Journal of Law and Judicial System
Volume 1, Issue 3, 2018, PP 9-20
ISSN 2637-5893 (Online)

The Legal and Planning Implication of Built Up Area Encroachment on Vegetation Resource (Green Areas) - The Case of Calabar and Ikom Statutory Planning Areas

[1]Offiong Victor Eyo, [2]Surv P.E. Bassey, [3]Tpl Dr. Emmanuel Agbor, [4]Uzoezie, Arinze Destiny

[1]Department of Urban and Regional Planning, Planning and Building Law,Cross River State University of Technology
[2]Department of Geo-Informatic and Surveying,University of Nigeria, Nsukka
[3] Department of Urban and Regional Planning (CRUTECH), Nigeria
[4]Department of Geography and Environmental Science University of Calabar

***Corresponding Authors:** Offiong, Victor Eyo, Department of Urban and Regional Planning, Planning and Building Law, Cross River State University of Technology victoroffiongandassociates@yahoo.com*

ABSTRACT

With the increasing episode of unplanned urbanization occurring in the State of Cross River, and its attending implication on the sustainability of the environment, one can barely imagine the fate of the State in few years to come. As a result, numerous academic resources have been geared towards understanding the patterns, reasons and problems associated with this unplanned development. This study entails a comparative analysis of the Land Use Land Cover change in Ikom and Calabar, two developing Local Government Areas in Cross River State, and the planning as well as the legal implication of Built up area encroachment on Vegetation Resources (Green Areas). The aim and objectives of the study was to investigate the planning and legal implication of Built up area encroachment on Vegetative resource (Green areas) and to compare this encroachment spatially and temporally over Ikom and Calabar. Remote Sensing and GIS technology, an innovative methodology, was adapted for this study. Both primary and secondary data were utilized, with the primary data involving data on measurements of land cover, and the secondary data include data on satellite imagery of the study areas. These data were subjected to two statistical tests to validate the hypotheses postulated for the research. A student t Test one sample analysis was used in assessing if there was a significant difference in LULC of Ikom and Calabar in 2000 – 2017. The result of the Student t test shows that there exist a difference spatio-temporally in the LULC of Ikom and Calabar from 2000 – 2017. And the result of the Pearson correlation shows that as Built up areas increases, Green Space of Vegetative resource decreases and vice versa. To this end relevant recommendations that willgenerally improve the awareness of residents in both Calabar and Ikom Local Government Area, of the effect of increased Built-up areas on the sustainability on the environment and the development of effective conservation plan for management of the environments, were developed.

Keywords *Land Use Land Cover; Legal and Planning Implication; Built up Areas; Green Areas ; Vegetative Resource Encroachment; Statutory Planning Area.*

INTRODUCTION

Rapid development of the space information technology is evolving mankind day-by-day into a new horizon by providing satellite communication navigation especially in observation of the Earth using remote sensing. This development has increased our understanding of the world around us, and its application in Urban studies is unparalleled to any other technology.

The technology is not new, but evolved early on the mid 1950's and has been used for earth observation more than three decades.

Land use involves the management and modification of natural environment or wilderness into built environment such as settlement and semi-natural habitats such as arable fields, pastures, and managed woods. It also has undertaken in a certain land cover type"[1].

Land cover is the physical material at the surface of the earth. Land covers include grass, asphalt, trees, bare ground, water etc[2]. Land Use

[1] IPPC Special Report on Land Use, Land Use Change And Forestry, 2.2.1.1
[2] http://www.wikipedia.com/wiki/Land _Cover

Land Cover analysis, an application of Geographic Information System technique (GIS) is a key factor in observing most physical, chemical and biological processes of the earth. The cloud, land use, sea and land surface temperature and exchanges of energy and moisture are considered spontaneous features in time and space and are considered significant in micro, meso, and global climates change. Land Use Land Cover (LULC) is more important in global environmental changes. Studies in estimating radiation model are strongly influenced by the ability of the different surfaces (land use/land cover) to emit radiation differentially. However the surface emissivity of land cover differs; it is relatively uniform for densely vegetated surfaces and highly variable for heterogeneous surfaces, such as soils and other impervious surfaces (Weng, 2001).

Temporal and spatial distribution of physical characteristic of land surface changes easily. Also the dynamics and thermodynamic actions of land surface with atmosphere is not spatially even due to the diversity of land surface features. Every type of land surface has a distinguish way of energy distribution and mass exchange. Thus changes of land surface feature impacts on the balance of energy, momentum and mass between land and atmosphere, thereby affects Local, regional even global climate change.

Land Use Land Cover change analysis is a key parameter in observing human impact on environmental processes, and they are essential for planners, decision makers and those involved in land resource management[3].The knowledge of Land Use Land Cover is of much interest for understanding and quantifying land cover changes, to aid resources management and improve weather forecast, and monitoring of drought at continental and regional scales as well as understanding other environmental processes.

The interpretation of Land Use / Land Cover requires the knowledge of land cover /land use types in order to yield more reliable results. Upon this has been discovered that not much research on land use/land cover comparison have been published on the Cross River land form. This has elicited the need for a detailed study of the land use/land cover type so as to understand the land surface characteristics of the study areas.

The objectives of this study are to determine the legal and planning implication of built up area encroachment on and to compare the level encroachment spatially and temporally over Ikom and Calabar vegetative resource.

