THE CALL FOR THE GREEN CITIES

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Abstract

Creation of Green Cities involves designing well ventilated houses, apartment blocks and buildings that welcome natural lighting and consume less electric power. Designing green cities is not at all difficult. By so doing you will be creating sustainable environment. This paper examines the current state of green cities and strategies to increase green cities. Data for the study were derived from primary and secondary sources. The poor quality of Nigerian urban environment has been attributed partly to the inadequate, misuse and mismanagement of urban open spaces. It exerts major strain on the physical outlook on the nation's cityscape and a negative effect on the welfare and productivity of the residents. The green cities have an important multifunctional role in improving the living environment: pollution control; water conservation; soil erosion control; diminishing bacterial impact on man and animals by purifying the atmosphere; mitigating urban climate; and improving the quality of urban living through the psychological and sanogenic effect. Green cities require a multidisciplinary and collective approach for it to succeed. Many agencies and ministries must come together to create green cities. On a large scale all the Nigerian people need to be mobilized to adopt life styles that promote sustainable cities development.
Keywords: Green Cities, Sustainable Environment, Role, Governance, Approach

INTRODUCTION

Conferences like this one are designed to deliver impressive, relevant, and interactive experiences to governments and businesses providing tools and resources needed to improve policies, operations, and materials for sustainable decisions that save money, generate jobs and protect the environment. The general perception of the public is that issues of environmental enhancement do not create business opportunities. That notion is very wrong. Sustainable solutions create business opportunities and in this century and beyond will be the drivers of new business enterprises.

The most pressing issues of the 21st century are about the depletion of conventional energy resources, city overcrowding, increased chemical, physical and biological pollution, as well as global warming, with all their consequences on the quality of life. The most affected in this regard will be the large settlement, characterized by high densities of population and constructions; the planners will have to rethink their structure and functions in order to meet the needs for a sustainable urban living (Tirla, Manea, Vijulie, Matei and Cocos, 2014). But what do we actually mean by sustainable urban living in the cities of the 21st century? The answer is complex and lies in the multitude of attributes that urban territorial systems must preserve and/or acquire, as the ultimate goal consists in harmonizing the inter-relationships of the urban ecosystem: population, natural and semi-natural components, as well as human components (Farr, 2012, Lanos, 2000). In the 21st century, sustainable urban living depends on a proper urban planning, which gives the modern urbanism a new conceptual dimension.

Creation of green cities involves designing well ventilated houses, apartment blocks and buildings that welcome natural lighting and consume less electric power. Designing green cities is not at all difficult. By so doing you will be creating sustainable environments. In layman terms this means environments that will not burn out or self-destruct. But in climate change parlance green cities refer to cities that use eco-friendly services that reduce carbon emission and global warming. Principally, intelligent traffic solutions, green buildings, wastewater management, and smart grid infrastructure are just a few of the technologies helping to steer today's urbanization toward sustainability (Jibunor, 2012).

The environment at sustainability of cities in Less Developed Countries generally has been a key concern and the concept of "Green Cities" is being promoted as a response. In Nigeria, it remains essentially a concept. This concept is only discussed in seminar and conference papers but definitive action is lacking. There has been no policy response either at national or state levels to implement the green city agenda. The Green City concept is one of the latest response to the diverse efforts to address the problems caused by the dispersed model of city development and to help cities to become more sustainable (greener), less dispersed and more liveable (Brilhante and Klaas, 2018).

Urbanization and climate change call for new solutions to maintain and improve the quality of life in our cities. There has been several calls for green cities in Europe and America. In 2017, the European Nursery Stock Association in Belgium flagged off the "green cities" for a sustainable Europe.

The result of this work will lead us to use our own knowledge and expertise on urban management, environment, infrastructure, climate change, housing and energy to develop an initial simple green city concept and a tool to be incorporated in our academic activities and to complement our advisory work on supporting cities to become greener.

This paper examines the current state of green cities and strategies to increase green cities.

METHODOLOGY

A literature review of academic articles, journals, newspapers, textbooks, bulletins, internet on Green Cities was used in this study. Ministries of Environment, Agriculture and Natural Resources, Lands, Survey and Urban Planning, Nigerian Institute of Town Planners, Owerri Capital Development, Environmental Transformation Commission (ENTRACO), and Tertiary Institutions were interviewed orally on the case of green cities in Nigeria. Materials were carefully examined and critically reviewed.

