

CHANGES OF URBAN GREEN SPACE PATTERNS IN AKURE,  
NIGERIA

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## **DEDICATION**

*Specially dedicated to:*

*The loving appreciation of my beloved wife, Adebola, my children: Olugbenga, Olubukola, Oluwakemisola, and the late Oluwafisayo Ige, for inspiring me, a third time, towards the final degree of Doctor of Philosophy. To God be the glory.*

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## ABSTRACT

Unplanned urbanisation and disappearance of green spaces have prevented Nigerian cities from meeting international best practice standards. The World Health Organisation (WHO) requires that a city must attain a minimum of 9m<sup>2</sup> per capita green space benchmark before it can be considered liveable. One important indicator of a liveable city is the amount of green spaces it possesses. Urban green spaces represent the unbuilt part of a city reserved for recreation, relaxation, and the promotion of health and wellbeing. They also provide opportunities for physical and psychological restoration, and the production of ecosystem services. However, cities grow in size and number in Nigeria without corresponding increases in the quantity of their green spaces. Akure in Ondo State, Nigeria, manifests this deteriorating condition. Making Akure greener, attractive and liveable, therefore, constitutes an important goal. This research studied the changes in the pattern of urban green spaces in Akure, with a view to preserving the availability of green spaces in the city. The rational choice theory and the theory of planned behaviour were adopted for this research. The study utilised a mixed method approach to elicit the opinions of 317 systematically sampled city residents. It also utilised remote sensing imagery to classify and detect land use changes and vegetation health. Survey questionnaires were analysed with SPSS Version 22.0, structural equation modelling, and the relative importance index. Findings revealed that although urbanisation, state creation and government policy initiated the conversion and loss of open spaces, the contribution of attitudinal factors to the process has been quite significant. Analysis of attitudinal factors revealed that lack of political will to enforce tree planting and conversion of incidental open spaces and urban gardens to residential and commercial uses were very strong. Analysis of remote sensing imagery revealed that increases in built-up area resulted in a two-fold disappearance of urban green spaces between 1987 and 2016. Further analysis revealed that Akure has a low per cent urban green space (PUGS) availability at 17 per cent, 4.3m<sup>2</sup> per capita green space index, and between 0.2 and 0.3 normalised difference vegetation index (NDVI). The low greenness indices imply that Akure is currently not green enough or liveable. The necessity for mass education and enlightenment towards pro-environmental behaviour, adoption of open space master plan, and harmonisation and centralisation of Akure urban land, are therefore canvassed. Apart from Akure, other cities in Nigeria and other developing countries in general, may also find these recommendations useful.

## ABSTRAK

Perbandaran yang tidak dirancang dan ketidakwujudan ruang hijau telah menghalang bandaraya Nigeria daripada memenuhi piawaian amalan terbaik antarabangsa. Pertubuhan Kesihatan Sedunia (WHO) menyatakan sesebuah bandar mesti mencapai tanda aras ruang hijau minimum  $9\text{m}^2$  per kapita sebelum ia boleh dianggap layak untuk dihuni. Satu penunjuk penting bandar yang boleh didiami ialah jumlah ruang hijau yang sedia ada. Ruang hijau bandar mewakili bahagian bandar yang tidak dibina yang diperuntukkan untuk rekreasi, bersantai, dan promosi kesihatan dan kesejahteraan. Ianya juga menyediakan peluang untuk pemulihan fizikal dan psikologi, dan pengeluaran perkhidmatan ekosistem. Walau bagaimanapun, bandar-bandar di Nigeria tumbuh dengan saiz dan bilangan tanpa kenaikan yang sama dalam kuantiti ruang hijau mereka. Akure di Ondo State, Nigeria, memperlihatkan keadaan ini. Oleh itu, menjadikan Akure lebih hijau, menarik dan boleh didiami, menjadi tujuan penting. Kajian ini mengkaji perubahan dalam pola ruang hijau bandar di Akure, dengan tujuan mengekalkan ketersediaan ruang hijau di bandar. Teori pilihan rasional dan teori tingkah laku yang dirancang telah digunakan dalam penyelidikan ini. Kajian ini menggunakan pendekatan kaedah campuran untuk mendapatkan pendapat 317 penduduk bandar secara sistematik. Ia juga menggunakan imej penderiaan jauh untuk mengklasifikasi dan mengesan perubahan penggunaan tanah, dan kesihatan tumbuh-tumbuhan. Soal selidik tinjauan dianalisis menggunakan SPSS Versi 22.0, pemodelan persamaan struktur, dan indeks kepentingan relatif. Dapatan kajian menunjukkan bahawa walaupun pembedaran, penciptaan negeri dan dasar kerajaan memulakan penukaran dan kehilangan ruang terbuka, sumbangan faktor-faktor sikap terhadap proses itu agak ketara. Analisis faktor sikap menunjukkan bahawa kekurangan keinginan politik untuk menguatkuasakan penanaman pokok, penukaran ruang terbuka sampingan dan taman bandar untuk penggunaan kediaman dan komersil, sangat kuat. Analisis imejan penderiaan menunjukkan bahawa peningkatan di kawasan binaan mengakibatkan kehilangan dua kali ganda ruang hijau bandar antara tahun 1987 dan 2016. Analisis lanjut menunjukkan bahawa Akure mempunyai ruang hijau (PUGS) yang rendah sebanyak 17%, indeks ruang hijau  $4.3\text{m}^2$  per kapita dan antara 0.2 dan 0.3 perbezaan indeks vegetasi (NDVI). Indeks hijau rendah menunjukkan bahawa Akure kini tidak cukup hijau atau boleh didiami. Keperluan untuk pendidikan massa dan pencerahan terhadap tingkah laku pro-alam sekitar, penggunaan pelan induk ruang terbuka, dan pengharmonian dan pemusatan tanah perkampungan Akure, dapat ditangani. Selain dari Akure, bandar-bandar lain di Nigeria dan negara-negara membangun pada umumnya, mungkin juga mendapati cadangan-cadangan ini sangat bermanfaat.

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## LIST OF ABBREVIATIONS / TERMINOLOGIES

USGS	-	United States Geological Surveys
NPC	-	National Population Commission
RGV	-	Reduction in Green Vegetation
ROS	-	Reduction of Open Spaces
NITP	-	Nigerian Institute of Town Planners
ACOMORAN	-	Amalgamated Commercial Motorcycle Riders Association of Nigeria
U. P. N	-	Unity Party of Nigeria
UHI	-	Urban Heat Island
NEPA	-	National Electric Power Authority
PUGS	-	Percentage Urban Green Space
RII	-	Relative Importance Index
MDG	-	Millennium Development Goal
AURPO	-	Area Urban and Regional Planning Office
UTC	-	United Trading Company
C. A. C	-	Christ Apostolic Church
ENVI	-	Environment for Visualization of Image
FUTA	-	Federal University of Technology, Akure
UGS	-	Urban Green Space
BUA	-	Built-up Area
HND	-	Higher National Diploma
ND	-	National Diploma

## LIST OF TERMINOLOGIES

A glossary of terms is provided to explain the local terminologies that appear in the thesis. This enhances the understanding of the thesis. The words are listed and explained accordingly, beginning with the word, ‘Yoruba’

Yoruba	-	One of the three major languages spoken in at least seven states across the Southwestern part of Nigeria.
Yorubaland	-	This is the area or region inhabited by the Yoruba nation. Akure, the study area, belongs to one of the major towns in Yorubaland.
Oja	-	A market: This represents a physical location in a town or city, where buying and selling activities take place. In the Yoruba settlement layout, the <i>oja</i> must be located next to the Oba’s (or King’s) palace. Both the <i>oja</i> and the king’s palace define the geographical centre of the Yoruba town or city.
Aafin	-	The Oba’s or King’s Palace in Yorubaland; the traditional seat of government of the Oba or King. The palace, usually a very large estate, occupies the geographical centre of a typical Yoruba town or city. The king resides there from coronation till death.
Oja-Oba	-	The traditional market established by a town or city for the Oba or King, for trade and commerce, and the performance of the social, ceremonial, and traditional cultural rites of the king, or the community.
Yara	-	A room or rooms, in a building or house.
Iloro	-	The passage or lobby in a building or house.
Agabala	-	The sitting room, or the court-yard of a building.
Ile-idana	-	The kitchen in a house.
Ile-iwe; baluwe	-	The bathroom.
Ile-igbonse	-	The toilet.
Oode; Odede	-	The front yard. Any of the two words can be used.
Ehinkule	-	The backyard.
Ayika	-	Around the house, or its immediate premises.
Ita	-	The external part of a building.

Papa-isere	-	A football field or pitch.
Odan	-	A park – a group of trees planted together, which provides shade for relaxation, play, or meeting.
Abe-odan	-	The bottom, under, or the precincts of shade trees, used for relaxation, meetings and ceremonies.
Ona; Oju-ona	-	An open space reserved for human, and or, vehicular movement in a town or city.
Erekusu	-	An urban forest; an isolated forest enclave within a town or city.
Adagun-odo	-	Odo-adagun: A lake – a piece of water surrounded by land.
Bebe odo, Eba Odo, Etido	-	The river corridor, the river and its banks or basins.
Aganju, Igbodudu, Egan	-	A thick, virgin forest; a forest reserve, or a wilderness.
Ira	-	A wetland, or a water-logged area, or an area liable to flooding.
Ibudoko	-	A motor-park; a dedicated area of a city or town, where commercial vehicles pick up and discharge passengers.
<i>Gbongan</i>	-	A multi-purpose meeting or gathering place; a venue in a city or town, usually a hall, or a roofed public space.
Ago	-	A camp, usually a Christian praying ground, or assembly.
Yidi	-	A Muslim praying ground.
Ojubo Orisa	-	A traditional shrine or sacred grove, for prayers, sacrifices, or the propitiation of gods or goddesses.
Ayo-opon; Ayo Olopon	-	A game played by two people, from a wood carved with holes, in which four or five hard, polished, grey-looking nuts are deposited in each hole.
Arin	-	A kind of games played on the ground by two or more people, using some hard, polished, brown-looking nuts, from a certain type of tropical climbing plant.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the Study

Research in urban planning and public health suggests that urban green spaces provide substantial environmental, economic, social, and cultural benefits. Urban green spaces are useful natural assets that enhance urban development and liveability in diverse ways (Adjei Mensah, 2015). Urban green spaces are composed of natural green vegetation and planned open spaces. They are areas planted with grasses and or trees, meant for recreation and exercise. Urban green spaces are the natural environments connecting human beings with nature. These include parks, community gardens, urban forests, natural reserves, and corridors along waterways (Chiesura, 2004).

An open space can be defined as any open piece of land that is undeveloped, and has no buildings or other built structures, but is accessible to the general public ([www3.epa.gov/region1](http://www3.epa.gov/region1)). Koohsari *et. al.*; (2015) defined open space as the built environment elements within neighbourhoods, which encourage a variety of physical activity behaviours. Open space, therefore, includes green spaces, (which are lands partly or completely covered by grass, trees, shrubs and vegetation, playgrounds, school yard, public seating or meeting areas, public plazas and vacant lots. Open space provides recreational areas for residents, and helps to enhance the beauty and environmental quality of neighbourhoods ([www3.epa.gov/region1/](http://www3.epa.gov/region1/)). As a component of open space, urban green space represents the undeveloped part of a city reserved for public recreation and relaxation, and the promotion of health and wellbeing (Nochian *et al.*, 2015). They form part of a city's landscape features important for human

recreation, environmental health and wellbeing, and the production of ecosystem services ( Zuazo and Pleguezuelo, 2009; Kabisch *et. al.*, 2016; Kabisch *et. al.*, 2017).