In clear term, the focus of this work is on the Built Up Area encroachment on other form of land use, notably, green areas, with the attending objective of assessing and comparing of the land use / land cover change in Ikom and Calabar from 1986 – 2016 and the evaluation of the impact of increased built-up areas on the environment especially the green areas..

MATERIAL AND METHOD

Scope of Study

The scope of this project was limited to the set out objectives for the study in Ikom and Calabar Local Government Areas of Cross River States. For the sake of this study, Ikom Local Government Area, a less built up area when compared to other Built-up areas like Calabar, was chosen by the researchers, due to its nature as a city with less built up area, however, has a buoyant economy like Calabar and also for the reason that the city has an International River which connects the country to Cameroon. In other to carry out the spatial objectives of this research The scope of this project was limited to the set out objectives for the study in Ikom and Calabar Local Government Areas of Cross River States.

For the sake of this study, Ikom Local Government Area, a less built up area when compared to other Built-up areas like Calabar, was chosen by the researchers, due to its nature as a city with less built up area, however, has a buoyant economy like Calabar and also for the reason that the city has an International River which connects the country to Cameroon. In other to carry out the spatial objectives of this research another city similar to Ikom in terms of the economic disposition but more built-up was chosen by the researchers. Scrolling through the numerous cities in Cross River State, Calabar, a civil service, tourism city, was the only city in Cross River that suits the researchers objectives because Calabar, is highly built-up compared to Ikom, it has a large economy like Ikom and it also has an international River linking the country to the Equatorial Guinea.

[3] Principles of Environmental Remote Sensing and Photo interpretation, Ndukwe 1997

Study Area

Ikom

Ikom planning area as depicted in Figure 1 and 2 is located at longitude 8^{o} 42' 39" E and latitude 5^{o}57'40" is in the Central Senatorial District of Cross River State with eleven(11) council wards: Abanyum, Yala-Nkum, Olulumo, Ofutop I, Ofutop II, Nta/Nselle, Nde, Abijinkpor, Ikom Urban, Akparabong, Nnam. The present geographical entity called Ikom Local Government Area dates back to the 16th Century during the pre-colonial era when the area extended to some communities now enclosed in BokiObubra, Abi and Etung Local Government Areas. Like other typical traditional societies, Ikom was governed by Chief priests or Village heads who were both ceremonial and religious. Modern day Ikom began as a constituent part of the Afikpo Division in the early 1950s when it was together with Afikpo now in Ebonyi State and in 1976, Ikom local government was created with headquarters at Ikom. Ikom with a large size of 1,961 square kilometers is bounded on the North by Ogoja on the North-East by Boki, on the East by Etung Local Government and South by Obubra Local Government Area.aninterational river cuts through the LGA, and leads to the Cameroon river. The temperature in Ikom is relatively constant throughout the course of the year, with average high temperature usually ranging from 25 to 30 degrees Celsius and annual precipitation of Calabar averages at 3000mm.

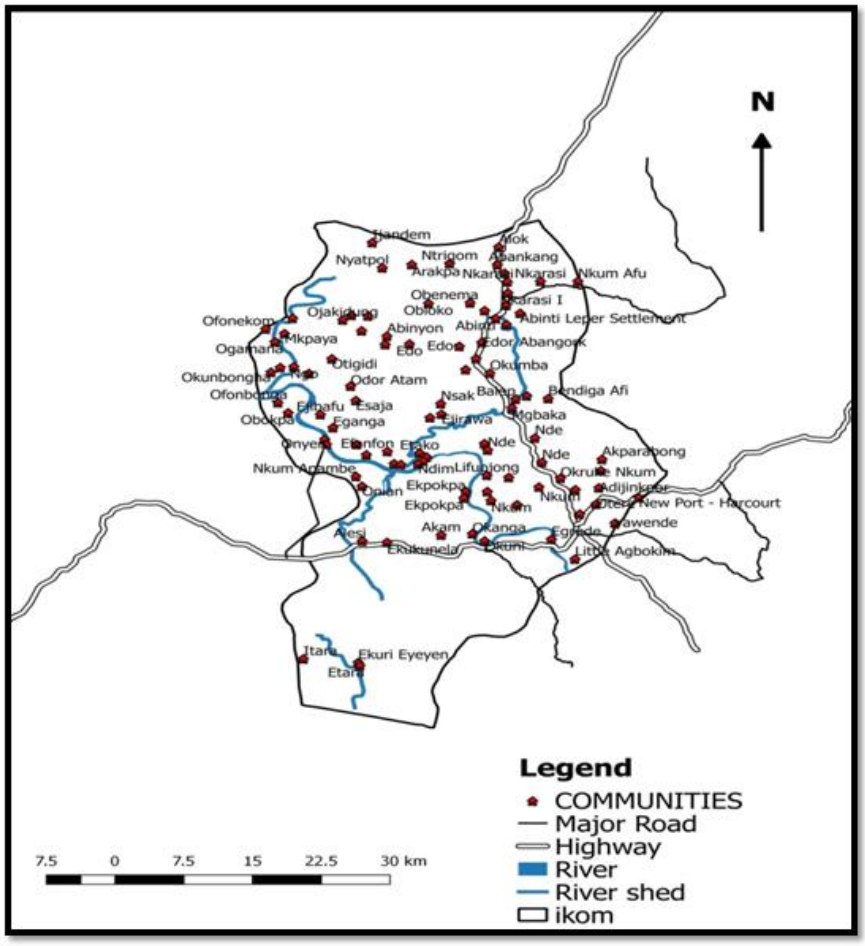

Fig1.*Map of Ikom Local Government Area*

Source: *Researchers' Fieldwork (2018)*

Calabar

Calabar planning area as depicted in figure 3 and 4 is the tourism capital city of Cross River State. The city, located in the southern part of Cross River State, lies between longitude 08^{0} 26 East of the Greenwich meridian and latitude 04^{0} 58 North of the equator and longitude 08^{0}22 East with a total surface area of 159.65 square kilometres.

