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A Review of Impacts of Urban Settlement Growth on the Environment

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Abstract*: The importance of the urban environment cannot be over emphasized because communities must develop and make progress irrespective of the fact that the impacts of settlement growth may be positive or negative on the urban environment. The objective of this research was to perform a scholarly review of empirical literature on assessment of urban settlement growth and its impact on the urban environment. Documentary data with regards to the research was obtained from various academic journal publications and other secondary sources reviewed. The reviews showed that much work has been carried out on urbanization, urban growth and the urban environment. However, much more still needs to be done on the assessment of urban settlement growth and its impact on the urban environment. The methodologies adopted in most of the studies were not adequate or clearly defined, though. This study recommended that more research should be carried out on the assessment of urban settlement growth and its impact on the urban environment and that the methodologies adopted for data collection should cover more than one method.*

Keywords*: Settlement Growth, Urban Environment, Settlement.*

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I. Introduction

According to a projection made by The UN (2008), from 2010, almost all urban growth in the world's population will be in urban centers in low and medium income nations. Already, world population is on the increase, especially in urban centers, with about 60% of the population of third world countries estimated to live in cities (Jinadu, 2015). In developing countries, urbanization is a process that is accompanied by informal settlements growth, rural-urban migration, inadequate infrastructure and urban services, especially in undeveloped nations.

Urban population in Nigeria as estimated would reach 68% of the total population by the year 2020 (Owei, 2017). The population growth comes in two dimensions; first is the rise in the number of settlement with population of at least 20,000 (the official Government definition of urban centers) and the second dimension are those whose populations are more than One million or more people. The numbers of urban centers were observed to have increased from 359 in 1991 to 450 by the year 2000 (Owei 2017). Jinadu (2015) agreed that the population of urban centers in Nigeria has been on the increase; in 2012 the percentage of urban population increased from 50% in 2012 and it is projected to increase to 57.9 percent by 2025. This suggests continuous growth of urban settlement in Nigeria.

A settlement is any form of human habitation from a single to the largest city. They could be either rural or urban. Settlement growth occurs where the original community population has grown enough due to birth rate or new people moving in to require that new buildings are built to house them or existing building be made larger to accommodate more people (Schetkes *et al*., 2011). Migration is an important factor to consider when discussing settlement growth since migration occurs when people with the desire for better condition of living and other factors move from one place to another. It could be in form of rural-urban migration or urban-urban migration (Marsh (1996) thus suggesting that improved transportation systems and good health facilities help contribute to rural-urban migration. People may move as a result of one or more "Push or Pull factors". Push factors such as improved economic condition, religion, ethnic or political intolerance or the pull factors such as improved economic opportunities could also attract people to a place.

An urban settlement is defined as a demographically large, relatively densely populated built up area (Sean *et al*., 2015). Various factors are responsible for urban settlement growth. Savani and Bhatt (2016) suggested that natural increase in population and migration to urban area, as well as improved transportation network, which opens access to different parts of the urban environment help in contributing to the growth of urban settlements. Other factors are industrial and economic growth, physical geographical features, uncoordinated public regulations and development policies, land speculation and expectation of land appreciation, development and property rate constraints, lack of affordable housing, single-family home and demand for more living space (Bhatta 2010) and a host of other factors.

Urban growth is characterized by expansion of built up areas via urban expansion and this in most times accompanies urban growth. But Sean *et al* (2015) argued that it is possible for a city to experience urban growth without expansion because growth can be absorbed within existing settlement boundaries, and that expansion can occur without growth where new developments are created into facilities covering population densities for existing communities. The impact of urban growth is both positive and negative depending on how the growth is managed (Owei, 2017)

There are theories from various researchers in their effort to explain how urban settlement growth evolves. According to Fellman *et al.* (2015), the concentric model by Ernest Burgess in 1925 asserted that cities grow outward away from a single center, that competition is high in the center, and as a result, high density, high rise building were usually around the Central Business District while at the edge of the town are low density buildings. Furthermore, the Sector Model theory as developed by Homer Hoyt in 1939 stated that all lands except the CBD forms a sector around the city. The theory went ahead to state that lands are used for different purposes in the urban areas; residential, leisure and recreation, business and commerce, industry, transportation e.t.c. Mid-income sectors are located adjacent to high rent areas while the lowest income groups occupy the remaining sectors of the growth in the city. There is also noticeable outward movement of wealthy people due to deteriorating conditions of the CBD to the suburbs leaving the low income group in the city center. On the contrary, Multiple Nuclei Model propounded by Chauncey Harris and Edward Ullman in 1945, counter the view of the concentric and sector model as it went ahead to state that apart from the CBD (central Business District) there are several secondary centers where growth can begin from because certain functions require specialized facilities or site.