Well-designed, well-managed, and well-connected green spaces are an integral part of urban green infrastructure – UGI - (GREEN SURGE, 2015). However, urban green spaces are very diverse. They range from city parks to green walls and rooftop gardens and from urban forests to allotment gardens. Urban green spaces encompass all vegetation types found within the urban environment. They also include blue spaces such as lakes or rivers, and their adjacent green areas. Urban green spaces can yield considerable social, economic, environmental, and health benefits if properly managed (Huang *et. al.*, 2017). According to the World Health Organisation (2016), the living conditions of people in urban environments constitutes the key to the health and well-being of urban residents. Therefore, the presence or availability of green spaces in cities is one of the key indicators of quality of life (Dunnett *et. al.*, 2002; Madureira *et. al.*, 2018). Urban green spaces include urban forests and woodlands, parks, allotments, private gardens, green roofs, cemeteries, rivers and streams, and lakes (Breuste *et. al.*, 2013). The contribution of these places to the enhancement of the quality of life in cities cannot be over-emphasised. They break the monotony of hard, concrete shacks in cities, and provide soft visual impression and fascination to the eyes (Korpela, 2001; Hartig *et. al.*, 2013).

The Greenspace Scotland (2010), characterise urban green spaces as breathing and resting places from the hustles and bustles of urban life. This connotes that, urban green spaces are good places for healthful living, meeting-places for play and togetherness, as well as creative places for learning and celebrations. These descriptions offer a lot of charm and attraction to people to want to use or experience green spaces. These descriptions imply that green spaces do not merely evoke aesthetic appeals, but are also nice places for learning and being connected, and places for the promotion of health and wellbeing. They are, therefore, great places for international tourism, which provide opportunities for nations and cities to earn huge foreign exchange, and become strong and competitive.

Green spaces provide some of the best natural places for exercise, relaxation, health, and psychological restoration. Many examples of green space locations abound in Nigeria. These provide equivalent restorative experiences as those in Europe or America. Such places include the Olumo Rock in Abeokuta, Ogun State, the Mambilla Plateau in Plateau State, the Bar Beach in Lagos and Badagry, and the Emir's Palace in Zaria (Oladeji and Adedapo, 2014; Aribigbola and Fatusin, 2016). The tourist attraction sites in Ondo State include the Deji's Place, the Idanre Hills, the Igbokoda Water Front, the Ebomi Lake, and the Owo Museum. Examples of green spaces in Akure include the Alagbaka Botanical Garden, the Ondo State Woodlot, the Ilula Caring Heart and Recreation Centre, and the Reuben Fasoranti Park, Alagbaka.

This research identifies the changes in the pattern of urban green spaces in Akure. Akure is the capital of Ondo State, Nigeria. It has a population of over 300,000 inhabitants (NPC, 2010). Akure was founded around 1850 A.D. by a hunter named Asodeboyede (Ige, 2010), who migrated from Ile-Ife and settled at the present site of Akure. Later, other ethnic migrants came to settle there. The different ethnic groups, therefore, organised themselves into enclaves of distinct cultures and traditions, which were quite different from those of the Akures. These enclaves later developed into six semi-autonomous communities known as quarters. The six quarters exist until date. Their names are Isolo, Oluwatuyi, Oshinle, Ala, Alagbaka, and Sijuwade.

The rapid socioeconomic development of the city arising from state-creation and urbanisation increased the city's physical size at the expense of its green spaces, from 1976. The need to halt this trend and promote the liveability of the city, informed this study. A comprehensive study into the availability, magnitude, and changes in the pattern of urban green spaces is important to Nigerian cities and Akure for many reasons. Firstly, for most Nigerian cities, and many cities in the developing world, meeting the World Health Organisation's (2016) minimum 9m<sup>2</sup> per capita green space benchmark constitutes a major challenge. This is due to the dearth of systematic studies into the structure of urban green spaces in these countries. Secondly, the inadequacy of green spaces in many cities of the developing world could place city residents at great health risks from non-communicable diseases, such as hypertension and diabetes, and from urban heat stress arising from urbanisation and global warming. The third,

relates to the necessity for enlisting Nigerian cities as one of the global cities, which constitute important centres for international politics, commerce, and prestige.

Ultimately, the active participation and patronage of cities for international business, influence, and diplomacy, will depend not so much on the possession of abundant natural resources in future, as the possession of green spaces, which constitutes one of the major indicators of urban liveability. However, the destruction of green spaces from urban development activities is not a bad thing. In fact, the building of schools and public institutions constitutes part of the normal process of economic development. Such activities become bad if and only if, the green spaces that are damaged are not ameliorated or replaced. The none-replacement of damaged green spaces in the city, initiated the disappearance of its green spaces. The increases in Akure urban population led to increases in the volume of socioeconomic activities. Therefore, the kind of pressures and impact arising from the city's population, calls for immediate replacement of the green spaces as soon as they are destroyed by the urbanisation. This is not the case with Akure, the study area.

Since the city continues to accommodate more people, making the city attractive, functional, and liveable through the provision of adequate and accessible urban green spaces, therefore, represents a worthwhile goal. Akure constitutes the low-lying flood plain for rivers Ala, Elegbin, Ukere and Omiyeye, which flow through the city. The city is about 250 metres above sea level (Fadairo, 2013). The relatively flat nature of the city's terrain, the narrowness and unmanaged nature of its river channels, and the high rate of illegal dumping from human activities, provoke massive flooding during the rains. Naturally, the city's flood plains ought to constitute great potentials for tourism, as well as good recreational grounds for individual and family picnics, relaxation and exercise, as is the practice in many developed countries. Unfortunately, however, the flood plains are not well planned and managed to provide such opportunities. Instead, they are regularly flooded and polluted with garbage and illegal physical development activities that cause frequent episodes of urban flooding in the city. The implication is that, the rivers have become liabilities rather than assets, through the poor attitudes and behavioural patterns of the city's residents. A flooded city is, by implication, an unhealthy city.



On the other hand, the disappearance of Akure urban vegetation, which began during the state-creation exercise, continued unabated to the extent that, its natural vegetation has greatly reduced. The depletion of urban vegetation due to urbanisation has become one of the city's notable indicators of environmental deterioration. The promotion of green areas in the city thus calls for urgent measures to rectify the disappearance of urban green spaces in the city. This requires the conduct of comprehensive studies into the changing urban green space patterns of the city. The conversion and depletion of many of the city's planned open spaces as a result of government's political and socioeconomic policies, also demands further investigation.

This research is intends to study the changes in the pattern of urban green spaces in Akure, with a view to providing urban planning a basis for intervention towards the actualisation of this goal. Consequently, the study intends to provide city planners and policy makers with relevant planning information to promote the availability of urban green spaces in the city. The research envisages that findings from the study will be applicable for improving the liveability of other medium cities in Nigeria. Elsewhere, the recommendations of the study may be adapted with modifications, to countries experiencing similar socioeconomic and cultural conditions as Akure, Ondo-State, Nigeria.

## **1.2 Statement of the Problem**

The impact of unplanned urbanisation and the limited availability of green spaces in many cities of the developing world, including Nigeria, have prevented the cities from meeting international best practice standards. Akure, Ondo State, suffers from this deteriorating condition. The forces of urbanisation exert undue pressure on land particularly at the Akure city centre. The pressure from the government also reduced urban green spaces in the city. In spite of the Land Use Act of 1978, which vests all (urban) lands in the government, individuals and families hold and use lands contrary to the Act, as well as against the city's statutory planning regulations and

standards. This resulted in the absence of systematic land documentation and precluded the accurate inventory of Akure land-holding status and practices.

The flexible autonomy and jurisdiction, and the different approval powers arrogated to Akure land agencies, produced diverse and uncoordinated open space standards. Therefore, the city's inadequate open spaces led to urban heat stress, erosion, reduced urban liveability, and low per capita green space. Similarly, the existence of limited advocacy and limited resistance of the residents to conversion of open spaces, and scanty research attention to urban green space issues, precipitated the depletion of urban green spaces in the city. The response to the pressures came in the form of violations of planning regulations, such as building on road, river and power line setbacks, and the conversion of approved open spaces to other uses. This led to the conversion of many statutorily-planned open spaces to schools, police stations and markets, between 1979 and 1983 by the government.

On the other hand, the shortage of green spaces at the Akure central area, created a shortage of places for exercise and recreation for inner city children. The only places children have to recreate are the backyards, the incidental open spaces, (which are also being sold off today), or along the less busy streets. Otherwise, children remain indoors for safety reasons. Preventing children from enjoying the opportunities in green spaces, which include social contacts, discovery and mastery of the environment, and development of strong leadership character, could affect children's cognitive development a great deal in later years. For the elderly, however, absence of green spaces could promote immobility, illness, and premature death.

The kind activities that go on in a city ultimately dictate the pattern of land use changes that emerge. For instance, the availability, size, location, distance, density and accessibility of urban green spaces influence the frequency of usage, and their positive health and wellbeing outcomes. Besides, changes in urban green space patterns can negatively affect a city's ecological functions to the detriment of the residents. The frequent change of Akure urban green space patterns could result in low greenness indices and reduced liveability. Similarly, pattern language in planning is a good indicator for assessing the spatial configuration of urban green spaces. It is a barometer

for measuring the level of facilities in a city, and a mechanism for assessing how equitable or random the planners' locational decisions within a city have been. The depletion of areas of former green vegetation in a city reveals the kind of pressure and impact that need to be urgently addressed, and their control measures. A continuing decreasing trend, such as is the case now in Akure, often produces limited green space availability and accessibility

Overcoming these challenges constitutes one of the most fundamental issues to urban planners, researchers and policy makers alike (Kabisch *et. al.*, 2016). Investigating the forces behind the depleting urban green space patterns, through a comprehensive study of this nature, therefore, becomes imperative. This provides the only mechanism by which the city's available urban green spaces may be protected and preserved.

### **1.3 Previous Studies on Changes of Urban Green Space Patterns**

A review of previous studies on changes of urban green space patterns was undertaken and shown in Table 1.1. The review covered the United States of America, China, Vietnam, Malaysia, Sweden, India, Germany, Iran and Africa. This procedure assisted in the identification of the research gap for the study. However, only a few of studies are presented here. This enhances our understanding of the forces, dimensions, and trends of the changes. It also helps to identify the research gap, and determine how and where, the current research fits into previous urban green space research. The tables indicate the names of the authors and year of publication, the title of paper, the study area, the methodology, and the findings on factors causing changes of urban green space patterns in the different countries. Analysis of the review suggests that, factors responsible for urban green space change patterns were mostly due to urbanisation and industrialisation in the developed countries. Although attitudinal factors did not explicitly feature as one of the factors in the developed world, the prevalence of urbanisation, industrial expansion and planning policies, demonstrate a lot of consistency with the developing countries. This suggests that the rigid adherence

to existing sociocultural, educational, technological, administrative, and legal regulations and values, unlike in the developing countries, might be responsible for the limited role of attitudinal factors in them. This means that, planners and policy makers should be sensitive to such differences when designing urban green space policies at the city level.

Table 1.1: Previous studies on changes of urban green space patterns.