It is bounded by two rivers which are the great Qua River and Calabar River. Also the city is bordered by Odukpani Local Government Area of Cross River at the North, Akpabuyo Local Government Area at the East, The Atlantic

Ocean at the South and AkwaIbom State at the West. Calabar was the first city in the then Eastern Nigeria and has remained more than 300 years in Nigeria.

Under the Köppen's climate classification, Calabar features a tropical monsoon climate (Köppen: *Am*) with a lengthy wet season spanning ten months and a short dry season covering the remaining two months. The harmattan, which significantly influences weather in West Africa, is noticeably less pronounced in the city. Temperatures are relatively constant throughout the year, with average high temperatures usually ranging from 25 to 28 degrees Celsius. There is also little variance between daytime and nighttime temperature, as temperatures at night are typically only a few degrees lower than the daytime high temperature. Calabar averages just less than 3,000 millimeters (120 in) of precipitation annually (Wikipedia 2017).

Despite differential temperature in Ikom and Calabar with a high degree of Tropical heat in Calabar, Ikom development is restricted to only Ikom town whilst Calabar is already expanding into the peripheries as movement and migration seems to be downwards toward the Southern Cross River Calabar from the central Ikom – Cross River rather than the Northern areas of Ogoja, Yala, Obanliku and Bekwara Local Government Areas.

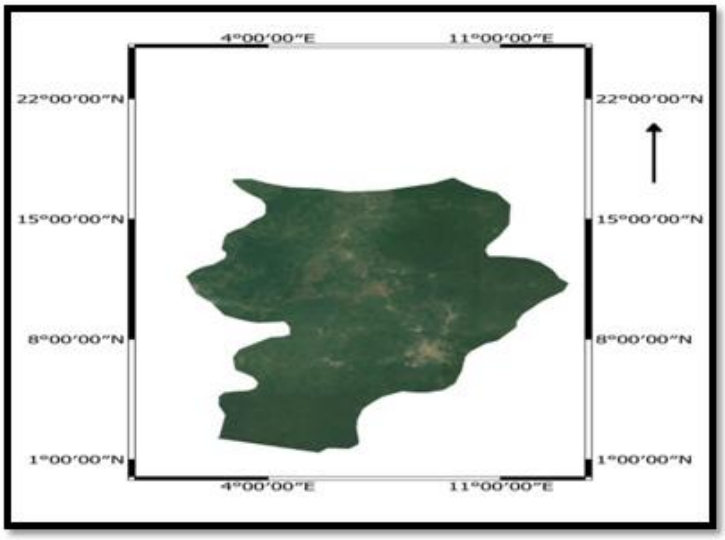

Fig2. *Satellite Imagery of Ikom*

Source: *Researchers' Fieldwork (2018)*

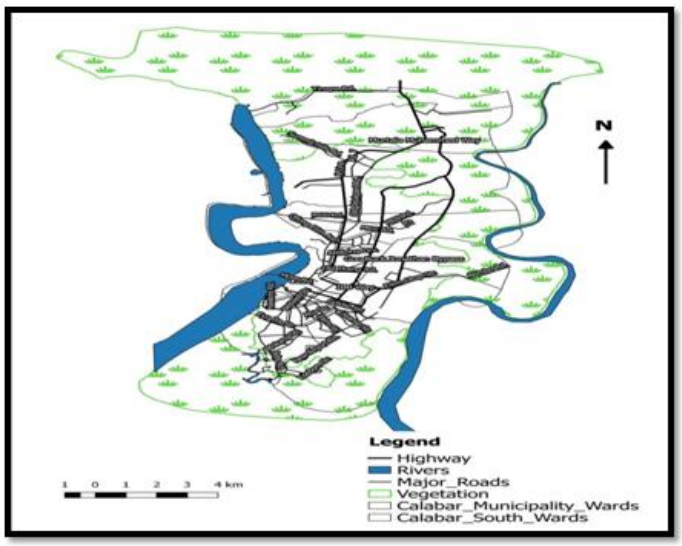

Fig3.*Map of Calabar Metropolis*

Source: *Researchers' Fieldwork (2018)*

Type of Data

The study utilizes field data type, which are geographic phenomena that have values everywhere in the study area. Field data can either be continuous or discrete. In a continuous field, the data values are smooth and do not change abruptly within the study area (Otto and Rolf, 2009). Type of continuous data used in this is the satellite imagery. Other data types include the shape-files of water bodies, local government and state boundaries.

Source of Data

Primary and Secondary data were employed in achieving the aim and objective of this study. Primary data used in this research, were basically measurements derived from the land use/ land cover analysis, which were applied in detecting the rate of change of land use / land cover fromthe period of 2000 to 2018. The primary data included just Physical Measurements of Land covers. While the secondary data, include: Satellite imagery as derived from the Landsat Geological Explorer, digitized shape-file exported from Google earth platform in KMZ format,existing literatures, journals and online articles. These type of data, aided in the assessment of the impact of land use/ land cover change on vegetation resource and consequently on Building types and quality.

