without resorting to the expensive option of the acquisition of built property, paying compensation followed by demolition in order to create space. What is possible is to explore the many available alternatives which, if applied in a focused manner, can produce results which will benefit the environment and the people.

5.6.2 Policy for Promoting Public and Private Green Space

It is usually assumed that green space is a facility that can be provided only through public sector action but the contrary is the case as green space can be public as well as private. Public green spaces constitute "parks and reserves, sporting fields, riparian areas like stream and river banks, greenways and trails, community gardens, street trees, and nature conservation areas, as well as less conventional spaces such as green walls, green alleyways, and cemeteries" (Roy, Byrne and Pickering,2012).The essential characteristic of this category is that it is available and accessible to the public either physically or visually. Private open spaces, according to Wolch, Byrne and Newell (2014), consist of private backyards, communal grounds of apartment buildings and corporate campuses.

The public sector contribution should be to pursue by force of law as well as by suasion, the greening all public places such as streets, daily markets, schoolyards, religious establishments, state and local government secretariats under the professional supervision of environmentalists, botanists, horticulturists and landscape architects working as a team. Greenery in its various forms: street trees, vegetated space, small-sized open spaces, greenways, green corridors green walls and green roofs should be explored. In addition, the law should compel owners of undeveloped plots to keep them in a green state pending their development. Apart from the other benefits already mentioned, the combined impact of public and private green spaces on this scale would impact aesthetically upon the city by changing its present unappealing outlook. The law may include incentives such as property tax reliefs for property which meet prescribed greening standards.

In dealing with private green space, the focus should be on ensuring that land is developed in compliance with the building regulations as to building line and site coverage makes its own contribution to the overall greening of the city. In this regard compounds with non-built space at their fronts, sides and rear which can support trees, shrubs, lawns and hedges when put into use on a wide scale would produce the critical mass needed for the desired positive impact on the environment.

The public sector has to give the lead in the promotion of both public and private open spaces. However, rather than the usual top-bottom approach to governance issues in which grassroots matters are handled at state or second-tier level rather than local government or third-tier level with a consequential minimal impact, the green objective should be pursued at the latter level if the critical mass required for impact is to be achieved. Just as all parts of the state belong under local governments, so do all parts of the capital, Benin City, belong under local governments Working through the local governments in a sincere and sustained manner is the best way not only to achieve the greening of the city, but most important, to sustain the achievement for the future. The state should act only in a strong supportive role, assisting in designing policy, empowering the local institutions for execution, monitoring progress and advising on implementation.

5.7 Planning City Expansions

The existing deficiency can be effectively and more speedily redressed through the opening up of new areas where provision has to be for open spaces from scratch. In doing so, two other considerations will be briefly discussed in the following paragraphs.

5.7.1 Providing a Range of Open Spaces

Table 4 shows the different designs of open spaces which feature in the British system where policy is well-established. The system recognizes the needs of children, young people as well as adults. It also considers proximity to the home and work environments; and active and sedentary recreation.

This paper assumes and recommends that open space policies for new areas of Benin City would borrow from the British template in Table 4 to design and deliver a range of open spaces which serve the needs of children and young people under 40 years (who constitute 60% of urban populations) adults and the aged.

5.7.2 Use of GIS Technology for Urban Monitoring

The ideal way to assess the need for open space is to apply GIS technology to identify accurately areas of rapid population increase and densification of settlement with a view to the pre-emptive public acquisition of the most suitable land in sizeable enough acreages to serve the purposes intended. Failure to act pre-emptively would mean that speculators might acquire the best parcels of land and render unworkable the vision of a more sustainable environment, if uncontrolled land sub-division is allowed to continue. This approach should be adopted in future expansions of the city, probably in its northern, eastern, and southern sectors which have seen the most spatial expansion between 1987 and 2008(Olayiwola and Igbavboa (2014,p2514) with the most growth occurring between 2000 and 2008.

Table 4: Open Space Types, Standards and Size Requirements

Name	Features	Purpose	Space Requirement	Location Requirement
Neighborhood/Town Park	Planted areas/ green linkages	For informal un-structured recreation	2 hectares	2km from every home
Children's Play Areas	Equipped for outdoor play& games	Outdoor play for children and young people	0.4 hectare for every 10 hectare residential area	Within proximity of every 1000 population or 435 homes
Natural Greenspace	Woodland, grassland, wetland, open water	Visual and recreational	1 hectare per 1000 persons	
Allotment	For growing ornamental plants, fruits, vegetables	Food, education wildlife, local open space, healthy activity	0.5 hectare per 1000 dwellings or per 50 hectare development site	
Outdoor sports	Grass pitches, tennis courts, tracks, car parks	recreational	0.8 hectare for every 10 hectare	Within 300m of every home
Amenity Greenspace	Pockets of grass, trees and landscaped areas included in design and layout	Informal activities close to home or work	No specific standard	Within 300m of home/work

** Fenland District Council, Cambridgeshire, England (February 2013)*

6. Conclusions

From the above discussion, the following general conclusions can be drawn:

- The assessed level of available open spaces represents a serious under-provision for the present population of the city. Based upon growth projections up to 2050, the deficiency rate would worsen with implications for the sustainability of urban life.
- Inspections of the urban environment confirm the lack of a conscious effort at greening the major streets as evidenced by the absence of street trees, well-tended gardens, other vegetated spaces and congested civic spaces with the most populated and high carbon-generating areas being bereft of greenery.
- The major roads are designed without any provision for a public right of way between the curbs and the fronts of plots. Whilst it is true that the incorporation of such a desirable provision would have had the effect of making the streets narrower, a solution should have been found in seeking an easement on private property (setbacks) which front onto the road.

In summary, the observed unsustainable trend in the development of the city suggests that:

- Standards for the design of urban roads need to be updated to incorporate street trees.
- The virtually tree-bare streets of the city should be redeemed by a conscious greening policy, but not merely comprising ornamental trees which mainly serve aesthetic purposes.

- Better open space standards should be established for newly developing areas.
- Improvement in public sector skills and monitoring effectiveness (e.g. creation of a street-tree planting and maintenance department).

The premise of this study was that there exists a dearth of open spaces in Nigeria's urban areas. Using the landscape of Benin City as a case study, the existing open spaces were assessed and measured against the requirements of the existing population of the city using measures adapted from established jurisdictions. The results confirm the premise to be valid and a case was presented for an increase in open spaces provision citing in support the impacts and implications of the inadequacy identified and the benefits of improved open space provision to the city and to its residents. Recommendations were made for greening the already built-up areas of the city and the provision of street trees for as HPHP (2015) asserts: "Every tree helps fight global warming by reducing the amount of greenhouse gases in the atmosphere and helps cool cities". The message is simply that open spaces should be expanded because they are vital to the sustainability of the city; constitute good selling points to prospective investors, residents and tourists; help to mitigate climate change, global warming and urbanization whilst impacting positively on well-being. It takes time to put in place adequate responses to climate change: street trees need growing time, just as planning takes time. The best time to act on climate change is at this stage when the effects are still incipient. For the many reasons adduced in support, there is adequate justification for the espousal of the argument in this paper.

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