To add to the wealth of knowledge, Rosset *et al* (2000) explained the Bid Rent theory as propounded by David Ricardo and which stated that land users compete for the most assessable lands within the CBD and that the location determined the amount the individual is willing to pay to acquire the land. It assumes that the poor can only stay at the periphery because it is affordable for them. Over the years this has changed because the wealthy prefer to buy more lands on the periphery for larger space, while the poor may want to stay in the CBD for easy accessibility to the employment centers. Pierces, (2015) posited that the African Model created by Harm De Blij explains the impact of European colonialism on African cities. He was of the opinion that there are three different CBD's namely, the Colonial CBD, Traditional CBD and Market zones that the wealthy people live close to CBD while the poorer farther away.

Adenekan, (2011) was of the opinion that most West African cities, Nigeria inclusive started as traditional settlements with built mud and family compounds, but with the coming of the Europeans and non-natives, separate residential and developmental areas were developed and differentiated by buffer zones. Dual cities were established with different planning and environment phenomena. These cities become old with a lot of environmental problems such as overcrowding, occurrence of flooding, narrow access road and drainage and so on, and these attendant problems of unemployment, poverty, environmental, housing and economic problems all contribute to the existing problem.

Urban environment entails both tangible and intangible materials (elements) found in the urban area e.g. land, water and socio-economic aspect of human society and behaviour. According to Satterthwite (1999), the physical environment in an urban area is a mixture of the natural elements including flora and fauna, air, water land and climate. Physical environment could be constructed or modified for human habitation (urban space, infrastructure and buildings, that is, the "built environment"). The economic environment on the other hand consists of the systems and processes of production in the urban environment.

These physical, social and economic environments of an urban environment inter-relate and inter-depend on one another with the impacts on the urban environment being either positive or negative. Urban environment provide platform to create jobs, distribute wealth, provide essential services and absorb population growth. There is the need to monitor urban settlement growth and its impact on the urban environment for the benefits of all. Various researchers have conducted studies on settlement growth and environmental management, within and outside Nigeria. The purpose of this paper was to review empirical literature on the assessment of settlement growth in Nigeria and its impact on the urban environment. The structure of this paper is as follows: The introduction, Methodology, a review of empirical literature on the assessment of settlement growth and its impact on the urban environment, discussion of the paper and lastly conclusion and reference.

II. Methodology

The research is an archival type where the outline of the study is a review of empirical literature on assessment of settlement growth in Yenagoa and its impact on the urban environment. The Methodology used in collecting the required data was based on secondary sources of data from the internet, article conference paper, academic journals and text books.

Empirical Literature on Assessment of Settlement Growth and its Impact on the Urban Environment.

Much attention has been given by researchers to the extent effects of urbanization, settlement growth, and their impacts on urban environment and other related topics.

Owei (2007) examined the distortion of the urban land, market in Nigeria cities and the implication for urban growth patterns with Abuja and Port Harcourt as case studies with the aim to analyze and explain land market distortion in Nigeria urban centers using Port Harcourt and Abuja as case studies. Data was obtained from three main sources, primary sources which included interview of key informant professional groups estate surveyors, valuers, town planners, Architects, government officials and communities, secondary sources from Government records and published researches and thirdly from selected allotters of government land in both study areas. The data were analyzed qualitatively. The findings revealed that unplanned and un-regulated development exist in both Port Harcourt and Abuja, especially on the urban periphery. Land speculators, developers and the local community take advantage of policy loopholes to get lands and sell outside of the plan proposal and regulation.

Iyorakpo (2015) studied the impact of rapid urbanization on environmental quality in Yenagoa Bayelsa State with the aim of determining the relationship between the impact of rapid urbanization and environmental quality. Data were collected from primary and secondary sources. Primary data from Questionnaire, interviews were conducted and analyzed. Questionnaires were administered to five zones known for their high population concentration before analysis was done. The findings revealed poor environmental quality as a result of serious abuses and contraventions of the environment. Baadom *et al.* (2016) studied urbanization and its consequences on this transitional rural settlement of Yengaoa. Primary data was gathered through the instrument of questionnaires. Questionnaires were administered. It was revealed that there is unguided growth of Yenagoa in the peripheral communities due to increase of human population in the suburb communities. Only one primary source of data was used and the possibility of getting back 100% of the questionnaires administered wasn't there at all.