S/N	Name of Author	Title of Paper	Study Area	Methodology	Findings (factors of urban green space change patterns).	Gap
1	Hope, D, Gries, W, Zhu, W.F, Pagan, C.L, Redman, N.B, Grimm, A, L.A, Nelson, C, Martin and A. Kinzig (2003)	Socio-economics Drive Urban Plant Diversity	Phoenix, Central Arizona, USA.	Probability-based survey and spatial statistical analyses	Heterogeneity in resource availability, urbanization, "luxury effect, education, institutional control, and culture.	Study did not address urban green space change patterns, and attitudinal factors.
2	Kong, F and Nakagosi (2005)	Urban Green Space Changes and their Driving Forces	Jinan City, China.	Gradient analysis and landscape metrics.	Urban greening policies and urban sprawl.	Study did not address urban green space change patterns, and attitudinal factors.
3	Phan, D.U. and Nakagosi, N. (2007).	Analysing urban green space pattern and eco-network in Hanoi, Vietnam	Hanoi, Vietnam	Gradient analysis, GIS, and FRAGSTATS 3.3.	Land use change, economic growth, population increase, urbanization, weak planning, and poor urban management.	Study did not address urban green space change patterns, and attitudinal factors.
4	Said, I. and Harun, N. Z. (2007)	The Morphological Transformation of Public Place in Historic Town of Melaka	Melaka, Malaysia.	Qualitative method, site survey and analysis.	Rapid urbanisation	Study did not address urban green space change patterns, and attitudinal factors.
5	Lambin, et al; (2007).	Causes of Land Use and Land Cover Change.	Royal Swedish Academy of Sciences.	Systematic Review: archival review	Population, poverty, response to economic opportunities	Study did not address urban green space change patterns, and attitudinal factors.
6	Sandhya, G Kiran and Usha. B. Joshi (2013)	Estimation of Variables Explaining Urbanization Concomitant with Land Use Change.	Vadodara City, Gujarat, India,	Combination of remote sensing and conventional data	Rapid urbanisation, industrialization and Haphazard local planning	Study did not address urban green space change patterns, and attitudinal factors.
7	Kiani, A. and Javadlyan, M. (2014).	Evaluation of Urban Green Spaces and their Impact on Living Quality of Citizens (Case Study: Nehbandan City, Iran). (2014)	Nehbandan City, Iran	Descriptive analysis approach and direct observation.	Urban development and land use changes.	Study did not address urban green space change patterns, and attitudinal factors.

8	Menzh, C.A. (2014).	Urban Green Space in Africa: Nature and Challenges	Africa	A systematic review approach and use of archival review.	Rapid urbanization, poor urban development policies	Study did not address urban green space change patterns, and attitudinal factors.
9	Lee, A.C. K., Jordan, H.C., and Horsley J. (2015).	Value of urban green spaces in promoting healthy living and wellbeing: prospects for planning	Global: Literature review	Narrative Summary	Competing urban planning priorities, economic considerations, and market forces.	Study did not address urban green space change patterns, and attitudinal factors.
10	Kabisch, N., Strohbach, M., Haase, D., and Kroenberg, J. (2016).	Urban green Space Availability in European Cities	Berlin, Germany and Lodz, Poland.	Land use and population data grid.	Low priority, limited financial budgets.	Study did not address urban green space change patterns, and attitudinal factors.
11	Nor, A.M.M., Coranjoje, R., Harris, J.A., and Brewer, T. (2017).	Impact of rapid urban expansion on green space structure	Kuala Lumpur, Metro Manila, and Jakarta	Land change integrated modelling and landscape ecology analytics.	Spatial master planning, rapid urban expansion, and poor planning policies	Study did not identify attitudinal factors. Study did not use questionnaire, or perception-based measures
12	Zhang, L., Wang, Z. and Da, L. (2018).	Spatial Characteristics of Urban Green Space: A Case Study of Shanghai, China.	Shanghai, China	Moving window method and gradient analysis, plus ArcInfo Software Version 8.2, ESRI, Redlands, and visual interpretation.	Rapid urbanization	Study did not identify attitudinal factors. Study did not use questionnaire, or perception-based measures
13	Li, F., Zheng, W., Wang, Y., Liang, J., Xie, S., Guo, S., Li, X. and Yu, C. (2019)	Urban green space fragmentation and urbanization: A spatiotemporal perspective.	Beijing, China.	Landscape fragmentation comprising the largest patch index, landscape shape index (LSI) and spatial metrics and night time lighting. Landscape fragmentation metrics. extent of light data (NTL)	Urbanization, and landscape fragmentation.	Study did not address urban green space change patterns, or attitudinal factors. It did not also utilize questionnaire, or perception-based measures
14	Lahoti, S., Keshi, M., Lahoti, A. and Saito, O. (2019)	Mapping Methodology of Public Urban Green Spaces Using GIS: An Example of Nagpur City, India	Nagpur City, India	Mapping methodology and GIS analysis	Rapid urbanization and changing landscape pattern	Study did not address urban green space change patterns, or attitudinal factors. It did not also utilize questionnaire, or perception-based measures

Nevertheless, the studies failed to address urban green space change patterns. This suggests that, the researchers did not regard changes of urban green space patterns as too important. Yet, understanding and quantifying urban green space change patterns is essential for monitoring and assessing the ecological consequences of population and urbanisation on cities. In addition, understanding the dynamics and spatiotemporal variations of urban green spaces in relation to rapid urbanization, can contribute to informed planning decision-making on appropriate, city-specific urban green space policies. Thirdly, the studies did not also address the role of attitudinal factors in the spatial configuration of urban green spaces in any of the countries in which the studies were conducted. This is quite different from the trend in Akure, Ondo State, Nigeria, where the impact of attitudinal factors was more pronounced. Attitudinal factors constitute one of these factors in the developing countries, where rigid laws and procedures, and institutional regulations to protect the sanctity of urban green spaces against unwarranted conversion to private or public uses, do not exist.

#### **1.4 Research Gap**

While the gap for the research was partly identified from the Table 1, the neglect of urban green space issues in Akure reinforces the gap. Available studies on Akure urban problems, for example, urban flood crises (Fadamiro and Adedeji, 2016), urban heat wave (Aderoju *et. al.*, 2013), land use changes and degradation of environmentally-sensitive areas (Balogun *et. al.*, 2011; Olajuyigbe *et. al.*, 2015; Owoeye and Ibitoye, 2016), urban expansion and urban sprawl (Balogun *et. al.*, 2011; Eke *et. al.*, 2017), and parks provision and management (Aribigbola and Fatusin, 2016; Ijatuyi and Ajenifujah-Abubakar, 2014), failed to specifically address the dynamics of urban green space change patterns in the city. This arises from the low priority attention to green space issues, and the lack of awareness of the citizens, too, of the inherent benefits of urban green spaces for enhanced wellbeing. Table 1.2 depicts the total number of research activities on urban problems in Akure, and the proportion of studies dedicated to urban green spaces in relation to the total.

Table 1.2: Areas of Research and Publication Activities on Urban Issues in Akure.

S/N	Themes/sub-themes	Authors and Years	Total Percentage
1	Urbanisation, housing and related issues	Fasakin and Ogunmakin (2006); Olotuah (2006; 2007; 2010; 2016); Tofowomo (2008); Owoputi (2008); Balogun <i>et al.</i> ; (2011); Fakere and Ayeni (2011); Ayeni, (2012); Fakere (2013); Aderoju (2013), Owoeye and Adedeji (2013); Oyinloye (2013); Ogundare and Ogunbodede (2014); Enisan and Ogundiran (2014); Olabode (2015); Oriye and Fakere (2015); Olamiju and Oyinloye (2015); Ogunleye (2015); Owoeye <i>et al.</i> ; (2015); Olajuyigbe <i>et al.</i> (2015); Olaoluwa <i>et al.</i> ; (2016); Ogundare (2016); Adegbehingbe (2016); Eke <i>et al.</i> ; (2017).	26 (76.47)
2	Green space: Parks, open spaces.	Ajenifuja and Fadamiro (2011); Ijatuyi and Ajenifuja-Abubakar (2014); Aribigbola (2016); Ibitolu and Ogunjobi (20116); Okunlola (2016); Ikundayisi (2017); Akinyoyenu <i>et al.</i> ; (2017), Akinyoyenu and Said (2018).	8(23.53)

From the thirty-four (34) studies reviewed, a significant 26 (76.47%) centred on urbanisation-based issues, such as traffic, housing, and land use changes. Relatively, only 8 (23.53%) focused on green space issues. Nevertheless, a few studies remotely connected to urban green spaces exist, such as those of Balogun *et. al.*, (2011), Olajuyigbe *et. al.*, (2015), Oriye and Fakere (2015, Owoeye and Adedeji (2013), Owoeye and Ibitoye (2016) Oyinloye *et. al.*, (2013), and Oyinloye *et. al.*; (2017). The studies concentrated attention on land use/land cover changes, and the impact of urban expansion on city size. They relied only on remote sensing change detection analysis, but failed to elicit the residents' perceptual experience on the city's urban green space change patterns. This highlights a major research gap. This research updates and elongates the previous studies, by combining multiple approaches such as historical narratives, survey questionnaires, remote sensing imaging, accuracy assessments, and the normalised difference vegetation index (NDVI), to unravel the



causes and impact of the changes. In addition, the study is desirable because a lot of physical, socioeconomic, and cultural changes had taken place in Akure since the previous studies were last conducted. The need to provide an update to the studies, by understanding and analysing the forces and impact of urban green space change patterns in the city, constitutes the hallmark of this research.

### **1.5 Research Questions**

The research intends to answer the following questions:

- i. What was the pattern of Akure urban green spaces like before 1976?
- ii. What changes occurred in the pattern of urban green spaces between 1976 and 2016?
- iii. What factors accounted for changes in the pattern of urban green spaces in the Akure between 1976 and 2016?
- iv. How strong are the factors?
- v. What is the magnitude of the changes, or how big are the changes?
- vi. What implication do the changes have on the city and the residents?

### **1.6 Aim of the Study**

The aim of the research is to investigate the changes in the pattern of urban green spaces towards the preservation of green spaces in Akure, Nigeria.

## **1.7 Research Objectives**

The specific objectives of the study are:

1. To explore the changes in the pattern of urban green spaces between 1976 and 2016 in Akure.
2. To evaluate the magnitude of changes that have occurred in the pattern of urban green spaces between 1976 and 2016 in the study area.
3. To identify the factors that influenced changes in the pattern of urban green between 1976 and 2016 in Akure.
4. To determine the implication of changes in the pattern of urban green space on the city and its residents between 1976 and 2016.

## **1.8 Matching Research Questions to Research Objectives**

Table 1.3 matches the research questions with the research objectives. This helps to discover how the research questions (RQs) correspond with the research objectives (ROs). An observation of the research questions and the research objectives revealed that the research questions agree with the research objectives as revealed in Sections 1.5 and 1.7.

Table 1.3: Matching Research Questions to Objectives.

S/N	Research Questions	Research Objectives
1	What was the pattern of Akure urban green spaces like before 1976?	To explore the changes in the pattern of urban green spaces between 1976 and 2016 in Akure.
2	What changes occurred in the pattern of urban green spaces between 1976 and 2016?	To evaluate the magnitude of changes that have occurred in the pattern of urban green spaces between 1976 and 2016 in the study area.
3	What factors accounted for changes in the pattern of urban green spaces in the Akure between 1976 and 2016? How strong are the factors?	To identify the factors that influenced changes in the pattern of urban green between 1976 and 2016 in Akure.
4	What implication do the changes have on the city and the residents?	To determine the implication of changes in the pattern of urban green space on the city and its residents between 1976 and 2016.