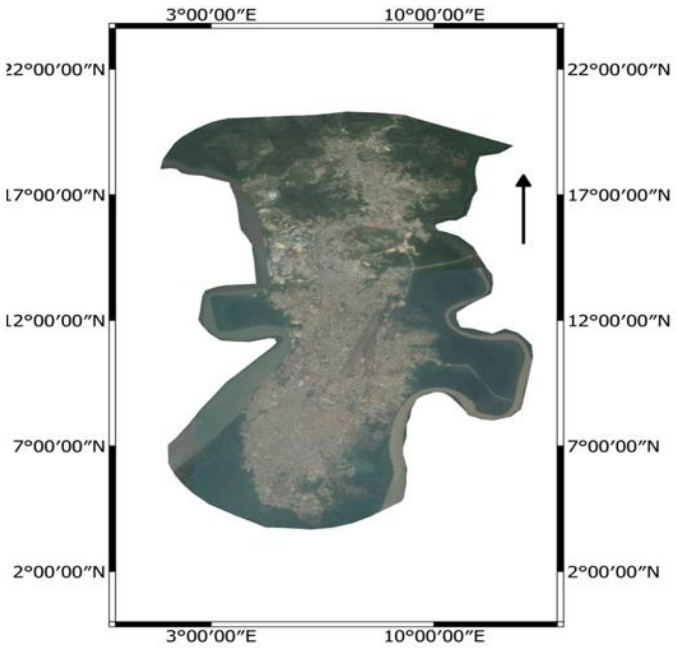

Fig4.*Satellite Imagery of Calabar*

Source: *Researchers' Fieldwork (2018)*

The primary data used in this study was derived from the measurement of the polygons of each land use class. This measurement was done using the Export Geometry tool in Qgis 2.15.18.While the Secondary data which include satellite Imagery and digitized shape filewas derived from the Landsat imagery bands. The Landsat imagery bands have long proved itself as a source of objective and reliable information, from the very first satellite launched in 1972 till the last one Landsat 8. Their archives provides around 40 years of multispectral data over the Earth. For the sake of this study the Landsat 8 TM + OLM data from 2000 to 2018 was utilized. Table 1 below shows the bands, spectral range and resolution of Landsat imagery. The data was derived from the link the http://www.esri.com/landing-pages/software/landsat/unlock-earths-secrets

Procedure for Data Collection

Based on the aim of the research, satellite imagery of Ikom and Calabar was mainly used in collecting the data relevant to the objective of the research. The satellite imagery was first downloaded from Landsat ESRI Earth Engine Explorer. This data was further used to calculate other parameters like the LULC of Ikom and Calabar was collected from the Landsat Repository over the year of 2000 to 2017.

Data pre-processing

The images to be used were pre-processed by using QGIS in order to rectify any geometric or radiometric distortion of the image to a level of quality product. The Pre-processing stage consist of geome also geometrically corrected and geo-referenced both image to the WGS 1984 datum and Universal Transverse Mercator (UTM) Zone 32 co-ordinate system. Data on Land Surface Temperature, were interpolated using the Inverse Distance Weighting (IDW). The Inverse Distance Weighting is an interpolation method which is a deterministic method for multivariate interpolation with a known scattered set of points. The assigned values to unknown points are calculated with a weighted average of the values available at the known points.

Data Analysis

The data were analyzed using QGIS version 2.18.5 software. After the Satellite imagery and land surface temperature data have been pre-processed, the satellite imagery was then subjected to land use/ land cover analysis.

Land Use/ Land Cover Analysis

Land use is a means of broadly classifying different types of activities relating to how land is used. Each type of use has its own characteristic that can determine compatibility, location and preference to other land uses in the town. The land use plan brings together consideration for both the physical development as well as the social characteristics of the town (Foth& Van Dyke, 2000). This has implication for Building types, Housing quantity and choice of dwelling and Holiday Location choice and whether the existing Building Development thereon are livable or not having regards to their encroachment on otherwise forest reserves, sanctuaries and other forms of Zinc in the tropics.

Land use/ Land cover analysis is the objective classification of the different activities a land is being used for. It has to do with grouping a particular section of land based on a widely acceptable grouping.

The land use/ land cover analysis for this study was carried out using Satellite imagery of both Calabar and Ikom local government area. The image has been geo-matically corrected and geo-referenced; the image was sent to ERDAS IMAGINE version 9.2 for an unsupervised classification of the study areas, in order to carry out the land use classification. For the purpose of the classification, three categories of land uses were assigned for classification. These land uses are:

- Built up
- Water Bodies
- Green Area

These categories were chosen so as to effectively understand the trends and impact of Built Up Area on Vegetation. As a result there was no need for further reclassification of the Green Areas (Vegetation Resource) into its subcategories.

In this research, Built-up areas is a term used in describing areas where buildings and non-building structures are present[4], normally as part of a larger developed environment such as: Residential areas, Market areas, Industrial areas, Transportation networks, infrastructures, and other Buildings from human endeavor.

Water bodies in this classification refer to areas covered by water; they consist of river channels, tributaries, creeks, streams and oceans.

Green Areas refer to, in this study, all vegetative areas, or areas covered with vegetation. Such as farm land, swamp, thick forest, parks, green field etc.

After the classification process was completed by ERDAS IMAGINE 9.2 software, the output of the classification was exported into QGIS version 2.18.15 software for further analysis of the land use land cover change.

