Geospatial Distribution's Pattern and People's Perception of Green Spaces in Bauchi, Nigeria

ABDULKADIR, I. Funtua, BABANYARA Y.Y. and MUSTAPHA K. M. Nigeria

Key words: Geospatial, Green spaces, Urban Environmental Planning, Nigeria

Summary

Provisions of green spaces are integral parts of urban environmental planning and are related to the quality of the city's image, environment and livability status. Knowledge about the distribution, pattern and the perceptions of urban dwellers in respect of these urban green infrastructures (G.I) in urban centers of both developed and the developing world cities is important. Despite the numerous benefits of urban green space to cities, studies have shown that these spaces are declining in several cities of the world. Absence of geospatial data of these infrastructures in a usable form are challenges facing urban planners and managers, particularly in Nigeria. This paper investigated the geospatial distributions, trends and peoples' perception of green spaces on the image of Bauchi city to provide the required geospatial information for policy and informed decision making. Descriptive analysis was used in assessing the obtained data and its presentations in the forms of maps and charts. The results shows a respective progressive green spaces decline from 24% in 1976 to 14% in 2018 of the total area of the city This erodes the scenic image as well as aesthetic, and quality status of the city. There is an absence of a green space plan and a lack of a distinct policy for green Infrastructure development. There was limited or absence of awareness of the long-term benefits of green space planning and development among the city dwellers. These create gaps between Statutory Planning and Urban Greening Practice. Recommendations include the setting up and development of Bauchi city Green System Plan through collaboration between the statutory departments for urban planning and other relevant stakeholders, and the promotion of green space development through the restoration of green areas with a view to improving the city's image.

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1.0 INTRODUCTION

The tolls of the British colonial administration that reign for over a century had contributed immensely to the spatial growth of most urban areas in Nigeria. The pre-colonial Northern Nigeria's pattern of lifestyles shaped the physical development of its pre-colonial cities. The cities were in a form of a curvilinear pattern, with the unique provision of small spaces within the housing area, usually related to shade trees, where people gather, sit and gossip and children play in quiet and safety. There was also a provision in each city or town, for a large space where festive and religious occasions can be celebrated (Maxlock, 1977). These free spaces serve as meeting points, petty trading points. They are the avenue for the interaction of human activities with the environment (EPA, 2017), and generally fostered community life. Thus, they are the native's conceptualized Green spaces. Green space comprises such vegetated areas as parks, public and private gardens and even trees lining streets. The colonialist introduced new outdoor recreational activities and facilities. They created race courses, for Polo, Golf, cricket, etc. and building free zones to separate them from the indigenous settlement. These added to the number and sizes of open and green spaces.

Urban green spaces are currently acclaimed as central elements in the promotion of environmental sustainability and quality of life in cities (Madureira et al, 2018). Green space is vital for people to relax and engage with nature and develop suitable biodiversity in the urban system (Moseley et al., 2013). Therefore preserving such green spaces in the physical landscape of urban areas has been identified to enhance the health and well-being of urban dwellers (Wolch et al., 2014; Cohen et al., 2008).

Since the 1880s, public green spaces have been increasing in the planning and design of most cities owing to the idea of urban parks and gardens founded by Fredrick Law Olmsted in the United States of America (Mensah, 2014).

Despite the numerous benefits that urban green spaces offer to cities, statistics show that these spaces are on the decline in several cities across the world. According to Shishay, (2011), the decline in Africa especially Nigeria is a result of urbanization phenomena characterized by rapid and uncontrolled urban growth destroying the natural environments and sensitive urban ecology.

The British arrived at Bauchi North East Nigeria in about 1903. Lamentably, Modibbo, et al (2017) observed that, Bauchi appears to be relegated in discourse about urban issues in the country. Notwithstanding the town's socio-economic changes,

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there were few documented attempts of developing a physical development master plan for the city, to cope with the challenges of rapid population increase, urban growth and other "Rural -push and Urban- pull factors. This results in the increased land demands.

With the increase in population and changes in the socio-economic status of the city over the years, there is an increase demand for land for the various uses. The existing provision of open spaces cum green spaces and other green infrastructures in the master plans of the city are the most vulnerable to these land demands pressures.

Understanding the distribution pattern and people's perception of green spaces in urban is a requirement to guide city planners and for informed decision making. Therefore, it is against this backdrop, that this study assessed, the availability, pattern of distributions and people's perceptions of the urban green spaces in Bauchi city using the geospatial and statistical approach.

The distribution of Green spaces is usually defined as the relationship between green area boundaries and all other elements present in the city. The total length of the edges is compared with the city's urban area (EEA, 2017). The uneven distribution of these spaces is the issue of social concern and environmental justice.