## 1.9 Scope of the Study

The starting point of the research was year 1976. Ondo State was created in 1976, and Akure was made the capital city. The focus of the current research is on publicly-accessible open spaces due to unrestricted access public access to them, and the potential for promoting recreation, relaxation, and the general health and wellbeing of urban residents. The private open spaces are different. They operate on strict schedules and guidelines, such as limitation to access, payment of entrance fees, and specific opening and closing hours. These limitations, and the barriers they pose to freedom and frequency of usage, informed their exclusion from the study. Similarly, the cemetery was excluded from the research, although it constitutes a vital component of the urban open space network. This is due the negative cultural and symbolic perception of cemeteries, particularly in South-Western Nigeria, as the abode of ghosts. This elicits great fears in the minds of people, and precludes the cemeteries from active usage as places for relaxation and exercise. In view of the similarity

between the terms open space and green space, the terms are used interchangeably in this research to connote the same meaning.

### **1.10 Significance of the Study**

All physical development activities must have clear goals and objectives. These constitute the main driving forces. The goal of this research is on the preservation of green spaces in Akure. Understanding the pattern of urban green space changes at the city level provides the mechanisms for controlling them. We need to understand how, where and why the pattern of green spaces change, before the impact and control measures can be effected. The study intends to investigate the factors responsible for the city's urban green space change patterns, and reveal the existing status of the green spaces in terms of size, distance, nearness, and per capita availability. Identifying these indicators could assist the planning and provision of urban green spaces in the city. Akure did not have specific urban green space indicators until now.

Furthermore, the research proposes to highlight the role of attitudinal factors in the changing pattern of urban green spaces in the city. Understanding pattern language in urban and regional planning provides a good assessment of the spatial configuration of urban green spaces. The depletion of former areas of green vegetation in a city reveals the kind of pressure and impact that need to be addressed, and their control measures. This calls for pro-active measures to replace green spaces as soon as these are depleted for physical development. Previous studies on environmental problems in the city had concentrated on urbanisation, and undermined the role of attitudinal factors in the process. This could assist researchers and policy makers to discern better outlines for urban green space interventions. The identification and focus on attitudinal factors in particular could also crystallise into a solid research domain in future.

The study intends to contribute towards the eradication of multiple plan-approving agencies through an e-enabled land administration framework proposed for the city. The effective operations of the land's bureau could also generate accurate and up-to-date data for the city. Building a spatial urban green space geo-database provides a basis for further studies of urban green spaces. Finally, the study intends to classify Yoruba and Akure urban green spaces. These have remained very loose and uncoordinated for a very long time.

### **1.11 Research Design**

The research design, (Figure 1.1), is presented to depict the steps and procedures adopted for the conduct of the study. Stage 1 outlines the preliminary steps of the research, such as problem statement and definition, as well as the aim and objectives of the research. Stage 2 deals with the collection and analysis of quantitative and qualitative aspects of the research data. Stage 3 addresses the collation and synthesis of data to inform policy actions. Stage 4 manifests as the data usage stage. This leads to the disclosure of the limitations to the research, and the areas of further studies.

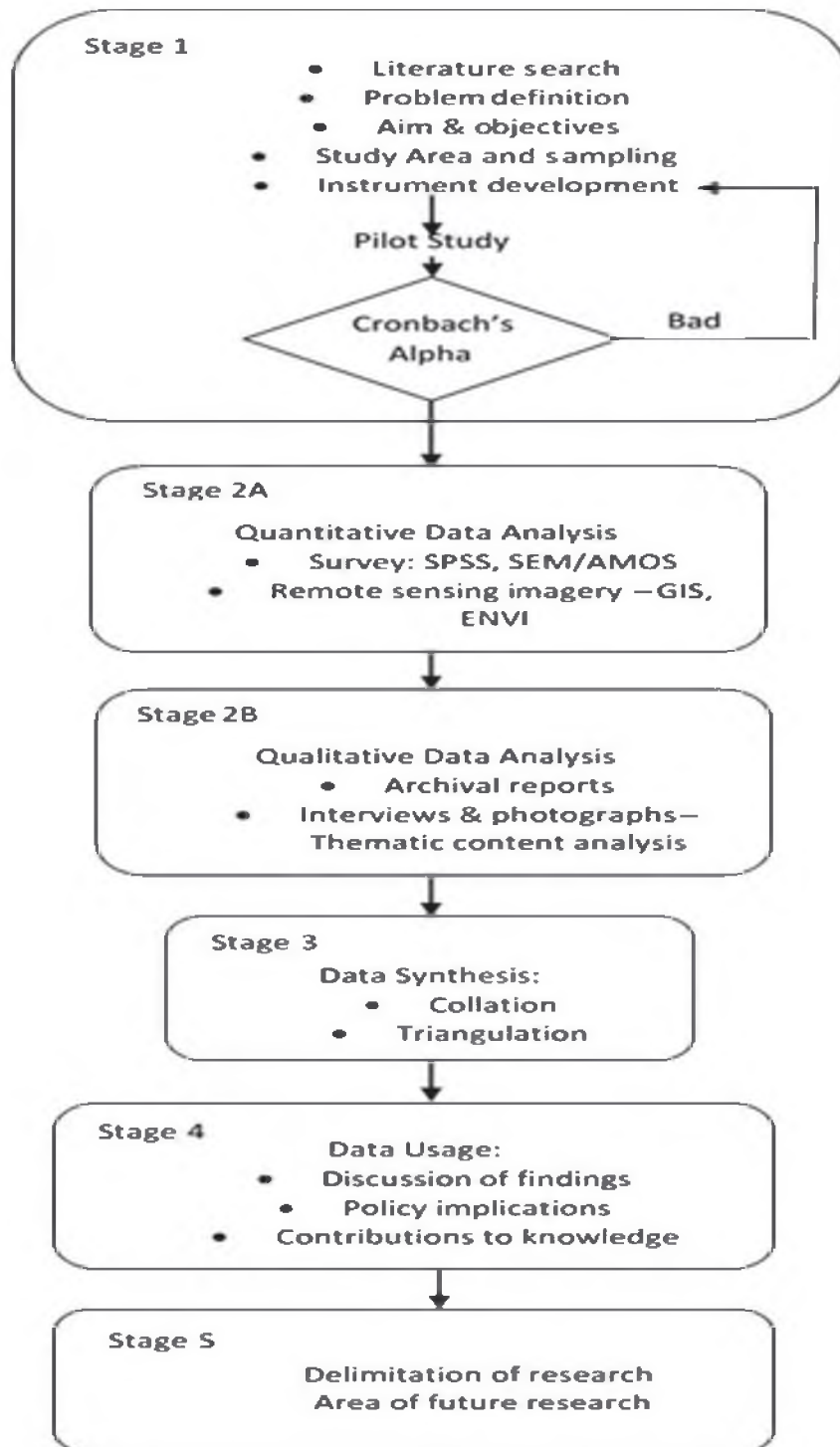


Figure 1.1 The Research Design Flow-chart.

## **1.12 Organisation of the Thesis**

The thesis contains six chapters. Chapter 1 provides the contextual background to the study. It relays the general overview of the research. The chapter presents the aim and objectives of the study, as well as the problem statement. It also presents the research questions, the justification, and scope of the research.

Chapter 2 presents a review of the previous research on urban green spaces from the global perspective. This reflects the green space situations in both the developed and developing countries. The review discusses the meaning and importance of open spaces. It also discusses the factors influencing the changes in open spaces in Akure. In addition, it discusses the theoretical and conceptual framework of the study. Finally, it examines the necessity for open space management in Nigeria.

Chapter 3 presents a detailed description of the study area. The location of the study area in Ondo State was described. The chapter also provides information on the geographical, climatic, and population structure of the Ondo State. It thereafter gives a full description of Akure's location, geography and population structure. A brief description of the Akure Master Plan (1980) was also made. This provides some information on formal land use planning practices in the city.

Chapter 4 details the research philosophy and methods adopted for the conduct of the study. The issues discussed include the research process, and the techniques and methods of data collection. The research design presents the flow of the research process in stages. It attempts a detailed description of the procedures for data analysis, as well as the justification for adopting the methods and techniques used in the study.

Chapter 5 focuses on data analysis, results and discussion. The data analysis, presentation and discussion of results was done according to the research objectives and research questions. The interpretation of results forms the basis for the policy implications and recommendations of the research.

Chapter 6 concludes the thesis by presenting the summary of findings of the research and their policy implications. It presents the thesis statement, which represents the comprehensive and informed position of the researcher on changes of urban green space patterns, their impact, and their control measures in Akure, the medium city.



## REFERENCES

- Abegunde, A. A., Omisore, E. O., Oluodo, F., and Olaleye, D. (2009). Commercial Horticultural Practice in Nigeria: Its Socio-Spatial Effects in Lagos City. *African Journal of Agricultural Research*, 4(10), 1064-1072.
- Adebo, G. and Odefadehan, O. O. (2015). Analysis of City Greening Approach to Sustainable Ecosystem Management in Ondo State. *Environmental Management and Sustainable Development*; 4 (1), 149-163.
- Adegbehingbe, V. O. (2011). An Appraisal of Housing Conditions in Residential Core Area of Akure City in South Western Nigeria: A Case Study of Erekesan. Paper presented at the West Africa Built Environment Research (Waber) Conference; 19-21 July 2011, Accra, Ghana, 93.
- Adegbehingbe, V. O. (2016). An Appraisal of Housing Conditions in Residential Core Area of Akure City in South Western Nigeria: A Case Study of Erekesan. Paper presented at the West Africa Built Environment Research (Waber) Conference 19-21 July 2011 Accra, Ghana, 93.
- Adekunle, V., Olagoke, A., and Ogundare, L. (2010). Rate of Timber Production in a Tropical Rainforest Ecosystem of Southwestern Nigeria and its Implications on Sustainable Forest Management. *Journal of Forestry Research*, 21(2), 225-230.
- Adeoye, D. O. (2016). Challenges of Urban Housing Quality: Insights and Experiences of Akure, Nigeria. *Procedia-Social and Behavioral Sciences*, 216, 260-268.
- Aderoju, O., Samakinwa, E., and Ibrahim, D. (2013). An Assessment of Urban Heat Island in Akure Using Geospatial Techniques. *Journal of Environmental Science, Toxicology*, 6(3), 24-34.
- Adjei Mensah, C. (2015). Sustaining Urban Green Spaces in Africa: A Case Study of Kumasi Metropolis, Ghana. University of Birmingham.
- Afe, A. E. (2012). A Historical Survey of Socio-Political Administration in Akure Region up to the Contemporary Period. *European Scientific Journal*, ESJ, 8(18).

- Ahern, J. (1991). Planning for an Extensive Open Space System: Linking Landscape Structure and Function. *Landscape and Urban Planning*, 21(1-2), 131-145.
- Ajzen I. (1985) From Intentions to Actions: A Theory of Planned Behavior. In: Kuhl J., Beckmann J. (eds) Action Control. SSSP Springer Series in Social Psychology. Springer, Berlin, Heidelberg.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
- Ajzen, I. (2001) Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology* 32, 11-20.
- Ajzen, I., and Fishbein, M. (2005). The Influence of Attitudes on Behavior. *The Handbook of Attitudes*, 173(221), 31.
- Akindele, S., Olaopa, O., and Obiyan, A. S. (2002). Fiscal Federalism and Local Government Finance in Nigeria: An Examination of Revenue Rights and Fiscal Jurisdiction. *International Review of Administrative Sciences*, 68(4), 557-577.
- Akinyoyenu, A. F. and Ogunmodede, L.R. (2006). Strategies and Options for Increasing the Supply of Rental Housing in Owo, Ondo State. *Journal of Environmental Planning and Development (JEP & D)*: 1 (1): 92-106.
- Akinyoyenu, A. F., Rafee, M. B. M. & Irina, S. Z. (2017). Botanical Gardens as Drivers of Climate Change Mitigation and Urban Sustainability in Ondo State, Nigeria. *Journal of Applied Sciences and Environmental Sustainability*; 3 (8), 110-126.
- Akinyoyenu, A. F. & Said, I. (2018). Analysing the Contribution of Attitudinal Factors to the Depleting Urban Green Vegetation in Akure, Nigeria. *Journal of Advanced Research Design*; 48 (1), 14-24.
- Al-Hagla, K. (2008). Towards a Sustainable Neighborhood: The Role of Open Spaces. *International Journal of Architectural Research: Archnet-IJAR*, 2(2), 162-177.
- Alcock, I., White, M. P., Wheeler, B. W., Fleming, L. E., and Depledge, M. H. (2014). Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas. *Environmental Science & Technology*, 48(2), 1247-1255.
- Aluko, O. E. (2011). Urbanization and Effective Town Planning in Nigeria. *African Research Review*, 5(2).