RESULT AND DISCUSSION

Land use analysis was done using the unsupervised classification approach (accuracy 79.08%) using Gaussian Maximum Livelihood Classified (GMLC) to classified the data into three categories (built-up, green areas and river)

It is evident from the data that the reasonably high accuracy of the classification is appropriate for the stated purposes of this study. The built-up areas exhibited the largest percent increase in both Ikom (2.72%) and Calabar (19.08) followed by 6.63% decrease in vegetation at Ikom and 1.07% in Calabar and lastly, the analysis shows a similar decrease in water body at Ikom (0.36 %) and Calabar (0.37 %)

[4]http://www.wikipedia.com/wiki/Built-up_area

However, the highest increased recorded by the built-up areas is evident in the number of building developed in response to the influx of people to the opportunities offered by the investors.

RESEARCH DESIGN

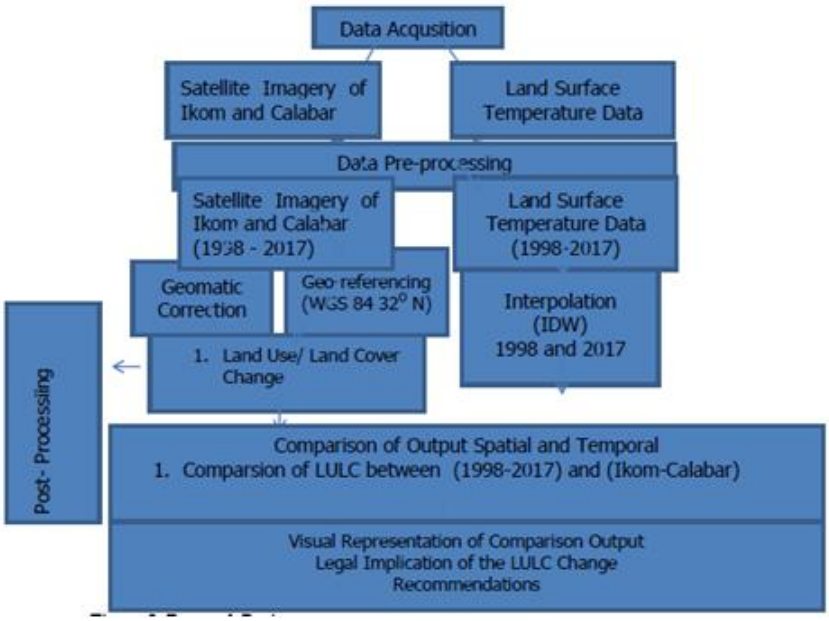

Fig5. *Research Design*

Source: *Researchers Fieldwork 2018*

The table above shows dynamic changes of different land use and land cover in 2000 and 2017 respectively. From the dynamic changes result continuous decrease of Green Areas and continuous increase of the region covered by urban or built-up land were represented on one hand. In addition the rate of urban growth IN Calabar is greater than Ikom

Table1. *LULC Ikom (2000).*

ID	Ikom Land use (2000)	Area (sqkm)	Percent
1	Built Up Area	164.09	10.60
2	Green Land	1464.80	94.65
3	River	21.30	1.376293
Total		1547.56	100

Source: *Researchers' Fieldwork (2018)*

Table2. *LULC Ikom (2017)*

ID	Ikom Land use (2017)	Area (sqkm)	Percent
1	Built Up Area	206.53	13.35
2	Green Land	1362.18	88.02
3	River	15.71	1.015
Total		1547.56	100

Source: *Researchers' Fieldwork (2018)*

Table3. *LULC Calabar (2000)*

ID	Calabar Land Use (2000)	Area (sqkm)	Percent
1	Built up	62	47.33
2	Green Area	57	43.55
3	River	12	9.16
Total		131	100

Source: *Researchers' Fieldwork (2018)*

Table4. *LULC Calabar (2017)*

ID	Calabar L and use(2017)	Area (Sqkm)	Percent
1	Built up	87	66.41
2	Green Area	35	26.72
3	River	9	6.87
Total		131	100

Source: *Researchers' Fieldwork(2018)*

Table5. *LULC Temporal Comparison Ikom (2000 -2017)*

ID	Location	Land use	2000	2017	Percent change
1	Ikom	Built up	10.60	13.35	2.75
2		Green Area	94.65	88.02	6.63
3		River	1.38	1.02	0.36

Source: *Researchers' Fieldwork (2018*

Table7: *Spatial Comparison of LULC (Ikom - Calabar)*

s/n	Land Use	Calabar 2000 (%)	Ikom 2000 (%)	Percentage Change
1	Built Up Area	47.33	10.60	36.73
2	Green Area	43.51	94.65	51.14
3	Water Bodies	9.16	1.38	7.78

Source: *Researchers' Fieldwork (2018)*

Table 8.*Spatial Comparison of LULC (Ikom - Calabar)*

Land Use	Calabar 2017 %	Ikom 2017 %	Percentage Change
Built Up Area	66.41	13.35	53.06
Green Area	26.72	88.02	61.3
Water Bodies	6.87	1.02	5.85