This study covered 1976 to 2016 period and based on the trend analysis, forecast the likely changes to the city's green spaces by 2026.The study uses the existing Master plan of the city and the freely available Landsat satellite imageries of the area, to assess the distribution pattern and the people's perception of the Green space in the area. It also quantified the level of green space depletion in Bauchi city using geospatial tools of ArcGIS 10.1 and paired t-test statistics. The green spaces were categorized as park and gardens, open space, green belt, street trees and, others.
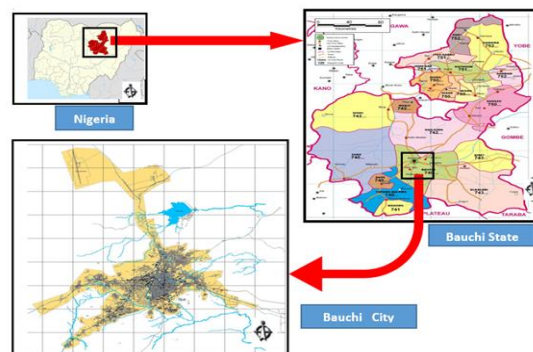
1.1 Study Area

Figure 1. Map showing the Study Area

Bauchi city, is situated in the Northeastern Nigeria (Figure 1) between latitude 100 180 57'' North and Longitude 90 50' 39'' lying approximately 690.2m above sea level. It has an annual rainfall of 1091.4mm. The hottest and coldest temperatures are noticeable in the months of April and (December, January), 40.56^0c and (6.11^0c and

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7.22^0c) respectively. Bauchi covers the old walled city and an extensive surrounding area. Altogether, it covers a total land area of 3,604sq.Km. The urban areas comprise of unevenly distributed different types of green spaces. These include principally the designated green spaces area as indicated in the Master plan, farmlands on the city fringes, remnants of natural areas including Rock outcrops and derelict land dominated by successive vegetation. The declining trends of these spaces are of great concern to the city's images. The British in about 1903 brought a new concept of urban planning and development in the town.

2.0 MATERIAL AND METHODS

The data for this study were base map, satellite image, and topographic map of Bauchi city as well as data from the respondents. The primary data were sourced from the respondents through a questionnaire, field observation and Landsat satellite imageries of the study area. Secondary data were obtained from the Bauchi Master Plan reports, other official records from the Ministry of Lands and Housing, journals, conference papers and internet, The Spatial data obtained were analyzed using GIS tools.

The study specifically used the following materials:

i. Max Lock's landuse proposal of Bauchi as contained in the Master plan prepared in 1975
ii. ArcGIS 10.1 and Microsoft Excel software
iii. Landsat 2 (MSS) and Landsat 7 (ETM+)

The satellite imageries were downloaded from the USGS website and imported into the ArcMap environment for processing and analysis. Normalized Difference Vegetation Index (NDVI) approach was used to analyze the Land use Land cover change. Band 7 and Band 5 of the Landsat2 (MSS) of 1975 was used as the baseline year of the study. Similarly Band 4 and Band 3 of Landsat 7 of the subsequent years (1986-2016) were utilized.

To assess the changes in the Areal extents of the green spaces, the study area was divided into three sections- Northern, Central and Southern areas. A combination of Field Survey Assessment (FSA) and Rough Screening Method were used to identify and rank the high density residential areas in each section in order of level of decline, distortion, and conversion of green spaces.

2.1 Analysis of people perceptions of green spaces

The analysis of people's perception of the uses of green spaces reflects their demands and needs or expectation from green spaces (Somjita and Harini, 2017). The information on the perception of the respondents was sought on the impacts of the green spaces on City image/visual amenity, Psychological wellbeing. Similarly considered were the influence and benefit and how a lack of green spaces affects the city image, Property values, Air quality and urban heat island, Noise reduction and Health.

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The study also sought the opinions of city dwellers on the need for provision and development green spaces on Social interaction, Recreation, Play spaces, and Flooding control. The results in the form of table and charts were presented.

