Evaluation of Tourist Location pattern in Abuja Municipality

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Abstract— The study examines the location pattern of tourist sites in AMAC.There is inadequate temporal spatial coverage integrated economic, social and physical status of most tourist sites in Nigeria. Inadequate digital spatial database of tourism sites and features, tourism industries operating below international standards, difficulties in of updating information in existing tourist guides and maps. The study delineates and map out existing and potential tourist sites in AMAC; examines the physical features; examines the suitability for tourism; and it generates a tourism database for the tourist sites for easy references. A user-driven frame-work which involves classifying tourism into classes' i.e. ecological, modern facilities and traditional, culture religious tourism data was used. Data for location of tourist site was collected through the use of GPS. Extraction and delineation of study area, creation of database model, and land use classification of the study area was carried out in Envi 4.7. Spatial analysis was done using Arc GIS 10.3. A buffer of 100m and spatial queries analysis of tourist site was also carried out. Results show that out of 28 tourist sites, 17% are traditional, cultural and religious, 71% are ecological and 12% are modern tourist site. Therefore ecological tourist sites appear to be the predominant tourist site in AMAC. Aso and Gwagwa forest are farther from the road with distance of 2672m and 1782m. The tourist sites are dispersedly distributed which allow free accessibility in any area of location. The Nigeria ministry of tourism needs to establish Geospatial units that will help solve most of the spatial problems that cause menace to the tourism sector.

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1 INTRODUCTION

THere is an increasing need to diversify the Nigeria Economy from Oil base to other viable sectore due to high population growth rate and growing unemployment.One of the segments that have great potentials to replace oil is tourism and recreation.The activity of people visiting places outside their unusual environments for a period of time for leisure,business,and other purposes is refered to as Tourism(Adeleke 2009).If Tourism is embraced with genuine practices and discipline,it could reduce the countries poverty and reliability to the Oil sector.with Tourism development in Nigeria,the country could be able to create job opprotunities,unite together in peace and heilp develop the rural communities.

There is lack of modern infrastructural facilities in some part of the country,acute conditions of underdevelop,poverty and inadequate access of tourism information such as tourist guide maps can be seen which many potential Nigeria and foreign bound tourist may not like to be confronted with(Abangma2011).

Some of the Tourist hubs in Nigeria are sited in Abuja Municipal Area council(AMAC)due to huge tourist potentials that exist in the atrea.this includes excellent road Network,a beautiful rolling terrain,good and Modern Nigeria Architecture good climate especially optimal temperatures,abundant tourist activities and many others.Therefore there is need to dethevelope tourism in AMAC.The study will discus important of GIS as a tool for analyzing and displaying of information for the promotion of tourism as Organization in Nigeria.

2. Review Stage

Tourism is characteris by 3 elements.These 3 elements give rise to travellers: 1.tenancity of travel 2.Origin of traveller 3.length of stay at distination (weaver 1998).leisure industry is a combination of activities, facilities, services and industries, which gives a travel experience that includes transportation,accomodationa,eatinganddrinking,entertainment,recreations,shoping and amenities available to trvellers away from house hold.In vocational industry,travelling to areas of natural or ecological interst for the purpose of observing wildlife,the environment,water body,natural vegetation,rocks ,hills and mountains gives knowledge of conservation of the environment.Tourism development in the world has made tourist development so significant in economic terms .

There has been a rapid growth in the industry since 2005 where tourism was registered as industry.The developing countries are working hard to embrace tourism for socioeconomic development (WTO 2006).

According to Ayeni et al(2001)Tourism could be divided into 3 major class.a.Traditional and cultural Tourism:this tourism are based on cultures and tradition,they include museum,traditional ,spiritual and general festivals,structures od art and crafts.b.Ecological/Natural tourism:this includes geomorphological feautures,geological and geophysical feautures.c.Modern feautures and amenities:here it includes oil rigs,hydro-electric power,man–made dams,sporting facilities and other engineering structures.