Source: *Researchers' Fieldwork (2018)*

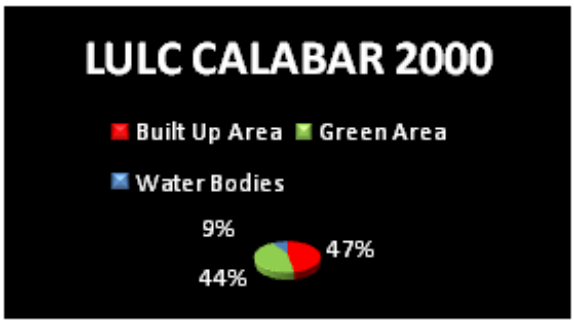

Fig5. *LULC Calabar 2000*

Source: Researchers' Fieldwork (2018)

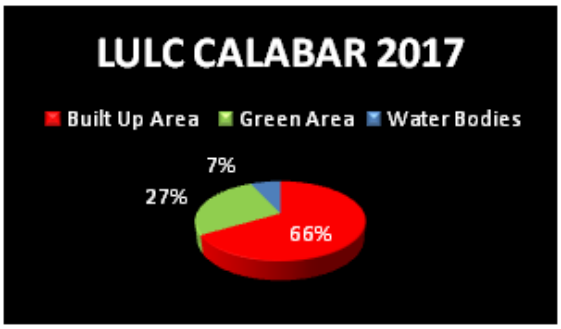

Fig6. *LULC Calabar 2017*

Source: Researchers' Fieldwork (2018)

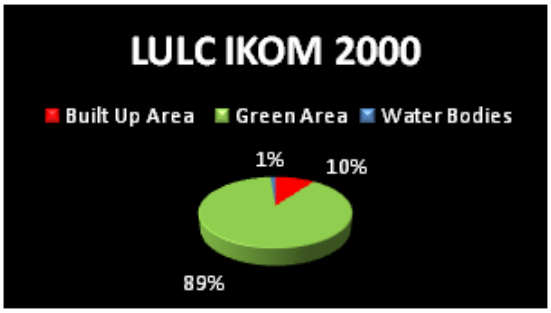

Fig7. *LULC Ikom 2000*

Source: Researchers' Fieldwork (2018)

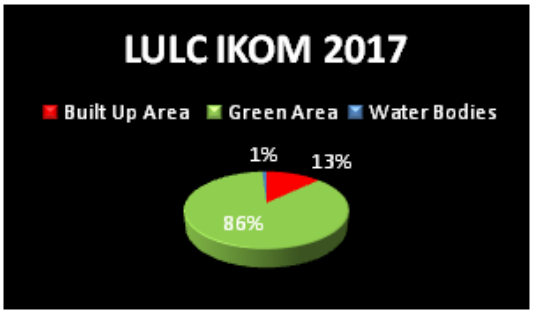

Fig8. *LULC Ikom 2017*

Source: Researchers' Fieldwork (2018)

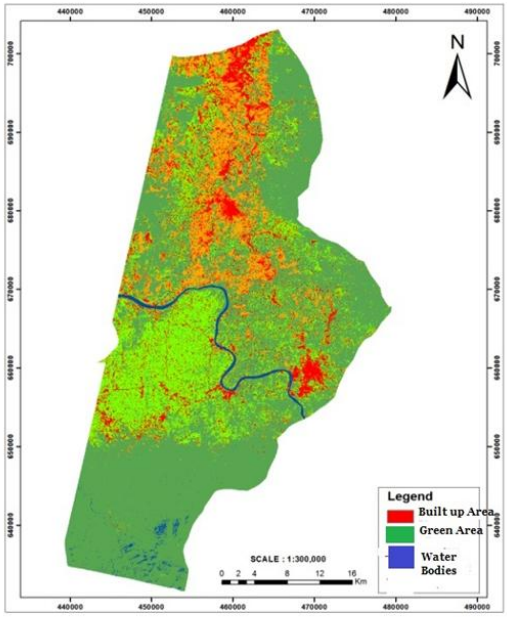

Fig10. *LULC Map Ikom (2000)*

Source: Researchers' Fieldwork (2018)

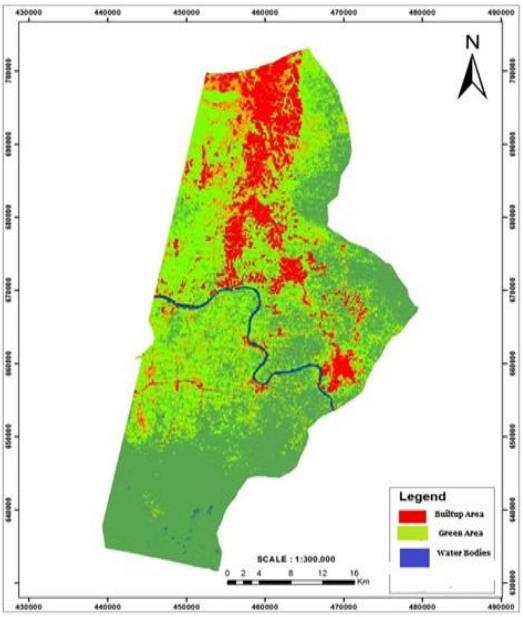

Fig11. *LULC Map Ikom (2017)*

Source: Researchers' Fieldwork (2018)