The conceptual framework for the green space of the city is illustrated in figure 2
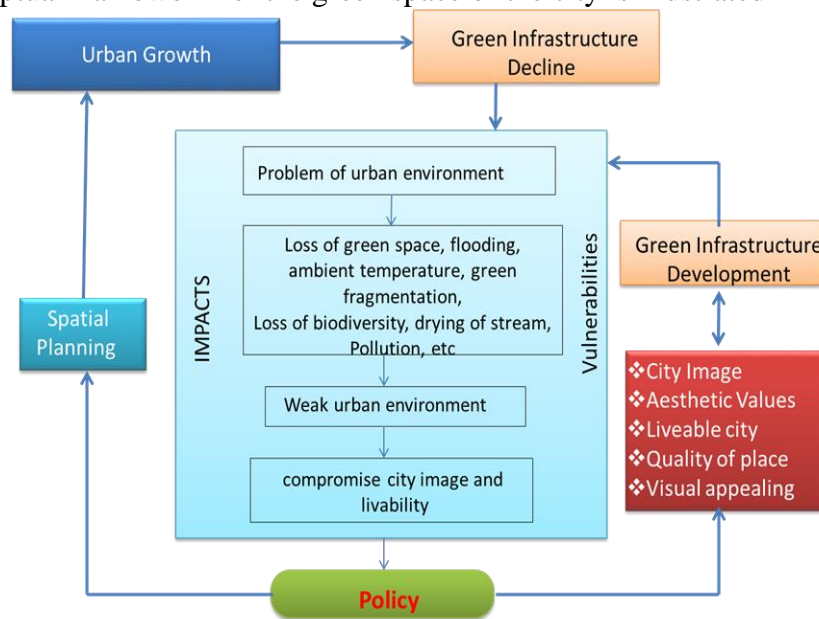

Figure2 Conceptual Framework for Green space Development

2.2 People's perception of Green spaces in Bauchi

To appraise the people's perception of green space in Bauchi, the study employed the use of three instruments for data collection namely, Oral Interviews, field observation, and questionnaire administration. Systematic random sampling was used and the sample size was based on the Krejcie &Morgan, 1970 table. Descriptive analysis was used in the assessment of the data.
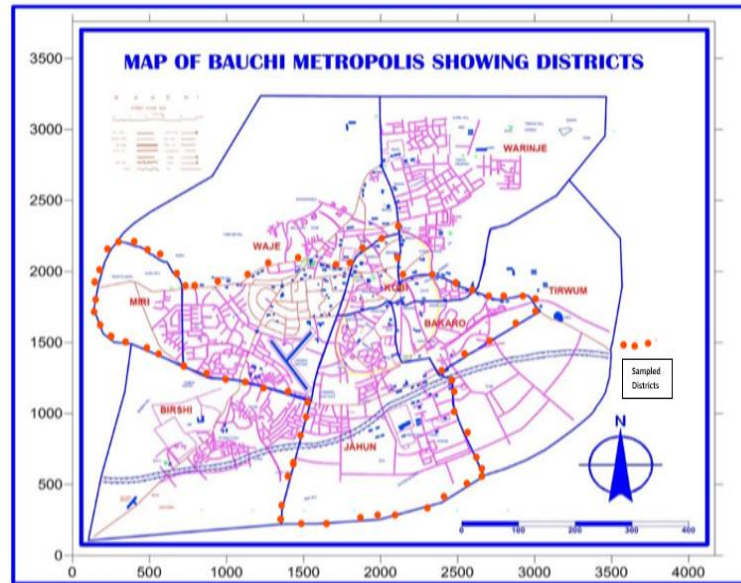
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Figure 3: **Map of Bauchi Metropolis showing the Sampled District areas**

1.0 The sample size and sampling frame

The study population consists of all the population of the study area as shown in the table below, which is about 365,760 across the eight (8) districts (Gana, 2016) (Figure 3) in the city

Three hundred and eight (308) randomly selected respondents from four selected districts were involved in the study. The sampled districts used for the study were Bakaro, Kobi, Jahun, and Miri respectively. The information sought for was on the Level of awareness, regulatory impediment and provision of Green space plan, Political interest, Maintenance requirement, and access to the green spaces.

The population figure of the study area being over 100,000, the Krejcie & Morgan, (1970) recommendations for the choice of sample size were adopted in determining the sample size for this study. Accordingly, to have unbiased and equal representation of the population, each district was given some questionnaires based on its projected total population using the Krejcie & Morgan, (1970). Table1 is the number of questionnaire distribution per district.

2.4 Questionnaires administration/ Field work

The questionnaires were prepared and administered in a regular interval of two-four households along the streets. Some of the questionnaires used were based on a Likert's scale and are either open or close-ended. To gauge the respondents' views, questionnaires comprise of 31 questions in three sections. **Section A** (Green Space Policy), **Section B** (Green Spaces and its Attribute and effect on the City Image). The Green Space and **Section C (**Green Space Barriers).

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Table1. Questionnaire Distribution per District

S/No		Population	%	No of questionnaire Administered
1	Bakaro	55,440	15%	52
2	Birshi	42,808	12%,	40
3	Jahun	41,648	11%,	38
4	Miri	31,232	8%,	27
5	Tirwun	22,080	6%,	20
6	Waje	42,512	14%,	14
7	Warinje	50,800	23%,	80
8	Kobi	79,240	11%,	37
	Total	**365,760**		

The languages used for the administration of the questionnaires and oral interviews were English and Hausa. The main elements and functions of the green spaces as well as their relationships with their surroundings were observed. Photographs were taken during the field visit. The oral interview/discussion was organized to obtain additional information from respondents and heads of the agencies in Green space development as well as use the responses to validate some of the results from the questionnaire and in-depth interview.