LITERATURE REVIEW

An extensive build-up of transport and other infrastructures contributed to the deterioration of urban environmental performance in many cities globally through increased city footprints and impermeable surface; destruction of urban natural resources and green fields; reduced water quality and quantity; increase journey time, traffic congestion, and fuel consumption; and more. (Brilhante and Klaas, 2018). The consequences of this car-dependent dispersed city prompted academics and urban managers to search for innovative ways to promote economic and urban growth with less environmental impact and use of natural resources.

In the 1980s, the report: "The Limits to Growth" introduced the idea of sustainable economic growth; "Our Common Future" demonstrated it was possible to reconcile economic growth, environmental preservation and social development; and the New Urbanism Movement advocated ways to limit disperse urban expansion of cities by using more environmentally friendly urban design practices such as walkable neighbourhoods, mixed land use and Transit Oriented Developments (TODs) (Brilhante and Klaas, 2018).

"Green" means different things to different people. The term is nowadays widely used by private and public organizations as a brand for sustainability and eco-friendliness. "Greening" is another term associated to the term green.

The Green City Concept

The Green City Concept is one of the latest responses to the diverse effort and research conducted to address the problems caused by the dispersed model of city development and to help cities to become more sustainable (greener), less dispersed and more liveable (Brilhante and Klaas, 2018). Green cities are those cities that are environmentally friendly (Rode and Burdett, 2015). The greening of cities requires some, or preferably such issues as controlling diseases and their health burden; reducing chemical and physical hazards; developing high quality urban environments for all; minimizing transfers of environmental costs to areas outside city and ensuring progress towards sustainable consumption. This can be achieved in terms of inter-linked benefits of green city. Economically, the benefits include: agglomeration economies, lower infrastructure costs, reduced congestion cost while reducing carbon emissions and other environmental pressures.

In terms of social benefits there will increase employment creation, poverty reduction and improved equity and quality of life including improved safety and community cohesion while Environmental benefits embedded in economic and social in such issues like reduced poverty which help improved public health and potential for improving ecosystems within urban areas (Ekong, 2017).

Creation of Green Cities according to Jibunor (2012) involves the following:

a) It involves designing residential, social, and economic districts that are well compartmentalized and lie within easy commute.
b) It involves building schools, hospitals, and markets within towns and council areas of the cities.
c) It means building a good network of roads for easy access to all areas with reduced travel times to save on fossil fuel.
d) It means having good public transportation to cut down on individual car ownership and the traffic volume at peak periods.
e) It means the designing of sustainable water supply for residents without recourse to self-reliance.
f) It means having the room, planning for, and executing future expansion in roads and other social services.
g) It means having a dust control department that will encourage and enforce greening of property yards and setbacks.
h) It also means the creation of parks and protection of flood plains, ravines and forests.
i) It requires a close liaison with the electric power authority to invest in clean energy like solar, wind, and nuclear in place of fossil fuel.
j) Finally, it involves advocacy and partnership with government, the legislature, and the planning authorities in enacting and enforcing regulations and codes.

These are not hard tasks. Once embraced, they should come naturally in the execution of our jobs. It is easier to do these than to look the other way; the Nigerian way. The energy we waste in hiding lies and misconduct cannot be compensated in any form. Once in a while, a Fashola or El Rufai would come around then to inflict pains on the delinquent. So you do have a challenge to live up to (Jibunor, 2012).

Contributions to a Better Understanding and Management of Urban Green Areas

The efficient creation and management of high quality green components within the urban territorial space requires the implementation of appropriate measures, which are integrated in the present study: re-establishing the values of urban ecosystem: resources and energy saving: sustainable management of urban waste etc. Measures to grow cities can increase social quality and quantity of life. Enhancing public transport systems for example, can reduce inequality by improving access to public services and other amenities, and by helping to relieve vehicle congestion in poorer neighbourhoods. Cleaner fuel for transport and power generation can reduce both local pollution and health inequality. Reducing traffic and improving conditions for pedestrians and cyclists can help foster community

cohesion, an important aspect of quality of life. Children who live close to green spaces are more resistant to stress; have lower incidence of behavioural disorders, anxiety, and depression; and have a higher measure of self-worth. Green space also stimulates social interaction between children. It creates jobs on a number of ways: urban and peri-urban green agriculture, public transport, waste management and recycling. Green manufacturing clusters will develop drawing on knowledge from university and research laboratories.