Eludoyin *et al*. (2007) studied the effect of urbanization changes on land use in Yenagoa metropolis Bayelsa State Nigeria. (1986-2013) the aim wass to investigate the impact of urbanization on land use change in Yenagoa metropolis. Lands at imageries of 1986-2009 and 2013 were acquired from the United State Geological Survey; supervised classification using the maximum likelihood classification Algorithm was done. Overlay (intersect modules) was employed to determine the impact of urbanization on other land uses. Prediction was calculated for probability land use change of 5 years, 10 years, and 20 years using probability Markovian algorithm. Standard method was employed to calculate the percentage land consumption rate (PLCR). For the land use trend and magnitude of land use change descriptive statistic were employed and the result revealed that built up areas from 1986-2013 was 36. 09km^2 in 1986, 83.27km^2 in 2009 and 102.25km^2 in 2013 while the percentage change of built up areas from 1986-2013 was 66.16km^2. It also revealed that the highest probability change of built up area in 2023 will be (19.81%) in 2033 (46.27%) and 2043 (54.83%) respectively. The percentage land consumption rate for 1986 was 0.085%, 2009 (0.035%) and 2013 (0.039%). The implication is that the built up areas would continue to have serious impact on all other land use type in Yenagoa with much impact on thick vegetation and sparse vegetation/ farmlands. Most of the lands will be used for built- up areas with time if the trend doesn't change.

Ohwo. and Abotutu. (2015) on their part studied the environmental impact of urbanization in Nigeria. The authors reviewed selected literatures and the outcome revealed that urbanization can be a great threat to environmental sustainability which creates serious environmental problems. It implied that if urban growth is not effectively managed, it can threaten environmental sustainability. We believe that Questionnaires could have been used also to get more data in their study.

Ibrahim *et al*, (2017) studied the urban growth assessment and its impact on the deforestation, in Bauchi: Metropolis using remote sensing and GIS techniques. GIS and RS technologies were employed to access urban growth and its impact on deforestation in Bauchi Metropolis from 1986-2016. Four Epochs of lands at imageries were used; thematic Mapper (™) of 1986 and 1996 Enhanced thematic mapper of 2006, and operational land imager (OLI) of 2016. Maximum likelihood algorithm was employed to classify the images. Cross-validation was done using confusion matrices and ground truthing to access the accuracy of the classification. The findings revealed that with kappa index as tm of 1986 was (0.83%) and 1996(0.87%), ETM of 2006 (0.90%) and OLI of 2016 (0.92%). Between 1986 and 2016 the post-classification comparisons and analyses performed result showed that changes have taken place in bare surface (+ 32.43%), built up (+ 565.

24%) farmland (+66.42%), forest (-91.80%) and rock outcrop (-49.21%). Also the land cover features of Bauchi metropolis that was reclassified into forest and non-forest for cross tabulation analysis, and the findings revealed that a changeover of 14965.97 Ha (39.68%) from forest to non-forest (deforestation) and that 467.69Ha (1.24%) form non-forest to forest (aforestation) between 1986 and 2016. The outcome of this study revealed rapid decrease in forest (deforestation) and increase in built up areas. This implied that there may be lack of improper environmental protection strategy in place in Bauchi metropolis.

Bariweni and Amukali (2017) carried out a study on wetland cover changes in Yenagoa metropolis, Bayelsa State, Nigeria. This study centered on the rate of wetland cover changes within Yenagoa metropolis due to urbanization and other developmental changes. Wetland cover changes in the Yenagoa Metropolis was assessed using aerial maps for 1987, 2002 and 2015 to determine their areal extent, trend and rate of changes. All the images which had spatial resolutions of 30m each were subjected to standard operations with 5 land use and land cover classes in focus; which were identified for the study. Results from the study showed that the dense forest was fast disappearing as the sparse forest was increasing indicating the impact of human activities on the dense forest. It also revealed that the wetlands were disappearing very fast. For instance, wetlands decreased from an initial 25,266.42 ha in 1987 to 16,820.48ha in 2002 and 8,930.34ha by 2015 as the built – up areas increased from 2,911.27ha in 1987 to 6,242.14ha by 2002 and 10,714.72ha by 2015 (r= -0.93). The annual change rate for the disappearing wetlands ranged from -3.01% between 1987 and 2002 to -3.98% between 2002 and 2015. It was concluded that about 64.66% of the wetlands in the Yenagoa Metropolis have been lost between 1987 and 2015 and that except urgent steps are urgently taken to curb the current trend, all the wetlands may be completed lost within the next 30 years.