- Amati, M. (2008). Green Belts: A Twentieth-Century Planning Experiment. In: M. Amati (Ed.), *Urban Green Belts in the Twenty-first Century*, 1-17. Aldershot: Ashgate Publishing.
- Annerstedt, M., Östergren, P.-O., Björk, J., Grahn, P., Skärbäck, E., and Währborg, P. (2012). Green Qualities in the Neighbourhood and Mental Health—Results from a Longitudinal Cohort Study in Southern Sweden. *BMC Public Health*, 12(1), 337.
- Arabi, Z., Hatami, D., and Jadidoleslami, M. (2014). Analysis of the Pattern of Spatial-Local Distribution of Green Space (Case Study of Mehr City in Iran). *Indian Journal of Scientific Research*, 8(1), 197-202.
- Aribigbola, A. (2005). Study of Urban Housing Choice in Akure, Ondo State, Nigeria. Unpublished PhD Thesis, Department of Urban and Regional Planning, Obafemi Awolowo University, Ile Ife.
- Aribigbola, A. (2008). Housing Policy Formulation in Developing Countries: Evidence of Programme Implementation from Akure, Ondo State, Nigeria. *Journal of Human Ecology*, 23(2), 125-133.
- Aribigbola, A., and Fatusin, A. (2016). Parks Provision and Management in Urban Areas on Nigeria: The Example of Akure, Ondo State. *Journal of Environment and Earth Science*, 6(10), 1-7.
- Millenium Ecosystem Assessment, M. E. (2005). *Ecosystems and Human Well-Being: 5: Island Press Washington, DC.*
- Awang, Z. (2012). *Research Methodology and Data Analysis: Penerbit Universiti Teknologi MARA Press.*
- Ayeni, D. A. (2012). Towards an Effective and Sustainable Use of Open Spaces in Nigeria. *International Journal of Engineering Science and Technology (IJEST)*, 1-11.
- Azadi, H., Ho, P., Hafni, and Urban Green Space Performance. *Journal of Environmental Planning and Management*, 54(6), 785-811.
- Badru, R. A., Olorunyomi, K. P., Salau, A. O., Akinwale, O. I., Alwadood, J., and Atijosan, A. (2017). Evaluation of Electric Field Pollution from 132 Kva Power Transmission Lines to Proximity of Infrastructures in Ibadan, Nigeria. *Bilge International Journal of Science and Technology Research*, 1(2), 46-58.

- Balogun, I. A., Adeyewa, D. Z., Balogun, A. A., and Morakinyo, T. E. (2011). Analysis of Urban Expansion and Land Use Changes in Akure, Nigeria, Using Remote Sensing and Geographic Information System (GIS) Techniques. *Journal of Geography and Regional Planning*, 4(9), 533-541.
- Barbosa, O., Tratalos, J. A., Armsworth, P. R., Davies, R. G., Fuller, R. A., Johnson, P. E. L. (2007). Who Benefits from Access to Green Space? A Case Study from Sheffield, UK. *Landscape and Urban Planning*, 83(2-3), 187-195.
- Bardhan, P. (1997). Corruption and Development: A Review of Issues. *Journal of Economic Literature*, 35(3), 1320-1346.
- Basorun, J. (2015). Reinvigorating Urban Nodes and Spatial Growth in Akure, Nigeria. The European Conference on the Social Sciences. Official Conference Proceedings; In the International Academic Forum.
- Baycan-Levent, T., Vreeker, R., and Nijkamp, P. (2009). A Multi-Criteria Evaluation of Green Spaces in European Cities. *European Urban and Regional Studies*, 16(2), 193-213.
- Bloch, R., Monroy, J., Fox, S., and Ojo, A. (2015). Urbanisation and Urban Expansion in Nigeria.
- Board, A. F. (2011). Project Performance Report Guidance Document to the Project Performance Report TEMPLATE.
- Bonsignore, R. (2003). The Diversity of Green Spaces. Design Center for American Urban Landscape. Design Brief, Number, 2.
- Bou-Zeid, E., Overney, J., Rogers, B. D., and Parlange, M. B. (2009). The Effects of Building Representation and Clustering in Large-Eddy Simulations of Flows in Urban Canopies. *Boundary-Layer Meteorology*, 132(3), 415-436.
- Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., and Pullin, A. S. (2010). A Systematic Review of Evidence for the Added Benefits to Health of Exposure to Natural Environments. *BMC Public Health*, 10(1), 456.
- Breuste, J., Schnellinger, J., Qureshi, S., and Faggi, A. (2013). Urban Ecosystem Services on the Local Level: Urban Green Spaces as Providers. *Ekologia*, 32(3), 290-304.
- Bucht, E., and Persson, B. (1994). *Grönstruktur I Städer Och Tätorter. Stad & Land, Alnarp* (127), 75.
- Carmona, M., and De Magalhães, C. (2004). Is The Grass Greener...? Learning from International Innovations in Urban Green Space Management.

- Carmona, M., Freeman, J., Rose, S., And Woolley, H. (2004). The Value of Public Space: How High Quality Parks and Public Spaces Create Economic, Social and Environmental Value. London. CABE SPACE.
- Cetateanu, A., and Jones, A. (2014). Understanding the Relationship between Food Environments, Deprivation and Childhood Overweight and Obesity: Evidence from A Cross Sectional England-Wide Study. *Health & Place*, 27, 68-76.
- Chang, Q., Li, X., Huang, X., And Wu, J. (2012). A GIS-Based Green Infrastructure Planning for Sustainable Urban Land Use and Spatial Development. *Procedia Environmental Sciences*, 12, 491-498.
- Chen, Y., Liu, T., Xie, X., And Marušić, B. (2016). What Attracts People to Visit Community Open Spaces? A Case Study of the Overseas Chinese Town Community in Shenzhen, China. *International Journal of Environmental Research and Public Health*, 13(7), 644.
- Chiesura, A. (2004). The Role of Urban Parks for the Sustainable City. *Landscape and Urban Planning*, 68(1), 129–138.
- Cho, S.-H., Poudyal, N. C., and Roberts, R. K. (2008). Spatial Analysis of the Amenity Value of Green Open Space. *Ecological Economics*, 66(2-3), 403-416.
- Chris, A. (2001). A Public Open Space Typology for Kampala: The Development of Form through Studying Traditional Open Space.
- City as Habitat: NCT Delhi. Land Use Strategy for the Conservation of Biodiversity: Addressing Climate Change in Urban areas. National Action Plan on Climate Change. <https://www.qub.ac.uk/researchcentres/RespondingtoClimateChange/India-UKPerspectives/Filestore/Theme3/Fileupload,239575,en.pdf>  
Retrieved 12/03/2019.
- Clarke, P. (2013). Urban Planning and Design. In Sustainable Urban Design Taylor & Francis.
- Cohen, O., Ashkenazy, H., Belinky, F., Huchon, D., and Pupko, T. (2010). GLOOME: Gain Loss Mapping Engine. *Bioinformatics*, 26(22), 2914-2915.
- Comber, A., Brunsdon, C., and Green, E. (2008). Using a GIS-Based Network Analysis to Determine Urban Greenspace Accessibility for Different Ethnic and Religious Groups. *Landscape and Urban Planning*, 86(1), 103-114.
- Conner, M., and Armitage, C. J. (1998). Extending the Theory of Planned Behavior: A Review and Avenues for further Research. *Journal of Applied Social Psychology*, 28(15), 1429-1464.

- Conner, M., MCEachan, R., Taylor, N., O'Hara, J., and Lawton, R. (2015). Role of Affective Attitudes and Anticipated Affective Reactions in Predicting Health Behaviors. *Health Psychology*, 34(6), 642.
- Cornelis, J., and Hermy, M. (2004). Biodiversity Relationships in Urban and Suburban Parks in Flanders. *Landscape and Urban Planning*, 69(4), 385-401.
- Costanza, R., Kubiszewski, I., Ervin, D., Bluffstone, R., Boyd, J., Brown, D., Et Al. (2011). Valuing Ecological Systems and Services. F1000 Biology Reports, 3.
- Creswell, J. W. (2011). Controversies in Mixed Methods Research. *The Sage Handbook of Qualitative Research*, 4, 269-284.
- Crompton, J. L. (2001). The Impact of Parks on Property Values: A Review of the Empirical Evidence. *Journal of Leisure Research*, 33(1), 1-31.
- Cvejić, R., Eler, K., Pintar, M., Železnikar, Š. Haase, D. Kabisch, N. and Strohbach, M. (2015). GREEN SURGE: A Typology of Urban Green Spaces, Eco-System Provisioning Service and Demand. The 7th Framework Programme. WP3. (2013-2017); 1-68.
- Daniel, O. (2015). Urban Extreme Weather: A Challenge for a Healthy Living Environment in Akure, Ondo State, Nigeria. *Climate*, 3(4), 775-791.
- Diaz, N., and Apostol, D. (1992). Forest Landscape Analysis and Design: A Process for Developing and Implementing Land Management Objectives for Landscape Patterns. R6 ECO-TP-043-92. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Region.
- Dimoudi, A., And Nikolopoulou, M. (2003). Vegetation in the Urban Environment: Microclimatic Analysis and Benefits. *Energy and Buildings*, 35(1), 69-76.
- Dramstad, W., Olson, J. D., and Forman, R. T. (1996). Landscape Ecology Principles in Landscape Architecture and Land-Use Planning: Island Press.
- Dunnett, N., Swanwick, C., and Woolley, H. (2002). Improving Urban Parks, Play Areas and Green Spaces: Department for Transport, Local Government and the Regions. London.
- Eke, E. E., Oyinloye, M. A., And Olamiju, I. O. (2017). Analysis of Urban Expansion for Akure, Ondo State, Nigeria. *International Letters of Social and Humanistic Sciences*, 75, 41-55.
- Elster, J. (1989). The Cement of Society: A Survey of Social Order: Cambridge University Press.