Table 1: Average Value US$/ha/y or services provided by Green Space in Urban Area

Service	Average US$/ha/yr	Range
Air quality regulation	602 (n = 9)	56 - 1958
Carbon sequestration	367 (n = 5)	54 - 653
Carbon storage	2906 (n = 3)	1783 - 4815
Storm water reduction	857 (n = 6)	572 - 2363
Energy saving	1313 (n = 34)	321 - 1774
Recreation & amenity	5882 (n = 2)	1984 - 9780
Health effects	17548 (n = 2)	N/A

Source: Elmqvist, Setala, deGroot and Handel (2014)

Open space apart from recreational purposes its provides other services (air quality, carbon sequestration, carbon storage, storm water reduction, recreation and amenity) as reflected in Table I.

New Concepts in Urban Planning

The concept of **new urbanism** (Bohl. 2000; Knaap and Talen, 2005) emerged from the increasing need of implementing sustainability in the field of urban planning. According to Beatley (2000), new urbanism should be identified, especially when it comes to urban planning and sustainable thinking, with green urbanism. This is a form of creating beneficial urban communities, both for the people and for the environment, by minimizing matter and energy consumption. By its content, originality, implementation degree and variety of approached components, green urbanism identifies itself with the European Countries (Beatley, 2000). On the other hand, a number of authors of works of international recognition support and promote the ecological models offered by the American cities (Birch and Wachter, 2008; Kahn, 2006; Slavin, 2011; Tumber, 2012). Indeed, green urbanism emerged in Europe but the Americans noticed the benefits it offered and did not fail to take the model. Besides, they had the advantage of space.

Biourbanism or organic urbanism introduces the idea that city and nature should meet, in order to create a friendly urban environment, topophilic and sanitary. Thus, this concept aims at restoring the lost values

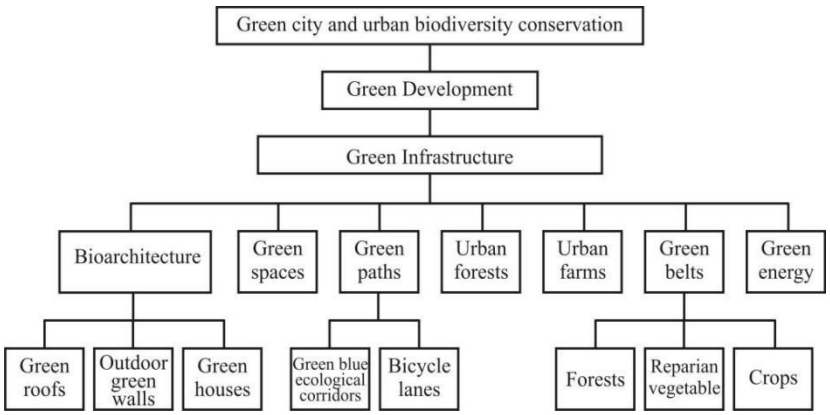
and the balance of urban ecosystem (Tracada and Caperna, 2012) and also at strengthening the design principle "for the people"

Biophilia is a term popularized by Wilson (1984) to describe the relationship of man with nature and other life forms. The biophilic cities contain large amounts of natural elements and are oriented towards the protection, preservation and restoration of nature (Wilson, 1984). They integrate nature in the urban design (Beatley, 2011).

In 1987, Register introduced the term "**eco-city**" in his book titled **Ecocity Berkaley: Building Cities for a Healthy Future** (Register, 1987). The sustainable cities or eco-cities are designed by taking into account their impact on the environment, in the sense of minimizing waste production and pollution, as well as the inputs of energy, water and food. These targets also constitute the principles of sustainable urban development (Habitat, 2009).