Digha *et al.* (2018) in their study investigated the influence of population growth on land use in Calabar metropolis, Nigeria. The aim was to examine the influence of population growth on land use changes in Calabar Metropolis. The study area was Calabar. Data was employed from satellite imagery of 2000, 2010 and 2014, multi-choice questionnaires, personal observation and interviews were used to supplement. A total of 120 questionnaires were administered in the study population for the years 2000, 2010 and 2014 was collected from GIS to analyze type and determine the extent of change in the land use type for the period under investigation. The imagery used was acquired from the US Geological Survey Glovis web-based data. To analyze the empirical data, Pearson product moment correlation technique and descriptive statistics were employed and the result revealed that there had been increase in traffic congestion, land conversion using cost of land, increasing housing rent and urban sprawls due to population growth in Calabar municipality.

Mahmoud *et al* (2016) modelled impacts of settlement expansion and urban growth using geo-information in assessing potential impacts of urbanization on climate in Abuja Nigeria. The study area was FCT Nigeria. Geo-information, ancillary data sets, land over maps from landsat imagery was derived for 1986, 2001 and 2014. To detect landuse, landcover changes with specific focus on the settlement development patterns, quantitative spatio-temporal analysis was conducted. The study revealed that between 1986 and 2001, urban areas increased by more than 11%, and between 2001 and 2004 increased to 17%. The implication was that allotted spaces for green areas and agricultural land might be lost to the great trend of settlement expansion if strict development measures are not in place. The study result also implied that the process of urbanization could influence the urban micro-climate through the alteration of natural land surface temperature, this could also lead to urban flooding.

Vermeiren *et al*. (2012) studied the urban growth of Kampala, Uganda: its pattern analysis and scenario development in focus. The study area was Kampala. Imageries for 1989, 1995, 2003 and 2010 was employed to map urban growth of Kampala. Spatially-explicit logistic regression model was developed for the study area. The indicators in this model were accessibility to the city centers, the presence of roads and distance to the existing built up area. Alternative scenarios were developed, business as usual, restrictive and estimative scenarios for future urban growth. The result showed alternative policy options led to contrasting future urban sprawl patterns with a significant impact on the local quality of life for the study area.

Horn (2016) studied the history of growth management in Quateng province in South Africa. It examined and reviewed the method the government used to contain urban growth inside the province for the desire of the government was a move to compact urban environment that will help increase access to urban opportunities and other environmental opportunities. The government used urban policy tools in the management of urban growth as urban edge policy was adopted with the aim to contain and redirect urban growth and at the same time allow for sustainable economically viable and equitable future. Introduction of the Guateng Spatial Development Framework (GSDF) densification principles and guidelines, brown field development requirement and guidelines, service delivery integration to facilitate high density greenfields and brown fields development and revised town planning control in public transport corridors to encourage densification and compaction in a planned manner. Relevant stake holders included the three affected municipalities. It was observed that the policy failed due to lapses and lack of supporting implementation tools and mechanism. This implied that administration lapses and interference in the process could hinder management of urban growth.

Jamal (2015) studied management of urban growth in the city of Amman, Jordan. The study area was the city of Amman. The author used face to face interview with experts from urban management sector. The result revealed there was positive transformation in the management of urban growth by the means of institutions, laws, regulations, plans and actions.

III. Discussion

Most of the studies reviewed focused primarily on urban growth and findings from various researches showed there was increase in urban growth and spatial expansion, with deforestation on the increase to give way to construction of built up areas. Environmental quality wass affected negatively, the high cost of rent due to the large population in the urban areas also led to urban sprawl and unguided growth on the peripherical communities. The researches have shown that environmental sustainability can be threatened by urban growth. This has also revealed the need for effective and inclusive environmental management framework for sustainable growth and development of urban environment.

However, only few researchers took into consideration existence of master plan to monitor and direct the settlement growth. Many efforts were not made by researches to provide appropriate environment management framework to effectively manage urban environment. Some of the methods used in gathering data were not sufficient. Some of the researchers use only interviews methods, others used only GIS and RS, while others only questionnaire method. There is the need to use sufficient instruments of data generation for gathering data; mapping techniques, questionnaire, direct interviews etc. to get quality information with a view to assessing settlement growth and its impact on the urban environment. There is also the need to develop appropriate environmental management framework to manage the urban environment which most of the researcher did proffer in their various studies.

IV. Conclusion

This study focused on assessment of settlements growth and its impact on the urban environment. The review showed that the urban environment is important to the sustenance of man. The growth of urban environment will continue to increase, owing to factors such as population growth and migration, good transportation network, improved health care facilities, industrialization and economic growth and a couple of other factors will help encourage settlement growth. However, urban settlement growth and its impact on the urban environment should be investigated for man to benefit and have sustainable urban environment and an appropriate environmental management for managing urban growth be developed in other to cover the research gap.

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