- Eneasoba, U., Uchegbu, S., Eneh, O., And Asogwa, J. (2017). The Effects of Pollution on Urban Water Supply in Enugu, Nigeria. Preface and Acknowledgements, 78.
- Enisan. O. and Olujimi, J. A.B. (2015). The Influence of Colonial Planning Education on Urban and Regional Planning Administration in Nigeria.
- Ephraim, E., and Mbina, A. (2014). The Impact of Greenery on the Urban Microclimate and Environmental Quality of Uyo Metropolis, Akwa Ibom State, Nigeria. *Scholarly Journal of Science Research and Essay*, 3(2), 22-27.
- Ernstson, H. (2013). The Social Production of Ecosystem Services: A Framework for Studying Environmental Justice and Ecological Complexity in Urbanized Landscapes. *Landscape and Urban Planning*, 109(1), 7-17.
- Fadairo, G. (2013). An Empirical Evidence to the Urban Storm Water Crisis and the Way out in Akure, Nigeria. *European International Journal of Science and Technology*; 2(5); 53-66.
- Fadamiro, J. A., and Adedeji, J. A. (2016). Cultural Landscapes of the Yoruba of Southwestern Nigeria Demystified as Solidified Time in Space. *Space and Culture*, 19(1), 15-30.
- Fainstein, S. S. (2005). Cities and Diversity: Should We Want It? Can We Plan for It? *Urban Affairs Review*, 41(1), 3-19.
- Fakere, A. A., and Ayeni, D. A. (2013). Communal Facilities and Residential Neighbourhoods in Akure, Nigeria. *Civil and Environmental Research*, 3(1), 48-56.
- Falade, J. (1989). Amenity and Open Space Planning in Nigeria. *Land Use Policy*, 6(2), 162-171.
- Falade, J. B. (1985). Nigeria's Urban Open Spaces: An Inquiry into their Evolution, Planning and Landscape Qualities.
- Faludi, A. (2013). *A Reader in Planning Theory (Vol. 5)*: Elsevier.
- Fasakin, J., and Ogunmakin, O. (2006). Some Characteristics of Alienated Land for Residential Development in Akure, Nigeria (1999-2003). *The Social Sciences*, 1(1), 72-76.
- Fermino, R. C., Reis, R. S., Hallal, P. C., and De Farias Júnior, J. C. (2013). Perceived Environment and Public Open Space Use: A Study with Adults from Curitiba, Brazil. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 35.

- Fishbein, M. Ajzen, I. (1985) From Intentions to Actions: A Theory of Planned Behavior. In: Action Control from Cognition to Behavior. Eds: Khul, J. and Beckmann, J. Berlin: Verlag. 10-39.
- Forman, R. T. (1995). Some General Principles of Landscape and Regional Ecology. *Landscape Ecology*, 10(3), 133-142.
- Forman, R. T., and Godron, M. (1981). Patches and Structural Components for a Landscape Ecology. *Bioscience*, 31(10), 733-740.
- Fraser, E. D. (2002). Urban Ecology in Bangkok, Thailand: Community Participation, Urban Agriculture and Forestry. *Environments*, 30(1), 37-50.
- Friedman, D. and Hechter, M. (1998). The Contribution of Rational Choice Theory to Macrosociological Research. *Sociological Theory*. 6 (2), 201-21.8
- Fryd, O., Pauleit, S., and Bühler, O. (2011). The Role of Urban Green Space and Trees in Relation to Climate Change. CAB Reviews: *Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources*, 6(053), 1-18.
- Fuller, R. A., and Gaston, K. J. (2009). The Scaling of Green Space Coverage in European Cities. *Biology Letters*, 5(3), 352-355.
- Fung Man-Kam, L. (2014). A Study of the Participation of Stakeholders in the Loss, Control and Prevention, and Improvements of Occupational Safety and Health at Work for Property Management in Hong Kong.
- Fuwape, J. A., and Onyekwelu, J. C. (2011). Urban Forest Development in West Africa: Benefits and Challenges.
- Gomiero, T., Pimentel, D., And Paoletti, M. G. (2011). Environmental Impact of Different Agricultural Management Practices: Conventional Vs. Organic Agriculture. *Critical Reviews in Plant Sciences*, 30(1-2), 95-124.
- Gonga-Saholiariliva, N., Neppel, L., Chevallier, P., Delclaux, F., and Savéan, M. (2016). Geostatistical Estimation of Daily Monsoon Precipitation at Fine Spatial Scale: Koshi River Basin. *Journal of Hydrologic Engineering*, 21(9)
- Grahn, P., and Stigsdotter, U. K. (2010). The Relation between Perceived Sensory Dimensions of Urban Green Space and Stress Restoration. *Landscape and Urban Planning*, 94(3-4), 264-275.
- Greenspace. (2010). Why Green Space Matters: What is Green Space? <https://www.Greenspacescotland.Org.Uk/What> Accessed 15/03/2019.



- Groenewegen, P. P., Van Den Berg, A. E., De Vries, S., and Verheij, R. A. (2006). Vitamin G: Effects of Green Space on Health, Well-Being, and Social Safety. *BMC Public Health*, 6(1), 149.
- Hair, J. F., Ringle, C. M., and Sarstedt, M. (2011). PLS-SEM: Indeed, a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-152.
- Han, S. S., Huang, J., Lu, X. X., Marcotullio, P., and Ramachandra, T. (2005). Peri-Urban Development and Environmental Sustainability: Examples from China and India. Final Report for APN Project; 1-83.
- Handley, J., and Bulmer, P. (1986). Making the Most of Greenspace. Report to the Department of The Environment under Research Contract, Unpublished.
- Haq, S. M. A. (2011). Urban Green Spaces and an Integrative Approach to Sustainable Environment. *Journal of Environmental Protection*, 2(05), 601.
- Hartig, T., Mitchell, R., De Vries, S., and Frumkin, H. (2014). *Nature and Health. Annual Review of Public Health*, 35, 207-228.
- Heynen, E., Van Der Helm, P., Cima, M., Stams, G.-J., And Korebrits, A. (2017). The Relation between Living Group Climate, Aggression, and Callous-Unemotional Traits in Delinquent Boys in Detention. *International Journal of Offender Therapy and Comparative Criminology*, 61(15), 1701-1718.
- Hope, D, Gries, W. Zhu, W-F Fagan, C-L Redman, N-B Grimm, A/ LA-Nelson, C. Martin and A Kinzig (2003) Socio-economics Drive Urban Plant Diversity; *PNAS*; 100(15); 8788-8792.
- Howarth, R. B., and Farber, S. (2002). Accounting for the Value of Ecosystem Services. *Ecological Economics*, 41(3), 421-429.
- Hoyle, R. H. (2012). Handbook of Structural Equation Modelling: Guilford Press.
- Huang, C., Yang, J., Lu, H., Huang, H., and Yu, L. (2017). Green Spaces as an Indicator of Urban Health: Evaluating its Changes in 28 Mega-Cities. *Remote Sensing*, 9(12), 1266.
- Ibama, B., Chikagbun, W. and Kpunpamo, O.B. (2015). Assessing the Use and Adequacy of Public Open Spaces in Old Port Harcourt Township. *International Journal of Scientific and Engineering Research*, 6(6), 657-665.
- Ige, D. A. (2010). Delineation and Identification of Land Use Changes in the Traditional Central Business District (CBD) in Akure, Ondo State, Nigeria. Unpublished Maters Thesis Submitted to the Federal Technology Akure, Ondo State. Nigeria

- Ige, D. A. (2016). Summary of Historical Formation of Akure: Its Urbanisation from Cradle till the Present Day. Unpublished Monograph. 1-16.
- Ijatuyi, O., and Ajenifujah-Abubakar, A. (2014). Towards a Liveable and Sustainable Urban Recreational Park: A Study of Users' Perception and Preferences. *Research on Humanities and Social Sciences*, 4(14), 94-101.
- India, C. A. H. N. (2019). Land Use Strategy for the Conservation of Biodiversity: Addressing Climate Change in Urban Areas. National Action Plan on Climate Change. [https://www.Qub.Ac.Uk/Research-Centres/Respondingtoclimatechangeindia-Ukperspectives/Filestore/Theme3/Fileupload,239575,En.Pdf](https://www.qub.ac.uk/research-centres/respondingtoclimatechangeindia-ukperspectives/filestore/theme3/fileupload,239575,en.pdf)
- Indra, H. H. (2008). Public Open Space Utilisation: How People Perceive It in Yogyakarta. Master's Thesis Submitted at ITC, The Netherlands.
- Israel, G. D. (1992). Determining Sample Size. University of Florida IFAS extension, 1-24.
- Jennings, V., Larson, L., and Yun, J. (2016). Advancing Sustainability through Urban Green Space: Cultural Ecosystem Services, Equity, and Social Determinants of Health. *International Journal of Environmental Research and Public Health*, 13(2), 196.
- Jibril, I. (2010). The Return of the Greens in Abuja, Nigeria's New Capital City. FIG Congress 2010. Sustainable Planning and Urban Renewal: Facing the Challenges, Building the Capacity.
- Jim, C. Y. (2004). Green-Space Preservation and Allocation for Sustainable Greening of Compact Cities. *Cities*, 21(4), 311-320.
- Johar, F., and Razak, M. R. (2015). The Right Attitude to Sustain the Green Neighbourhoods. *Procedia-Social and Behavioral Sciences*, 202, 135-143.
- Kabisch, N., Korn, H., Stadler, J., and Bonn, A. (2017). Nature-Based Solutions to Climate Change Adaptation in Urban Areas. Theory and Practice of Urban Sustainability Transitions.
- Kabisch, N., Strohbach, M., Haase, D., And Kronenberg, J. (2016). Urban Green Space Availability in European Cities. *Ecological Indicators*, 70, 586-596.
- Kafafy, N. A.-A. (2010). Dynamics of Urban Green Space in an Arid City: The Case of Cairo-Egypt: Cardiff University (United Kingdom).
- Kaplan, R., and Kaplan, S. (1989). The Experience of Nature: A Psychological Perspective: CUP Archive.

- Kiani, K., Javadiyan, M., and Pasban, V. (2014). Evaluation of Urban Green Spaces and their Impact on Living Quality of Citizens (Case Study: Nehbandan City, Iran). *Journal of Civil Engineering and Urbanism*; 4(5): 89-95.
- Koohsari, J; Mavoa, S; Villanueva, K; and Sugiyama, T. (2015). Public Open Space, Physical Activity, Urban Design and Public Health: Concepts, Methods and Research Agenda. *Health & Place*, 33 (75-82).
- Korpela, K. M., Hartig, T., Kaiser, F. G., and Fuhrer, U. (2001). Restorative Experience and Self-Regulation in Favorite Places. *Environment and Behavior*, 33(4), 572-589.
- Korpela, K. M., Ylén, M., Tyrväinen, L., and Silvennoinen, H. (2010). Favorite Green, Waterside and Urban Environments, Restorative Experiences and Perceived Health in Finland. *Health Promotion International*, 25(2), 200-209.
- Krejcie, R. V., and Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607-610.
- Krekel, C., Kolbe, J., and Wüstemann, H. (2016). The Greener, the Happier? The Effect of Urban Land Use on Residential Well-Being. *Ecological Economics*, 121, 117-127.
- Kuchelmeister, G. (1998). Urban Forestry in the Asia-Pacific Region: Status and Prospects. Asia-Pacific Forestry Sector Outlook Study Working Paper Series (FAO).
- Lambin, E.F., Turner, B.L., Geist, H.J., Agbola, S.B., Angelson, A., Bruce, J.W., Coomes, O.T., Dirzo, R., Fisher, G., Folke, C., Gorge, P.S., Homewood, Imbernon, J., Leemans, R., Li, X., Moran, E.F., Mortimore, M., Ramakrishnan, P.S. and Xu, J. (2001). The Causes of Land-Use and Land-Cover Change: Moving Beyond the Myths. *Global Environmental Change*; 11(4), 261-269.
- Langer, H., and McNamara, J. (2011). Africa Green City Index. Munich: Economist Intelligence Unit.
- Lahoti, S. Kefi, M., Lahoti, A. and Saito, O. (2019). Mapping Methodology of Public Urban Green Spaces Using GIS: An Example of Nagpur City, India. *Sustainability*, 11; 1-23.
- Lawal, T., and Oladunjoye, A. (2010). Local Government, Corruption and Democracy in Nigeria. *Journal of Sustainable Development in Africa*, 12(5), 227-235.
- Lee, A. C., and Maheswaran, R. (2011). The Health Benefits of Urban Green Spaces: A Review of the Evidence. *Journal of Public Health*, 33(2), 212-222.