Both descriptive and inferential statistics were used for the analysis. The results of the findings were presented in tables and bar charts for graphical presentation. The Microsoft Excel and the Minitab Statistical packages were employed for the analysis. These were used to draw inferences and answer the research questions.

3.0 RESULTS

Using the satellite imageries, Nigeria topographic map, Google Map and the GIS tools, the quantum of the land use and land cover changes (LULC) of the study area from 1976-2016 were obtained at different epoch at 10-year interval and based on 5 categories (Table 3) that comprise of park and gardens, open space, green belt, street trees, and others. The projection of the respective changes of these for the 2016- 2026 period is shown in Table 4.

The Green spaces categories of Bauchi city recorded noticeable changes, see Table 3, it shows that the parks/gardens increased from 2.4% in 1976 to 10.4% in 1986, while it also declined to 8.6% in 1996, 6.2% in 2006 and declined ten (10) years later in 2016 to 5.3%.The Open spaces area has been largely decreased from 1976 to 2016, from 5.7% to 2.1%. The Green belt has also decreased from 4.8% in 1976 to 0.8% to 2016.

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Table 3: Green space Distribution of Bauchi City (1976-2016)/sq.m

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Year	Parks & Gardens	%	Open Space	%	Green Belt	%	Street Trees	%	Others	%	Total
1976	7609248.864	2.4	18071966.052	5.7	15218497.728	4.8	6658092.756	2.1	269494230.6	85	100%
1986	32643677.627	10.4	22599469.126	7.2	15577364.876	5.6	12241379.11	3.9	228819624.9	72.9	100%
1996	26293061.908	8.6	14675197.359	4.8	9783464.9059	3.2	10394931.463	3.4	244586622.65	80	100%
2006	19244424.481	6.2	10863788.013	3.5	8380636.4675	2.7	10243000.127	3.3	261662094.15	84.3	100%
2016	16299645.171	5.3	6458349.9733	2.1	2460323.7994	0.8	9553754.7225	3.1	272788401.25	88.7	100%

(**Source:** Authors' Lab work, 2019)

Table 4: Projected Green space Distribution of Bauchi City (2016-2026))/sq.m

Year	Parks & Gardens	%	Open Space	%	Green Belt	%	Street Trees	%	Others	%	Total
1976	7609248.864	2.4	18071966.05	5.7	15218497.73	4.8	6658092.76	2.1	269494230.6	85	100%
1986	32643677.63	10.4	22599469.13	7.2	15577364.88	5.6	12241379.1	3.9	228819624.9	72.9	100%
1996	26293061.91	8.6	14675197.36	4.8	9783464.906	3.2	10394931.5	3.4	244586622.7	80	100%
2006	19244424.48	6.2	10863788.01	3.5	8380636.468	2.7	10243000.1	3.3	261662094.2	84.3	100%
2016	16299645.17	5.3	6458349.973	2.1	2460323.799	0.8	9553754.72	3.1	272788401.3	88.7	100%
2026	9841295	3.2	5997039.141	1.95	7073430.781	2.3	10763916.4	3.5	273864787.4	89.05	100%

(**Source:** Lab work, 2019)

The street lined trees are the only component of Green space that has increased from 2.1% to 3.1% over a period of forty (40) years, yet substantial part of the streets are completely covered by impervious surfaces. The parks and gardens, open areas, and green belts have been changed to built-up areas in the city and in some cases to commercial purposes. However, streets lined trees increased in the city significantly. Based on the observed trends, Table 4 shows the projected statistics of Green spaces components for 2026.

Comparing the percentages representation of Table 4 and that of Table 3, similar distribution pattern of decrease and increases are observed. However, the parks and Gardens projection indicates a decrease by 3.2% in the year 2026, open spaces will also decrease to 1.95%, Green belt and street trees will likely increase by 2.3% and 3.5%