A similar concept is the **smart city**. A city may be defined as smart when the investments in socio-human capital, urban infrastructure, and rational management of natural resources encourage a sustainable economic development a high quality of life through participatory actions and commitment from community members (Caragliu, Delbo, and Nijkamp, 2009; Pacesila and Colesca, 2007).The green city means a way to increase the sustainability of urbanized area. It is a concept of urban planning relying on the ecosystem services that green infrastructure can supply. In essence, this concept includes the characteristic of all the urban concepts described previously meeting with nature, restoring the values of urban ecosystem, minimizing resource and energy consumption, and taking advantage of the ecosystem services of the blue-green natural components.

Figure I: Hierarchical Diagram of a Green City Structure



The green infrastructure is an interconnected network of green areas and hydrographic elements, contributing to the preservation and enhancement of biodiversity and to the maintenance of the biotic processes within the urban environments close to their natural condition. Thus, it promotes the raising of the quality of life and sustainability (Benedict and McMahon, 2006). By its integration into the category of infrastructure elements, urban greenness gets the same rank as communication infrastructure, water supply system, waste disposal system etc. As such, it becomes a component

the presence, functionality and diversity of which is compulsory for urban ecosystems (Pauleit, Liu, Ahern and Kazni erczak, 2011).

The Essential Elements of Green Cities

The specific components of green cities influence their morphology and functionality, which in their turn are responsible for the differences between these settlement and the "common" cities.

Green and blue oxygen-producing areas. One of the fundamental components of urban infrastructure, in general, and the green cities, in particular, is represented by the green areas. These areas encompass all the spaces with planted flowers, shrubs or trees, while the urban green area system includes both the green spaces within the city and those lying on its outskirts. (Manea and Mihai, 2007).

The green corridors (or greenways) are a network of linear spaces conceived, planned and managed for multiple purposes, including recreation and biodiversity conservation. At the same time, they have an aesthetic and cultural role, or any other role that is compatible with the sustainable use of the territory (Ahrn, 2002).

The blue corridors include all the natural and/or anthropogenic watercourses crossing the urban areas, which may become urban stems or branches, making up genuine urban hydrological systems (Ruhnke, 2011). The blue-green corridors may be used as instruments for integrating water surfaces and green areas, as part of the strategic spatial planning of urban environments, with the intention to manage the flood risk and to maintain the biodiversity of fauna and flora.

The green belts are areas delimited around the large cities with a view to protect the elements of natural setting. At the same time, they are meant to prevent their uncontrolled expansion, to preserve the valuable traditional landscapes and to ensure additional areas for leisure and recreation (Manea, Cocos, Tiscovschi and Negulescu, 2010; Nita, Mihaita, Onose, Patroescu, Vinau and Ciocanea, 2012; Osborn, 1969). An important component of the green city is the **urban forest**. Broadly speaking, it represents the tree vegetation within the cities or around them, in the most various forms: from the isolated trees within the private gardens to the street lining trees and from the small clusters around the residential buildings to the parklands and the remnants of natural forests (Milter, 1997; Wu, 2010). In our opinion, urban forests are areas with natural, semi-natural or planted forests situated in the cities or on the outskirts.

Apart from urban forests, which are usually entirely managed by the authorities, another green, useful practice that has emerged in modern cities is urban agriculture. Urban agriculture "is the growing of plants and the raising of animals for food and other uses, and related processing and marketing activities, within and around cities and towns" (Van Veenhuizen, 2006).

The green features of the buildings.

The green buildings are those edifices built and used in a more responsible manner with regard to the environment during all their life cycle: design, construction, use, maintenance, rehabilitation and demolition. The

preliminary condition for the development of a green residential infrastructure is the choosing of location. The buildings are designed so that to use efficiently the energy, the water and other renewable resources. Energy efficiency is extremely important, most of the green buildings consuming 40% less energy than convential edifices.

Green walls and vertical gardens.

Unlike the conventional city, where urban greenness is only one of the urban structure components, the green cities regard it as a central point. The traditional green area are embedded in new planning concepts, meant to interconnect residential areas, green area and water surfaces through unconventional green and infrastructures. The element of novelty is the introduction of vegetation (adjacent green) to the arrangement of a green building: green roofs and terraces, green walls and green hedges made of trees or shrubs (Anderson, 2008; Blanc, 2012). Thus, a green building can help increase comfort by bringing the benefits of urban green spaces closer to the user.