- Lee, A. C. K., Jordan, H. C., and Horsley, J. (2015). Value of Urban Green Spaces in Promoting Healthy Living and Wellbeing: Prospects for Planning. *Risk Management and Healthcare Policy*, 8, 131.
- Lee, J., Park, B.-J., Tsunetsugu, Y., Ohira, T., Kagawa, T., and Miyazaki, Y. (2011). Effect of Forest Bathing on Physiological and Psychological Responses in Young Japanese Male Subjects. *Public Health*, 125(2), 93-100.
- Li, F., Zheng, W., Wang, Y., Liang, J., Xie, S., Guo, S. Li, X. and Yu, C. (2019). Urban Green Space Fragmentation and Urbanization: A Spatiotemporal Perspective. *Forests*, 10; 333; 1-20.
- Levin, J., and Milgrom, P. (2004). Introduction to Choice Theory. Available from Internet: [http://Web. Stanford. Edu/~ Jdlevin/Econ](http://Web.Stanford.Edu/~Jdlevin/Econ), 20202.
- Lovell, S. T., and Taylor, J. R. (2013). Supplying Urban Ecosystem Services through Multifunctional Green Infrastructure in the United States. *Landscape Ecology*, 28(8), 1447-1463.
- Maas, J., Verheij, R. A., De Vries, S., Spreeuwenberg, P., Schellevis, F. G., and Groenewegen, P. P. (2009). Morbidity is related to a Green Living Environment. *Journal of Epidemiology & Community Health*, 63(12), 967-973.
- Maas, J., Verheij, R. A., Groenewegen, P. P., De Vries, S., and Spreeuwenberg, P. (2006). Green Space, Urbanity, and Health: How Strong is the Relation. *Journal of Epidemiology & Community Health*, 60(7), 587-592.
- Mabogunje, A. L. (1968). Urbanization in Nigeria: University of London Press London.
- Madureira, H., Nunes, F., Oliveira, J., And Madureira, T. (2018). Preferences for Urban Green Space Characteristics: A Comparative Study in Three Portuguese Cities. *Environments*, 5(2), 23.
- Makama, S. I. D. (2007). Report of Nigeria's National Population Commission on The 2006 Census: Blackwell Publishing 9600 Garsington Rd, Oxford Ox4 2dq, Oxon, England.
- Makworo, M., and Mireri, C. (2011). Public Open Spaces in Nairobi City, Kenya, Under Threat. *Journal of Environmental Planning and Management*, 54(8), 1107-1123.

- Meek, B., Design, S. and Eindhoven, D. (2013). A New Application for Urban Green. How Can a Social Designer Help to Create a Green Urban Landscape Adapted to Contemporary Needs? 14-17.
- Mensah, C. A. (2014a). Destruction of Urban Green Spaces: A Problem beyond Urbanization in Kumasi City (Ghana). *American Journal of Environmental Protection*, 3(1), 1-9.
- Mensah, C. A. (2014). Nature and Challenges of Urban Green Spaces in Africa. *International Journal of Ecosystem*, 4(1): 1-11.
- Misra, A.K. (2014). Climate change and challenges of water and food security. *International Journal of Sustainable Built Environment*; 3 (1), 153-165.
- Mitchell, R., and Popham, F. (2007). Greenspace, Urbanity and Health: Relationships in England. *Journal of Epidemiology & Community Health*, 61(8), 681-683.
- Mitchell, R., and Popham, F. (2008). Effect of Exposure to Natural Environment on Health Inequalities: An Observational Population Study. *The Lancet*, 372(9650), 1655-1660.
- Mitchell, R. J., Richardson, E. A., Shortt, N. K., and Pearce, J. R. (2015). Neighbourhood Environments and Socioeconomic Inequalities in Mental Well-Being. *American Journal of Preventive Medicine*, 49(1), 80-84.
- Molloy, G. N., Genot, S., Ciechomski, L., and Bryant, D. (2001). SPSS Survival Manual: A step-by-step Guide to Data Analysis Using SPSS. Allen & Unwin.
- Morris, J., Marzano, M., Dandy, N., and O'Brien, L. (2012). Forestry, Sustainable Behaviours and Behaviour Change: Theories. The Research Agency of the Forestry Commission.
- Moruzza, A. K., Matteo, A. D., Mallard, J. C., Milton, J. L., Nallapaneni, P. L., and Pearce, R. L. (2016). Methodology for Ranking Relative Importance of Structures to Virginia's Roadway Network: Virginia. Dept. of Transportation.
- Myneni, R. B., Hall, F. G., Sellers, P. J., and Marshak, A. L. (1995). The Interpretation of Spectral Vegetation Indexes. *IEEE Transactions on Geoscience and Remote Sensing*, 33(2), 481-486.
- Mytton, O. T., Townsend, N., Rutter, H., and Foster, C. (2012). Green Space and Physical Activity: An Observational Study Using Health Survey for England Data. *Health & Place*, 18(5), 1034-1041.
- Nicholls, S. (2001). Measuring the Accessibility and Equity of Public Parks: A Case Study Using GIS. *Managing Leisure*, 6(4), 201-219.

- Nnaemeka-Okeke, R. (2016). Urban Sprawl and Sustainable City Development in Nigeria. *Journal of Ecological Engineering*, 17(2).
- Nochian, A., Tahir, O. M., Maulan, S., and Rakhshanderoo, M. (2015). A Comprehensive Public Open Space Categorization Using Classification System for Sustainable Development of Public Open Spaces. *Alam Cipta*, 8(1), 29-40.
- Nor, A.N.M; Corstanje, R; Harris, J.A., and Brewer, T. (20). Impact of rapid urban expansion on green space structure. *Ecological Indicators*; 81; 274-284.
- Nowak, D. J. (2017). Assessing the Benefits and Economic Values of Trees. Routledge Handbook of Urban Forestry, 152-163.
- NPC. (1991). Population Census of the Federal Republic of Nigeria: Analytical Report at the National Level. Lagos, National Population Commission. 290p.
- NPC. (2013). and ICF International. Nigeria Demographic and Health Survey, 34-37.
- Obateru, O. I. (2005). Basic Elements of Physical Planning: Penthouse Publications.
- Obateru, R. I. (2003). The Yoruba City in History: 11th Century to the Present: Penthouse Publications (Nig).
- Officha, M., Onwuemesi, F., and Akanwa, A. (2012). Problems and Prospect of Open Spaces Management in Nigeria: The Way Forward. *World Journal of Environmental Biosciences*, 2(1), 7-12.
- Ogu, M. I. (2013). Rational Choice Theory: Assumptions, Strengths, and Greatest Weaknesses in Application outside the Western Milieu Context. Nigerian Chapter of Arabian Journal of Business and Management Review, 62(1087), 1-10.
- Ogunbodede, E.F. and Sunmola, R.A. (2014). Flooding and Traffic Management in Akure (Nigeria) Metropolitan Environment. *European Environmental Sciences and Ecology Journal (EES)*, 7(2), 121-130.
- Ogundare, B. A. and Ogunbodede, E. F. (2014). Traffic Congestion and Parking Difficulties in Akure Metropolis, Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 19 (8), 1-07.
- Ogunbodede, E. F. and Ogundare, B. A. (2014). Intra-Urban Parking Capacities and Parking Demands in Akure, Ondo-State. *European Environmental Sciences and Ecology Journal*; 1(1), 1-10.

- Ogunleye, B. M. (2015). Analysis of Investment Performance of Residential Property in Government Housing Estates in Akure, Nigeria. *Journal of Emerging Trends in Economics and Management Sciences*, 6(3), 193-201.
- Oke, T. R. (1989). The Micrometeorology of the Urban Forest. Philosophical Transactions of the Royal Society of London. B, *Biological Sciences*, 324(1223), 335-349.
- Okunlola, A., Ewulo, T., Owolabi, K., Okunlola, J., and Balogun, I. (2016). Perceived Influence of Trees, Greens in Open Spaces on Microclimate: A Case Study of the Federal University of Technology, Akure. *International Journal of Horticulture*, 6(5).
- Oladeji, S., and Adedapo, O. (2014). Performance and Visitor's Satisfaction of Recreation Facilities in Akure Metropolis: A Veritable Tool for Impacts Studies in Undp Mdgs Cities in Nigeria. *British Journal of Economics, Management and Trade*, 4(8), 1230-1250.
- Olajuyigbe, A. E., Adegboyega, S. A.-A., Popoola, O. O., and Olalekan, O. A. (2015). Assessment of Urban Land Use and Environmental Sensitive Area Degradation in Akure, Nigeria Using Remote Sensing and GIS Techniques. *European Scientific Journal*, 11(29), 318-339.
- Olamiju, O. J., Olamiju, F. O., Adeniran, A. A., Mba, I. C., Ukwunna, C. C., Okoronkwo, C., Et Al. (2014). Public Awareness and Knowledge of Neglected Tropical Diseases (Ntds) Control Activities in Abuja, Nigeria. *PLOS, Neglected Tropical Diseases*, 8(9), E3209.
- Olanusi, J., Akingbohunge, D., and Ogunraku, M. (2017). Urban Open Space Management and Implications on Environmental Quality of Lagos Satellite Towns. *Journal of Geography, Environment and Earth Science International*, 1-9.
- Olapeju O.O and Farotimi A.O, (2017). Profile of Buildings on the Setback of High Tension Power Lines in Agbado, Ogun State. Conference Paper; 1-16.
- Olotuah, A. (2006). The State of Repair of Buildings in Akure, Nigeria. Paper Presented at the Proceedings of CIB on Construction in Developing Economies: International Symposium. New Issues and Challenges, 18-20.
- Olotuah, A. (2010). Housing Development and Environmental Degeneration in Nigeria. *The Built & Human Environment Review*, 3, 42-48.

- Olutuah, A. O. (2015). Assessing the Impact of Users' Needs on Housing Quality in Ado-Ekiti, Nigeria.
- Olutuah, O., and Olukayode, A. (2007). Housing Quality in Suburban Areas: An Empirical Study of Oba-Ile, Nigeria' *Journal of Architecture and Built Environment*, 34(2), 133-137.
- Olufemi, O. F., and Adebayo, A. (2018). Development Control Regulations Compliance: Paradigm Change to Reinvent Disrupted Public Spaces and Make Future Great Place in Ado-Ekiti, Nigeria. *Civil Engineering and Architecture*, 6(1), 1-17.
- Olugbenga, E., and Adekemi, O. Implications of Urban and Regional Planning Laws on Urban Renewal Projects in Akure, Nigeria.
- Olugbenga, E., and Adekemi, O. (2013). Challenges of Housing Delivery in Metropolitan Lagos. *Research on Humanities and Social Science*, 3(20), 1-8.
- Olujimi, J. (2009). Evolving a Planning Strategy for Managing Urban Sprawl in Nigeria. *Journal of Human Ecology*, 25(3), 201-208.
- Omole, F. (2009). Land Use Violations: Implications for Sustainable Development: The Case Study of the Federal Capital City Abuja, Nigeria. *Current Research Journal of Social Sciences*, 1(1), 31-37.
- Omotayo, T., and Kulatunga, U. (2015). The Research Methodology for the Development of a Kaizen Costing Framework Suitable for Indigenous Construction Firms in Lagos, Nigeria. L. Scott and C. Udejaja (Eds.).
- Onwuanyi, N., and Ndinwa, C. (2017). Remaking Nigeria's Urbanism: Assessing and Redressing the Dearth of Open Spaces in Benin City. *International Journal of Built Environment and Sustainability*, 4(2).
- Oriye, O., and Fakere, A. (2015). Urban Land Use in the City Centre of Akure, Nigeria. *Ethiopian Journal of Environmental Studies and Management*, 8(5), 471-483.
- Osimen, G. U., Adenegan, T. S., and Balogun, A. (2013). An Assessment of Corruption in the Public Sector in Nigeria: A Study of Akure South Local Government Area, Ondo State. *Canadian Social Science*, 9(5), 87.
- Owoeye, J., and Adedeji, Y. (2013). Poverty, Sanitation and Public Health Nexus—Implications on Core Residential Neighbourhood of Akure, Nigeria. *International Journal of Developing Societies*, 2(3), 96-104.
- Owoeye, J. O., and Ibitoye, O. A. (2016). Analysis of Akure Urban Land Use Change Detection from Remote Imagery Perspective. *Urban Studies Research*, 2016.