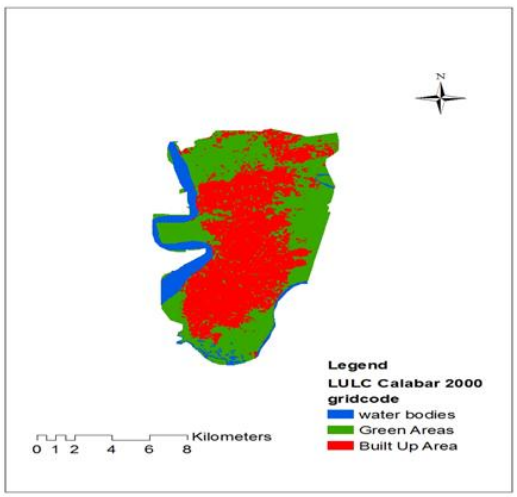

Fig12. *LULC Calabar (2000)*

Source: *Researchers' Fieldwork (2018)*

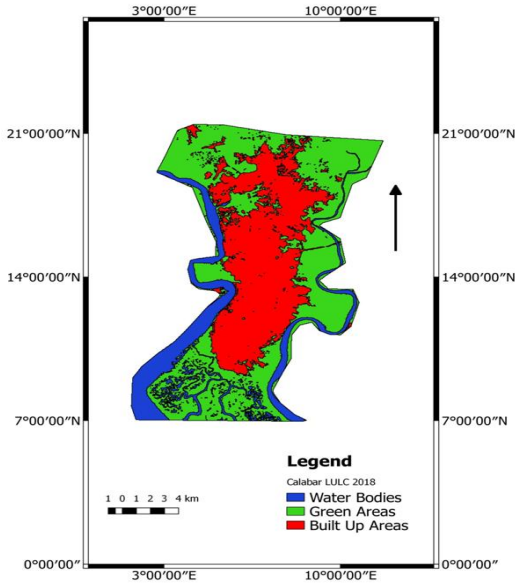

Fig13. *LULC Calabar (2017)*

Source: *Researchers' Fieldwork (2018)*

Test of Hypothesis

Three hypothesis, as relevant to the objective of the study were tested, in order to objectively observe the relationship between Built Up Area change and Green Area change of the Study Area. The objectives are as follow:

Hypothesis One

H_o: There is no significant temporal difference in Land Use change between 2000- 2017 in Ikom and Calabar

H_1: There is significant temporal difference in Land Use change between 2000- 2017 in Ikom and Calabar.

The outputs of the 2 tailed Student t test, show that at a degree of freedom, 2, $t > 0.05$, hence giving the researchers the power to uphold the alternative hypothesis while rejecting the null hypothesis. So therefore, there exist temporal difference in LULC from 2000 – 2017 at Calabar and Ikom. These outputs as displayed in Table 9 and 10 show the statistical test result of

the LULC temporal change in the Study Area. Based on the output, it is evident that the Land Use practice in the Study Area has change significantly over a consecutive period of Seventeen (17) years. The change in the Land Use/ Land Cover (LULC) in the Study Area shows an increase an increase in Built Up Areas by 19.08 % in Calabar and 2.75% in Ikom. The Green Areas decreased by 1.07 % in Calabar and 6.63% in Ikom and finally the water body decreased by 0.37% in Calabar and 0.36% in Ikom. Although this is evident in Table5 and 6, Table 9 and 10 further buttresses this fact, using inferential statistical approach rather than just the descriptive statistical approach.

Hypothesis Two

H_o: There is no significant spatial difference in Land Use change between 2000- 2017 in Ikom and Calabar

H_1: There is significant spatial difference in Land Use change between 2000- 2017 in Ikom and Calabar.

The output of the 2 tailed Student t test, shows that at a degree of freedom, 2, $t > 0.05$, hence giving the researchers the power to uphold the alternative hypothesis while rejecting the null hypothesis. So therefore, there exists a spatial difference in LULC at Calabar and Ikom between 2000 - 2012. Table 11 and 122 below shows the statistical test result of the LULC temporal change of both Calabar and Ikom (2000 - 2017).

Table 11 and Table 12 show that there is a significant change in the rate of Land Use/Land Cover (LULC) characteristics of Ikom and Calabar. The LULC change in the descriptive Table of 7 and 8 shows that the rate of change in Built Up Area is 36.73% in 2000 and 53.06% in 2017, while Green Area changes at a rate of 51.14% in 2000 and 61.3% in 2017 and the Water Bodies changes at a rate of 7.85% in 2000 and 5.85% in 2017.

Hypothesis Three

H_0: There is no significant relationship of Built up area increase on Green Areas (Vegetative Resource) in Ikom and Calabar in 2000 – 2018

H_1: There is a significant relationship of Built up area increase on Green Areas (Vegetative Resource) in Ikom and Calabar in 2000 – 2018

The Pearson correlation Test was applied in test the third hypothesis

The output of the Pearson correlation shows a negative correlation of 1, which is a perfect correlation. This means that an increase in Built Up areas by a Unit, result to a reduction in Green areas by a Unit.

Table 14 shows the result of the relationship between the change in Built Up Area and the change in Green Area in Ikom and Calabar from 2000- 2017. The output of the Pearson Correlation analysis, was as expected, a perfectly negative correlation, where the increase in one variable, result to the decrease in the other variable. In this case, the increase in the Built-Up Area is associated with a corresponding decrease in the Green Area. Correlation analysis shows how the variables relate with each other, with all factors being constant.

Planning and Legal Implication

The Planning and Legal implication of this study is that the concept of environmental sustainability would be compromised, as result of increase demand pressure on the environment. With the increasing number of Built Up Areas, and the decreasing number of Green Areas, the concept of sustainable cities or sustainable development would be faltered, because the Vegetative resources (Green Areas) that would have served as climate regulators, Carbon sinks, Food, Source of Oxygen, and Cool shade, which together make life livable for residence in the Urban environment, would be lost to the uncontrolled level of urbanization in Calabar and Ikom.