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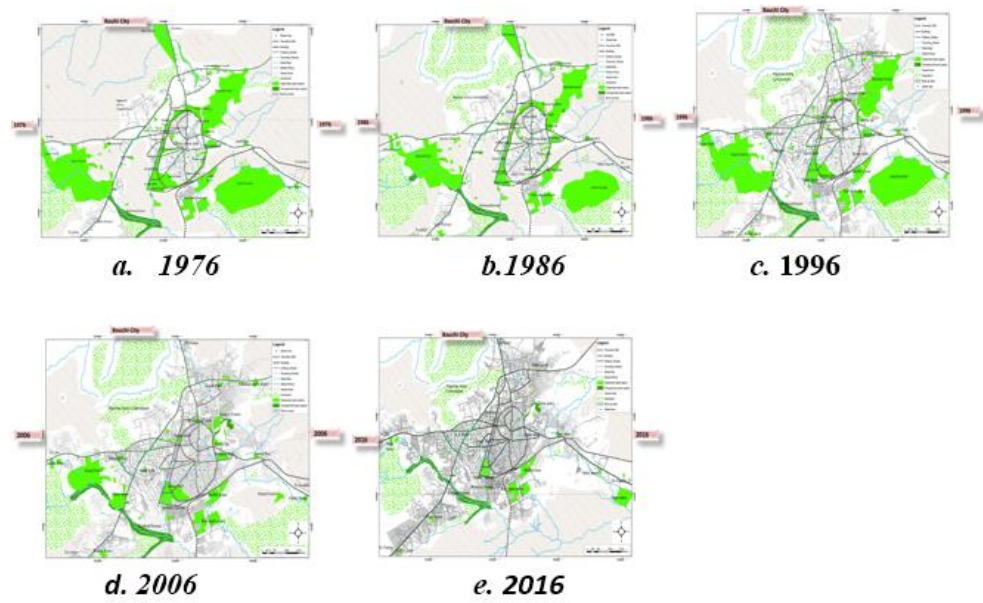respectively. However, the other green areas will largely increase to 89.05%.

Figure showing the Green space distribution and deflection pattern in Bauchi

Table 5 is the list of public open spaces lost to other uses in Bauchi urban area (Ghani, 2002) in comparison with the proposed extent in Maxloc1976 master plan

From the research, 25% of the respondents have resided in the city between 5-10 years. While about 28% indicated their residency period was between 15-20 years, and 20% resided between 25-30 years and 27% reside over 35years in the city.
Respondents were asked their level of awareness of green space and policy/legislation. 81% of the respondents were not aware of the green space while about 13% of the respondents were aware of the term Green space and 6% of the respondents indicated no response.

On the legislation/policy, 83% of the respondents do not know any legislation/policy for Green Spaces. While about 9% were aware of the legislation/policy (Figure. Additionally, 8% indicated that they not know. This data suggest that the majority of the respondents were not aware of the existence of legislation on Green Infrastructure.
From the research, 7% of the respondents strongly agreed that the planning board requires Green Infrastructure in the city. While 18% of the respondents agree, about 3% of the respondents indicated neutrality. And 28% of the respondents disagreed planning board does not require Green Infrastructure in the city and about 34% of the respondents strongly disagreed.

Table 5. Open space lost to other uses in Bauchi Urban Area

S/no.	Proposed Area (Ha)	Existing	Lost Area	% of

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		Area	(Ha)	the lost
1	Tafawa Balewa Stadium	6	6	0
2	Town Park	34	12	64.7
3	Decorative Formal Garden	14	0	100
4	Youth and Sport	5	0	100
5	Jahun Local Park	76	20	73.68
6	Kofar Idi local Park	93	24	74.19
7	Wambai Local Park	30	0	100
8	Race Course	31	12	61.29

(Source: Ghani, 2002)
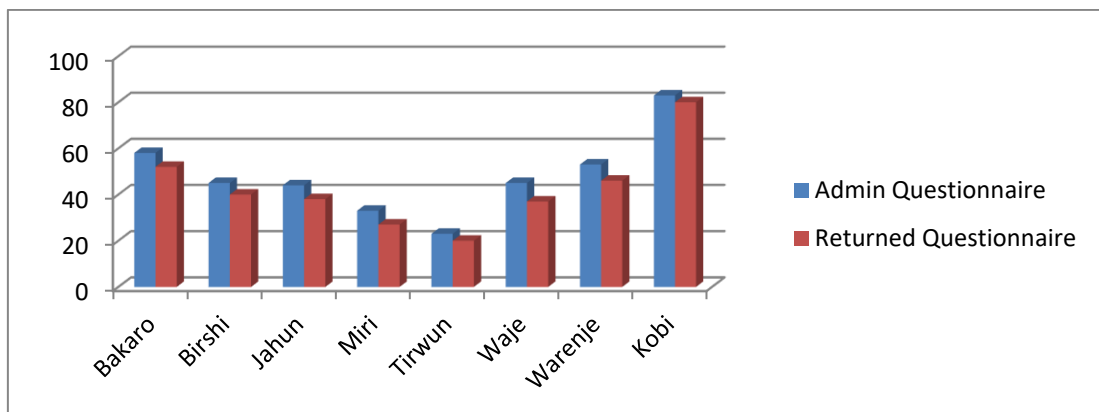
Fig 9. Administered and Returned Questionnaires
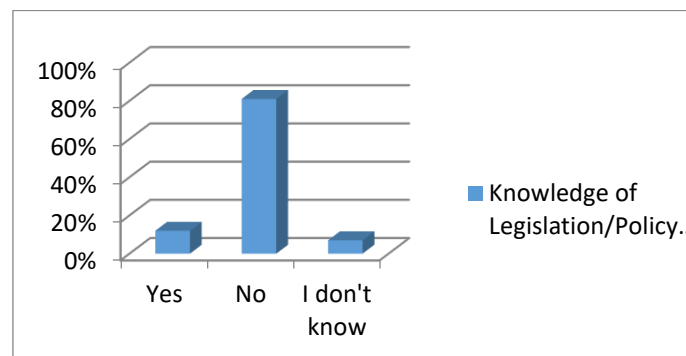
Figure 10: Respondents Perception on Knowledge of Policy to Green space