Appropriate plant species in vertical and roof gardening.

When choosing the species, one has to take into account the thermal and hydric requirements of the plants, paying attention that most of them should be autochthonous. In this respect, it is advisable to make an assessment of the ecological potential of the territory based on the mean length of vegetation season and the ratio between temperature and moisture (Manea, 2011).

Green houses.

A more recent trend is the returning to the old methods, techniques and building materials. However, the resulted building traditions, blending energy efficiency with cultural-aesthetic values, is the use of the famous cob. Cob houses authomatically adjust moisture and maintain heat in winter and coolness in summer (Evans, Smith and Smiley, 2002; Goodhew and Griffiths, 2005).

The street network.

In the green cities, transport infrastructure should have a minimum impact on the natural components of the environment and especially on soil permeability and oxygen-producing area. Thus, when the ground is covered by impervious materials such as concrete or asphalt, soil properties worsen. Under the circumstances, the green cities' architecture should envisage environment-friendly materials and landscaping techniques (pervious concrete slabs, porous asphalt, natural stone, recyclable rubber tiles, tartan boards etc. (EU, 2012).

Eco-friendly sidewalks are a viable choice to concrete pavement; being more flexible, they affect to a lesser extent the trees and their root systems. The rubber sidewalk modular paving system allows the water to percolate the soil. At the time, rubber is soundproofing and less risky for users (cushions the shock of falls, reduces injury risk, especially for children and elder people. (Manea et al, 2014)

The Role of Urban Greenness in Reducing the Heat-Island

The emergence of urban heat island is caused by the extremely low share of oxygen-producing areas (Ioja, Onose, Nita, Vanau, Patroescu, Gavrilidis, Saghin and Zarea (2011).It is well known that a distinguished consequences of urbanization phenomenon is the emergence of the urban heat island (Hirano and Fujita, 2012). Usually, this overlaps the inner city, where green areas are either reduced or quasi-inexistent. The heat island is further amplified by the following factors: the higher heat capacity of the built-up area and paved surface; the higher heat retention coefficient of asphalt and concrete (Camilloni and Barros, 1995, 1997; Mitchell, 1961); the increase amounts of shortwave radiation absorbed by the canyon-like avenues (Strathopoulou and Cartalis, 2007); the increased amount of long wave radiation absorbed as a result of pollution (Masson, 2006); lower evapotranspiration (Mihalakakou, Santamouris, Papanikolau, Cartalis and Tsanrassoulis, 2004); increased building density and mineral facades (Patroescu, Ioja, Rozylowicz, Vanau, Nita, Patroescu-Klotz, Ioja (2012) etc. The expansion of the green and blue oxygen-producing area is one of the recommended measures meant to reduce the intensity of urban heat island; therefore, this must be included in the urban development plans (Patroescu et al, 2012).

The development of green urbanism and green city concepts has made necessary to measure the green advantages of the large metropolises, which are confronted with serious problems regarding the quality of environment and, implicitly, the quality of living. The Green City Concept is relevant to Nigerian cities especially when we consider the current scenarios in our cities. Nigeria's economy will continue to suffer especially as the advanced countries continue to implement the "Green Agenda" in energy use (buildings, urban transportation, urban LIU).

Challenges of Green Cities in Nigeria

The poor quality of Nigerian urban environment has been attributed partly to the inadequacy, misuse and mismanagement of urban open spaces. It exerts major strain on the physical outlook on the nation's cityscape and a negative effect on the welfare and production of the residents.

The Social Implication of Traditional Urban Development

The pattern of urbanization in Nigeria raises important social challenges. Many urbanized areas are characterised by uncontrolled horizontal expansion leading to urban sprawl of affluent populations with lower development densities. This increased dependency on private car and peripheralisation of the urban poor decreasing their access to the city and its workplace, services and infrastructure.

Policy/Legal Instruments available

Numerous instruments for enabling green cities are available and tested but need to be applied in a tailored, context-specific ways. In contexts with strong local government, it is possible to envisage a range of planning, regulatory, information and financing instruments to advance green infrastructure investment, green economic development and a multitrack approach to greater urban sustainability.