- Owoputi, A. (2016). The Impact of Road Development and Expansion On Urban Cities. A Case Study of Akure Metropolis. *World Wide Journal of Multidisciplinary Research and Development*, 2(6), 46-48.
- Oyinloye, M. A., Olamiju, O. I., and Oyetayo, B. S. (2013). Combating Flood Crisis Using GIS: Empirical Evidences from Ala River Floodplain, Isikan Area, Akure, Ondo State, Nigeria. *Communications in Information Science and Management Engineering*, 3(9), 439.
- Panduro, T. E., and Veie, K. L. (2013). Classification and Valuation of Urban Green Spaces—A Hedonic House Price Valuation. *Landscape and Urban Planning*, 120, 119-128.
- Pataki, D. E., Carreiro, M. M., Cherrier, J., Grulke, N. E., Jennings, V., Pincetl, S., Et Al. (2011). Coupling Biogeochemical Cycles in Urban Environments: Ecosystem Services, Green Solutions, and Misconceptions. *Frontiers in Ecology and the Environment*, 9(1), 27-36.
- Pauleit, S., and Duhme, F. (2000). Assessing the Environmental Performance of Land Cover Types for Urban Planning. *Landscape and Urban Planning*, 52(1), 1-20.
- Pettorelli, N., Vik, J. O., Mysterud, A., Gaillard, J.-M., Tucker, C. J., and Stenseth, N. C. (2005). Using The Satellite-Derived NDVI to Assess Ecological Responses to Environmental Change. *Trends in Ecology & Evolution*, 20(9), 503-510.
- Region 1: EPA New England. Definition of Open Space. <https://www3.epa.gov/region1/eo/uep/openspace.html>
- Rittel, H. W., and Webber, M. M. (1973). Dilemmas in A General Theory of Planning. *Policy Sciences*, 4(2), 155-169.
- Rogers, C. D., Lombardi, D. R., Leach, J. M., and Cooper, R. (2012). The Urban Futures Methodology Applied to Urban Regeneration. *Proceedings of ICE Engineering Sustainability*, 165(1), 5-20.
- Rostami, R., Lamit, H., Khoshnava, S., Rostami, R., and Rosley, M. (2015). Sustainable Cities and the Contribution of Historical Urban Green Spaces: A Case Study of Historical Persian Gardens. *Sustainability*, 7(10), 13290-13316.
- Rupprecht, C. D., and Byrne, J. A. (2014). Informal Urban Greenspace: A Typology and Trilingual Systematic Review of its Role for Urban Residents and Trends in the Literature. *Urban Forestry & Urban Greening*, 13(4), 597-611.

- Said, I., and Harun, N. Z. (2010). The Morphological Transformation of Public Place in Historic Town of Melaka. South-East Asian Technical University Consortium 4, 25th-26th February 2010.
- Sandell, R. G. (1968). Effects of Attitudinal and Situational Factors on Reported Choice Behavior. *Journal of Marketing Research*, 5(4), 405-408.
- Sandhya, G. K. and Joshi, U. B. (2013). Estimation of variables explaining urbanization concomitant with land-use change: a spatial approach. *International Journal of Remote Sensing*, 34, (3), 824–847.
- Saunders, M., Lewis, P., and Thornhill, A. (2012). *Research Methods for Business Students* (6. Utg.). Harlow: Pearson.
- Savard, J.-P. L., Clergeau, P., and Mennechez, G. (2000). Biodiversity Concepts and Urban Ecosystems. *Landscape and Urban Planning*, 48(3-4), 131-142.
- Schipperijn, J., Bentsen, P., Troelsen, J., Toftager, M., and Stigsdotter, U. K. (2013). Associations between Physical Activity and Characteristics of Urban Green Space. *Urban Forestry & Urban Greening*, 12(1), 109-116.
- Sheil, D., and Murdiyarto, D. (2009). How Forests Attract Rain: An Examination of a New Hypothesis. *Bioscience*, 59(4), 341-347.
- Shrestha, B. (2018). Expression of Cultural Identity in the Contemporary Urban Built Form of Kathmandu.
- Simon, R. (2015). Prevalence and Usage of Open Recreational Spaces in Ibadan, Southwest Nigeria. Covenant University, Ota.
- Southampton Council Green Space Strategy Summary and Action Plan. [https://www.southampton.gov.uk/policies/green%20space%20strategy%20summary%20and%20action%20plan\\_tcm63-363566.pdf](https://www.southampton.gov.uk/policies/green%20space%20strategy%20summary%20and%20action%20plan_tcm63-363566.pdf) Accessed 23/9/2019.
- Spaces, W. U. G. (2016). *Health—A Review of Evidence*. Copenhagen, WHO Regional Office for Europe.
- Stanley, B. W., Stark, B. L., Johnston, K. L., and Smith, M. E. (2012). Urban Open Spaces in Historical Perspective: A Transdisciplinary Typology and Analysis. *Urban Geography*, 33(8), 1089-1117.
- Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 56(3), 407-424.

- Stronach, D. (1990). The Garden as a Political Statement: Some Case Studies from the Near East in the First Millennium BC. *Bulletin of the Asia Institute*, 4, 171-180.
- Sukopp, H., Numata, M., and Huber, A. (1995). *Urban Ecology as the Basis of Urban Planning*: Balogh Scientific Books.
- Swanwick, C., Dunnett, N., and Woolley, H. (2003). Nature, Role and Value of Green Space in Towns and Cities: An Overview. *Built Environment*, 94-106.
- Tanko, B. L., Abdullah, F., Ramly, Z. M., and Enegbuma, W. I. (2017). Confirmatory Factor Analysis of Value Management Current Practice in the Nigerian Construction Industry. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, 9(1), 32-41.
- Tapia-Armijos, M. F., Homeier, J., Espinosa, C. I., Leuschner, C., and De La Cruz, M. (2015). Deforestation and Forest Fragmentation in South Ecuador since the 1970s Losing a Hotspot of Biodiversity. *PLOS ONE*, 10(9), E0133701.
- Taylor, H. A. (1995). Urban Public Parks, 1840-1900: Design and Meaning. *Garden History*, 201-221.
- Taylor, L., and Hochuli, D. F. (2017). Defining Greenspace: Multiple Uses across Multiple Disciplines. *Landscape and Urban Planning*, 158, 25-38.
- Taylor, R. W. (1988). Urban Development Policies in Nigeria: Planning, Housing, and Land Policy. *Journal of Centre for Economic Research in Africa*; 1-8.
- URGE TEAM (2004). *Making Greener Cities-A Practical Guide*. Leipzig: UFZ Centre for Environmental Research.
- URGE-Development of Urban Green Spaces to Improve the Quality of Life in Cities and Urban Regions. UFZ Centre for Environmental Research Leipzig-Halle, Leipzig.
- Thompson, C. W. (2002). Urban Open Space in the 21st Century. *Landscape and Urban Planning*, 60(2), 59-72.
- Thompson, C. W., Roe, J., Aspinall, P., Mitchell, R., Clow, A., and Miller, D. (2012). More Green Space is linked to Less Stress in Deprived Communities: Evidence from Salivary Cortisol Patterns. *Landscape and Urban Planning*, 105(3), 221-229.
- Thompson, S., and Maginn, P. (2012). *Planning Australia: An Overview of Urban and Regional Planning*: Cambridge University Press.

- Ulrich, R. S. (1981). Natural versus Urban Scenes: Some Psychophysiological Effects. *Environment and Behaviour*, 13(5), 523-556.
- Unit, E. I., and Siemens, A. (2011). Asian Green City Index. Assessing the Environmental Performance of Asia's Major Cities.
- Van Herzele, A., and Wiedemann, T. (2003). A Monitoring Tool for the Provision of Accessible and Attractive Urban Green Spaces. *Landscape and Urban Planning*, 63(2), 109-126.
- Velarde, M. D., Fry, G., and Tveit, M. (2007). Health Effects of Viewing Landscapes—Landscape Types in Environmental Psychology. *Urban Forestry and Urban Greening*, 6(4), 199-212.
- Walker, S. E., and Duffield, B. S. (1983). Urban Parks and Open Spaces—an Overview. *Landscape Research*, 8(2), 2-12.
- Westerink, J., Haase, D., Bauer, A., Ravetz, J., Jarrige, F., and Aalbers, C. B. (2013). Dealing with Sustainability Trade-offs of the Compact City in Peri-Urban Planning across European City Regions. *European Planning Studies*, 21(4), 473-497.
- Wheeler, B. W., Cooper, A. R., Page, A. S., and Jago, R. (2010). Greenspace and Children's Physical Activity: A GPS/GIS Analysis of the PEACH Project. *Preventive Medicine*, 51(2), 148-152.
- Wilkinson, P. F. (1988). The Historical Roots of Urban Open Space Planning. *Leisure Studies*, 7(2), 125-143.
- Wolch, J. R., Byrne, J., and Newell, J. P. (2014). Urban Green Space, Public Health and Environmental Justice: The Challenge of Making Cities 'Just Green Enough'. *Landscape and Urban Planning*, 125, 234-244.
- World Health Organization (2013). Urban Population Growth. Global Health Observatory. World Health Organization. Available: [http://www.who.int/gho/urban\\_health/situation\\_trends/urban\\_population\\_growth\\_text/en/](http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/). Accessed.
- World Health Organization (2016). World Health Statistics 2016: Monitoring Health for the Sdgs Sustainable Development Goals: World Health Organization.
- WHO. (2018). Global Action Plan on Physical Activity 2018–2030: More Active People for a Healthier World.

- Zhang, L., Wang, Z. and Da, L. (2018). Spatial Characteristics of Urban Green Space: A Case Study of Shanghai, China. *Applied Ecology and Environmental Research*; 17(2):1799-1815.
- Zuazo, V. H. D. and Pleguezuelo, C. R. R. (2008). Soil-erosion and Runoff Prevention by Plant Covers. A Review. *Agronomy for Sustainable Development*; 28 (1), 65-86

## LIST OF PUBLICATIONS

### **Journal**

Akinyoyenu, A. F., Rafee, M. B. M. and Zen, I. S. (2017). Botanical Gardens as Drivers of Climate Change Mitigation and Urban Sustainability in Ondo State, Nigeria. *Journal of Applied Sciences and Environmental Sustainability*; 3 (8), 110-126.

Akinyoyenu, A. F. & Said, I. (2018). Analysing the Contribution of Attitudinal Factors to the Depleting Urban Green Vegetation in Akure, Nigeria. *Journal of Advanced Research Design*; 48 (1), 14-24.

### **Conference Presentation:**

Akinyoyenu, A. F; Mohammad, R.B.M. and Irina, S.Z. (2016). Mainstreaming the Local Botanical Gardens into Climate Change Mitigation and Urban Sustainability Agendas in Ondo State. Paper Presented at the International Conference on Science, Engineering, and Social Science (ICSESS 2016), 29th May-1st June, 2016, at the Universiti Teknologi Malaysia, Johor Bahru, Malaysia.