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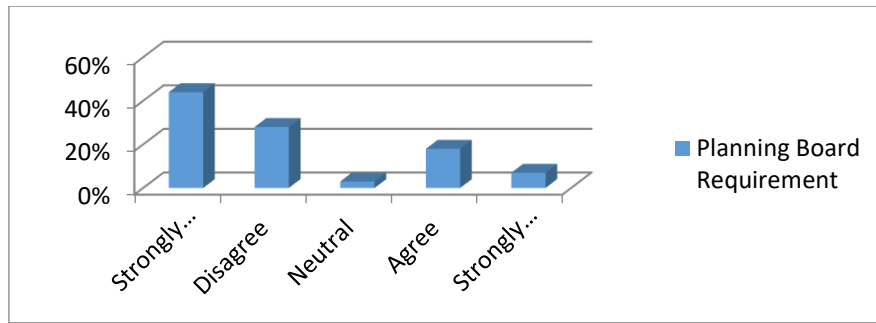Amsterdam, the Netherlands, 10–14 May 2020

Figure11: Respondents Perception on adherence to Planning Board Requirement for green space

On the period of noticeable decline of green spaces, 15% of the respondents stated that the green space elements decline between the last "5-10 years" while 27% of the respondents indicated that it was between a period of "10-15 years'' and 38% of respondent indicated 20-25 years and 17% of the respondents indicated 30-35 years and only about 3% of the respondents indicated 40 years and above as the period of green space elements decline in the city

36% of the respondents acknowledged that the urban growth and change of land use was responsible for the green space decline, while 52% of the respondents indicated that urbanization is responsible for the green space decline and 9% of the respondents indicated market/economy as responsible for the green space decline in the city, and only about 3% indicated others

On the Green space elements benefit to the city, 51% of the respondents strongly agreed that the Green space elements benefit the city. While 28% of the respondents agree, about 4% of the respondents indicated neutrality. 9% of the respondents disagreed green space elements benefit the city and about 8% of the respondents strongly disagreed.

On inadequate/lack green space, 16% indicated strongly disagree, 15% disagreed, 4% neutral, 27% agreed and 38% indicated strongly agreed that inadequate/lack of green space elements affects city livability. Out of the respondents, 38% of the respondents strongly disagree that the city has availability of Green Infrastructure elements. While 21% of the respondents disagree, about 11% of the respondents indicated neutrality. And 18% of the respondents agreed there are green infrastructure elements in the city and about 12% of the respondents strongly agreed on the availability of green infrastructure.
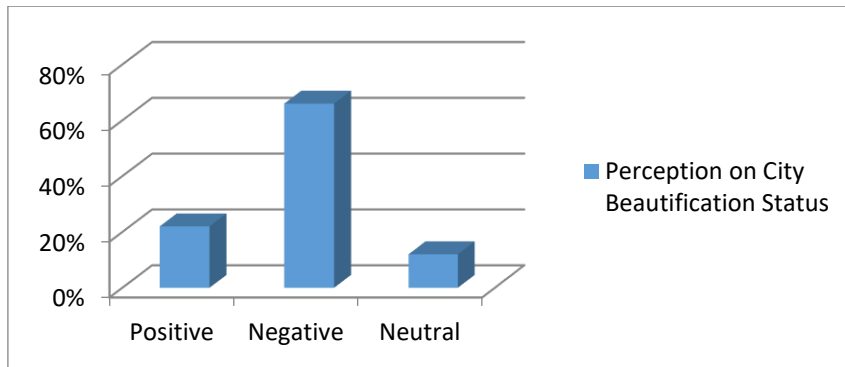
Figure 12: Respondents Perception of Bauchi City Image Status

Out of the respondents, 22% of the respondents acknowledge that the perception of the city image is positive, while about 66% of the respondents indicated that the city image is negative. And only 12% of the respondents optioned for neutrality. The data also confirmed that the respondents agreed that Green space decline affects the city image.