National Commission and a Technical Committee on the Great Green Wall were inaugurated in August in Abuja 2012. These bodies were charged with the planting of 1,500km of trees, 5km deep along the frontline states in the north, it is a Pan-African initiative borne in Nigeria. We know that in our country Nigeria has a history of creating laudable commissions to tackle good programmes only to leave them unfunded after a few short months or years.

Rapid Pace of Urbanization

The rapid pace of urbanization may tend to overwhelm cities where the struggle to develop infrastructure, mobilise and manage resources have negative consequences for the environment. Also the unpredicted nature of migration with lack of adequate data may pose a lot of drawbacks for the implementation of green city model.

Lack of City wide Data and Information

The fundamentals for planning do not even exist; for instance, no city in Nigeria can tell us the number of housing units and the state of those houses. There are no records of all the streets and that houses on those streets are not properly numbered. Planning becomes impossible because there is no data and effective planning depends on adequate data. Planning in Nigeria focuses mainly on development control without basic data.

Squatter in the Cities

These squatters and others that are there for different reasons all put pressure on the services the cities have to offer. There is usually no sanitation in such places and so the people relieve themselves within and around the same area. There may be no portable water supply so the people get water from whatever source they can find, mostly untreated and unhygienic. There will be no power supply but that is no problem as they will simply connect electric cables direct to the overhead 240 volts cable from the nearby street. Of course there will be no schools for the children who grow up uneducated, and the people will not afford to have medical care so diseases are rampant and of epidemic proportions. Infant mortality and maternal death amongst these people are usually very high.

Structured Development

In the EU countries and North America, cultural practices in human settlement have given way to structured planning of cities and towns; where possible old monuments and heritages are preserved while executing a development that is patterned to give functionality, social and economic services to the inhabitants. Here in Nigeria, with most of our people still living in the rural setting, such structure development of cities and towns is lacking. The rural-urban migration of the early seventies following the oil boom coupled with the inexplicable abdication of their responsibilities by governments and city planners have turned our major cities into slums.

Structural Capacity

The environmental performance of cities is dependent on a combination effective green strategies and physical structure-urban form, size, density and configuration (LSE Cities, 2011). From the outline and our

knowledge of Nigeria this will not pose any problems at all. The only thing that is needed is to these cities more compact, reduce travel distances and invest in green transport mode for energy efficiency. There is a growing evidence that compact urban environments with higher-density residential and commercial buildings (as opposed to low-density, sprawl (like development) and a well distributed pattern of uses and an efficient, transport system (public transport, walking and cycling) reduces the energy footprint (Burgess, 2000, Bertrand, 2004, Hornmeg et al, 2004 in LSE Cities, 2011). All these challenges will have significant effect on the potential of Nigeria to be green.

Best Practices of Green Cities

a) Ambitious, well defined goals, and regular reporting of progress.
b) Electricity generations using renewable resources
c) Strict building codes favouring green technology
d) Investment in public transportation
e) Efforts and policies to cut waste, reduce water consumption
f) Increased density
g) Encourage knowledge-based, creative economies
h) Access to affordable, healthy food
i) City government who leads by example
j) Encourage grass roots efforts to engage citizens.

CONCLUSION AND RECOMMENDATIONS

The green cities have an important multifunctional role in improving the living environment: pollution control; water conservation; soil erosion control; diminishing bacterial impact on man and animals by purifying the atmosphere; mitigating urban climate and improving the quality of urban living through the psychological and sanogenic effect.

Good urban planning is necessary, being located in an area of natural beauty helps people often feel more of a connection to their surroundings. It is not just about saving the planet, going green drives revenue for a city, there is money to be made in sustainable manufacturing and services.

Government, people and businesses should make a huge difference in transforming cities to green hotspots. Green cities require a multidisciplinary and collective approach for it to succeed. Many agencies and ministries must come together to create green cities. On a large scale all the Nigerian people need to be mobilized to adopt life styles that promote sustainable development. Also Green City Action Plan should be adopted. Architectural design solutions for approval should involve well articulated greenery via shrubs, trees etc.

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