Furthermore, the increase in Built-Up Area, is correspondent to the increase in Population, as Population increases, more roads would be needed, more Houses would be built, office space would be increased etc, this would result in the need for more land space, and more land space means more trees fallen down and more wetlands reclaimed, and as these vegetation are lost to anthropogenic cause, man would be left to suffer for his cause. Legally this would pose a serious problem to the Government and citizens, in terms of environmental serenity.

CONCLUSION

This study employed a methodology using combination of Remote Sensing and GIS techniques to compare and contrast information on Land Use Land Cover of Ikom and Calabar. It has also demonstrated the characteristics of

the change in respect to the areas of the LULC classification.

The study reveals that increase in urbanization process leads to replacement of natural surfaces and continuous increase in artificial land covers in form of roads, building and other anthropogenic features which increases the impermeability of the ground, with reduction of underground water storage, as the negative impact. The continuous and enormous changes of LULC with urbanization and encroachment and destruction of the ecosystem in our urban green space has led to the increase in land surface temperature intensity, which resulted in negative changes in the environment.

The changes will cause environmental impact with air pollution a factor that contributes to global warming increasing the surface temperature. Other affect the absorption of solar radiation, evaporation rates, surface temperature, the storage of heat and wind turbulence all condition fit to contribute to the urban heat Island phenomenon.

From the study, it can be concluded that an increased in built up area development, would mean a decrease in green areas, would result in negative impact on the environment. Also it was discovered that there is a significant difference spatio-temporally, between Ikom and Calabar Planning areas.

RECOMMENDATIONS

This research investigated the pattern of LULC change, the planning and legal implication of Built up Area encroachment on Vegetative Resource (Green Areas)in Ikom and Calabar Planning Areas of Cross River State, Nigeria. The study also illustrates the importance of the research finding to planners, urban mangers and decision makers is of particulars importance in the local government Area of Ikom and Calabar to take up actions and execute policies to control the LULC changes so as to minimize and reduce the encroachment of buildings on green areas, hence mitigating the problems of urban green areas. With this increasing interest on green areas and Built-up area information, it of important to make the following recommendations;

- The Government of Cross River State should ensure that the Building Regulation of 1984 as amended in 1987 should be thoroughly enforced. This would ensure that developers follow the regulated standard of Building Development, which is sustainable with the environment. Furthermore, it would ensure the sustainable use of land resources in order to make sure that land is being used judiciously to avoid wastage. Also, the increase in built up environment on vegetation, has resulted in the increase in the Land Surface Temperature, hence creating phenomenal events like Urban Heating, Climate Change, Crop Withering, as a result of less moisture. This recent upsurge in this environmental deterioration is an indicator of an unplanned urbanization. As a result, government should allocate all necessary resources to effectively regularize the rate of urbanization especially in Calabar Metropolis.
- The residents in both Calabar and Ikom Local Government Area should be thoroughly sensitized on the deleterious effect of the increased in Built-up areas on the sustainability on the environment, because one of the reasons, for this increase in building, is that most of the residents are not aware of their impact on the environment. However, through sensitization programs, residents would be enlightened on the impact of their action on the environment.
- One of the major problems of urbanization is the unplanned increase in population. There is no form of urbanization that does not lead to an increase in population, but when this increase is unplanned the problem of land scarcity sets in because the threshold of the carrying capacity of the land has been compromised. And when this happens the problem of uncontrolled urban expansion sets in. However, with the collaboration of the Governments, NGO's, Community people, in putting up a conservation plan, like that of Primac 1998, this would lead to the provision of protected areas like Urban Biosphere Reserve, vegetation sanctuaries, city parks, Urban Wilderness, etc, which would result to an intensive preservation of sensitive Urban Vegetation eco-system, in order to ensure environmental sustainability.

REFERENCES

[1] http://www.esri.com/landing-pages/software/landsat/unlock-earths-secrets

[2] Otto H. & Rolf A. de (2009) "*Principles of Geographic Information Systems, an introductory textbook*". The International

Institute for Geo-Information Science and Earth Observation, Fourth Edition, ITC, pp. 69-72.

[3] Offiong, V.E. (2002) "***Law*** *examination techniques and the new environment* ***Law*** *perspective, questions for answers. Clear lines Publications*". Clear Lines Publications. ISBN-978-36720-1-0

[4] Weng .Q (2001) "*A remote sensing–GIS evaluation of urban expansion and its impact on surface temperature in the Zhujiang Delta, China*". International Journal of Remote Sensing, 2001,vol.22,no.10,1999–2014.

[5] Weng, Q., Lu, D. and Schubring, J.(2004) *"Estimation of Land surface Temperature vegetation Abundance Relationship for urban Heat Island studies*" Remote sensing of Environment, 89 (4): 467-483.

[6] Wu. A, W. W. Hasieh, and B. Tang , (2006) "*Neurol network forecasts of the tropical sea surface temperature*", Neural network, vol 19, no 2 145-154.

Citation: *Offiong Victor Eyo, Surv P.E. Bassey, Tpl Dr. Emmanuel Agbor, Uzoezie, Arinze Destiny. "The Legal and Planning Implication of Built Up Area Encroachment on Vegetation Resource (Green Areas) - the Case of Calabar and Ikom Statutory Planning Areas" Journal of Law and Judicial System, 1(3), pp.9-20*