Respondents who reported on the availability of green space components believed that it is inadequate in the study area, while 38% of the respondents who strongly disagree that the city has availability of Green space elements, 21% of the respondents disagree, about 11% of the respondents indicated neutrality. And 18% of the respondents agreed there are green Space elements in the city and about 12% of the respondents strongly agreed in the availability of green infrastructure such as Parks, Street trees, Public/gardens within the city

On green space increase, 44% indicated strongly disagree, 31% disagreed, 2% neutral, 9% agreed and 14% indicated strongly agreed. On the decline, 12% indicated strongly disagree, 16% disagree, 7% of the respondents indicated neutral, 36% of the respondents indicated agreed and only about 29% indicated strongly agreed.

Similarly on the factors responsible for the decline, From the results, 36% of the respondents acknowledged that the urban growth/change of land use was responsible for the green infrastructure decline, while 52% of the respondents indicated that urbanization is responsible for the green infrastructure decline and 9% of the respondents indicated market/economy as responsible for the green infrastructure decline in the city, and only about 3% indicated others.

For the people's perception of green space elements influence city image, 6% indicated strongly disagree, 11% disagree, 3% of the respondents indicated neutral, 37% of the respondents indicated agreed and only about 43% strongly agreed that green space influences city image.
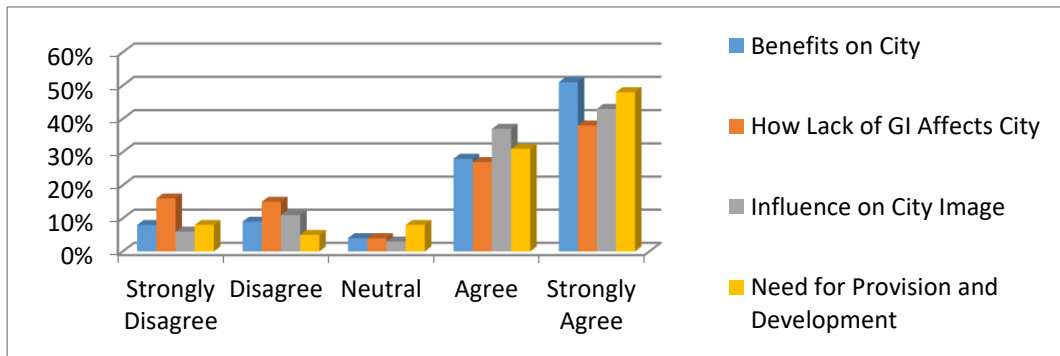
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Figure 13: Respondents Perceptions of Green Space Benefits and Effects

On the provision and development of green space, 8% indicated strongly disagree, 5% disagree, 8% of the respondents indicated neutral, 31% of the respondents indicated agreed and only about 48% strongly agreed that there's the need for green space provision/development in the city.

This data suggest that the majority of the respondents acknowledge that green space needs to be provided and developed.

In contrast, 71% of the respondents acknowledged that they do not require Green space as part of a new development. While about 11% of the respondents indicated yes. Additionally, 14% reported maybe while 4% indicated I don't know

Respondents were asked to rate the effects of Green Space on a five scale rating ranging from 'Strongly Disagree (Score of 1) to 'strongly Agree' (Score of 5). To facilitate interpretation of the responses, the ordinal rankings as to the effects have been interpreted as a nominal Likert scale of 1-5. City image was rated among the effects, with a mean score of 4.5 and a 65% rating as 'strongly agree' (Table 6).

Recreation, urban heat island, psychological well-being followed, both receiving a mean score of 4.4 and 4.3. This data shows that Green Infrastructure has effects on the city such as recreation and relaxations as well as psychological well-being etc. Respondents were also asked to rate the barriers to Green Space. Lack of awareness was rated by all respondents as strongly agree, with a mean rating of 4.9. This was followed by regulatory impediments with a mean of 4.7 and a lack of Green space plan with a mean of 4.5. However, the following four variables all receiving a mean score of 1 point, Lack of Political interest, Maintenance requirement, limited access to space and lack of Incentives.

This data confirms that some barriers have impeded the development of Green Space and more need to be done to overcome these barriers to a certain degree for Green space development.

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Table 6: Respondents perception of Green spaces effects on the Image of Bauchi city

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score
City image/visual amenity	0%	0%	11%	23%	65%	4.5
Recreation	0%	1%	14%	25%	60%	4.4
Urban heat island	1%	0%	10%	33%	56%	4.4
Psychological wellbeing	0%	3%	15%	23%	59%	4.3
Property values	0%	0%	10%	42%	48%	4.3
Play spaces	0%	1%	11%	44%	43%	4.2
Social interaction	1%	0%	14%	27%	58%	4.2
Flooding	0%	7%	15%	31%	47%	4.1
Air quality	0%	1%	22%	43%	33%	4.0
Noise reduction	3%	7%	26%	31%	33%	3.8
Health	1%	3%	26%	49%	21%	3.8

Table 7: Respondents perception on barriers to Green Infrastructure in Bauchi city

Variables	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score
Lack of awareness	0%	0%	2%	3%	95%	4.9
Regulatory Impediments	0%	0%	5%	15%	80%	4.7
Lack of Green space plan	0%	5%	5%	20%	70%	4.5
Lack of Political interest	52%	28%	20%	0%	0%	1.7
Maintenance requirement	62%	18%	17%	3%	0%	1.6
Limited access to space	56%	29%	15%	0%	0%	1.7
Lack incentives	17%	35%	43%	5%	0%	1.1

Source: Field Survey, 2019

4.0 DISCUSSIONS

The Bauchi city illustrated in the time series analysis maps from 1976-2016, (Figure) represents the share of the city's green space. The maps represent Green space data. The data shows that the significant share of green space (parks and gardens, green belt, open spaces) in Bauchi city has been depleted spatially.

The city's green land cover constitutes only about 2.4% in 2016, from 15% in 1976. This is particularly the case where the change to another land cover type is felt through the construction of newly built up that affects the city green image and livability as stated by Alexis Chaffler, (2013).

The green spaces components illustrated on the maps showed the decline in the spatial extent between "1976-2016". The observed decline of the green spaces in Bauchi is in line with the work of (Beatley, 2000). The currently available spaces are short of the standard requirement. The minimum standard of green spaces provision

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by WHO and FAO in an urban areas is 9m2 per person (Singh, et al., 2010). Therefore, there is a need to restored and increase the components of Green spaces in Bauchi city to meet the minimum requirements for green space per person and also to brand the city image.

Furthermore, the results obtained revealed that there are two main agencies in charge of urban green space in Bauchi State. These are Bauchi State Environmental Protection Agency (BASEPA) and Forestry departments in the State and Local Government respectively. There has not been a clear division of tasks between these two agencies, and this division is more or less defined by the Green space components. Their functions are not effective and lack an adequate enforcement, task team.

This study found that the relationship between urban green planning and urban planning has not been prioritized in Bauchi. Subsequently, an integral aspect within statutory urban planning is less discussed.

To solve the problems of green infrastructure in the study area; Restoration of the green areas, developing green space plan, maintaining the existing open spaces, increasing parks and gardens and making parks with legally protected trees and other vital features of green infrastructure is being suggested.

4.0 Summary of Findings

a) There has been a reduction in the quantum of Green Infrastructure Components such as parks and gardens, open spaces and Green belts from 15% to2.4%) between "1976-2016" in the city.

b) Urban growth, urbanization, and land use changes were responsible for Green space decline.

c) Inadequate green spaces in the city erode the city scenic image, it also increases the inadequacy of recreation area, urban heat island, flooding risk, low air quality, property values, etc.

d) Absence of Green space plan was also identified as part of the major problem in achieving the green infrastructure development in the city.

e) There is a gap between Statutory Planning and Urban Greening Practice in the city as well as the lack of political interest, regulatory impediment as some of the major barriers to Green spaces development.

f) Lack of distinct policy for Green space development was also identified in the city.

g) Awareness of the benefits of green space, its planning and development is limited in the city, but respondents suggested that government should do more publics enlighten on the benefits of green areas for the benefits of both the dwellers and the image of the city

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5.0 CONCLUSION

The urban greening has not been an important and integrative part of urban development in Bauchi city. The decreasing trend of green space in Bauchi is as a result of gross inadequacy in the provision of the green spaces, and the land demand pressures due to urban growth.

It is also concluded that a wide knowledge gap exists in terms of people's perceptions of green spaces and its usefulness among many dwellers of Bauchi.

The result of the study could be of benefit to public authorities such as BASEPA and particularly the geospatial analyst and urban planners to effectively plan and manage public green spaces that would meet the people's preferences.

5.1 Recommendations.

To achieve an aesthetic and livable city image and an improved status of Green space development in Bauchi city, there is a need for public awareness and policy formulation on, monitoring and implementation. It is also recommended that there should be an adequate and sustainable provision of green spaces in the city master plan.

There is a need to halt the green space decline in the city both in the short term and long term, to help improve the city image and aids the green space development. It is also our recommendations that considerations for opinions and understanding the people perceptions and preferences is a requirement for a sustainable planning and development and management green space urban area particularly in developing city like Bauchi.

Future works on the evaluation of urban green spaces characteristics and functionality are advocated as well as the application of a more rigorous analysis of both the qualitative and quantitative data in respect of the urban green spaces.

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