The study dwells on location analysis of tourist sites and geospatial tools can be used to locate the tourist site, determine the topography that can influence the location of an existing tourist sites.The significance and need to develop tourism cannot be overlooked because if well developed, tourism can lead to to improvement in standards of living of the local people, poverty alleviation, employment, recreational and research purposes. Forest, lakes, rivers, culture and history are all important in promoting tourism. This study will locate potential tourist sites and the topography of ecological tourist sites

2.1 Objectives

The specific objectives of the study are to: 1.Delineate and

map out existing and potential tourist sites in AMAC.

2. Examine the physical features of the tourist site.

3. Examine the suitability for tourism 4. Generate a tourism database for the tourist sites for easy references.

2.2 Significance of the study

Geography information system answers questions about where facilities and resources are located which is of great use. It affords information which could be of great gain to Abuja municipal area and Nigeria. Other benefits include income generation, exhibiting, quick mapping, analysis and extrapolation.

3.Study Area

Abuja is located at the centre of the country on the guinea savannah of the middle-belt between 60° 45'W and 7° 30'E of the Greenwich meridian. The geographical location is 9° $10'$ $33''$ north, 7° $10'$ $51''$ east. The FCT is divided into six area councils which include Abuja municipal, Gwagwalada, Abaji, Kuje, Bwari and Kwali. It occupies an area of 8000 sq km.

3.1Weather and climate: Abuja has two seasons: the wet season commences from April and through November and the waterless period commence by November and ends in March. By November, Abuja experience brief harmattan season caused as a result of north east trade wind and dust haze, which gives rise to little dryness and cold.
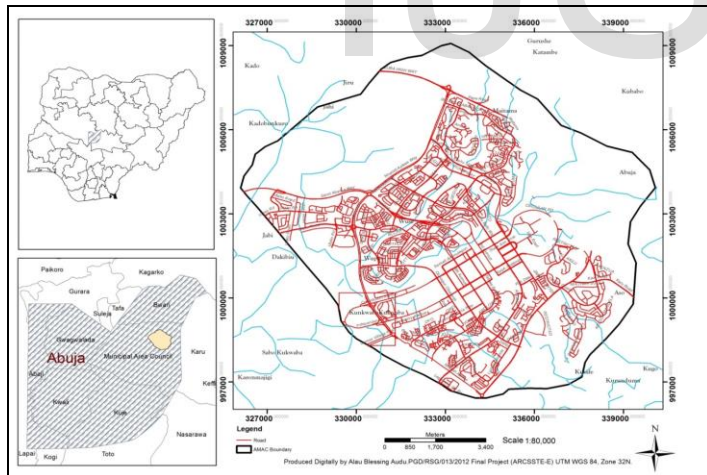
Study area, Abuja FCT.

3.3 Methodology: Primary and secondary data (both spatial and non-spatial data) were both used to accomplish the objectives of the study, these includes;

1. The administrative map of the study area extracted from Abuja administrative map, at scale of 1:50,000, sourced from the Federal Surveys office Abuja. Year: 1967.

2. G.P.S data of Tourist sites from the study area.

3. Topographic maps of Abuja N.E area, sheet number 186 at scale of 1:50,000.sourced from federal surveys office Abuja.

3.2.1 Data descriptions

| S/N	Name	Date	Format	Source	Scale/resolution	Preparations
1	Topographic maps of Abuja	1975	Digital	federal surveys	1:50,000	• Import • Geo-reference • Digitize • Shape File
2	Coordinates of the Tourist Sites	varies	Digital	Study Area	28 points	• Input to excel • Export to access • Convert to Dbase
3	Administrative map of Abuja	1967	Digital	Federal survey	1:50,000	• Import • Geo-reference • Digitize • Shape File
4	Land Sat ETM+	2006	Digital	GLFC	28m	

Source: Author's Field Work

3.2.2 Technics for Data Analysis and Model specification

3.2 TableTourism data classification scheme

Sub layer/Class	Layer/Description
Traditional and Cultural Tourism	These include places like Exhibition hall, art passageways, ethnic, spiritual and national anniversaries and ancient testimonials.
Ecological /Natural Tourism	This kind of tourism includes Geomorphologic features, Geological and geophysical features. The features that is geomorphological.

Modern Tourism and Amenities	These are man-made products like Hydroelectric power, barrages, oil gears, decent amenities and additional prominent manufacturing configurations.

(Adapted from, Ayeni 2001.)
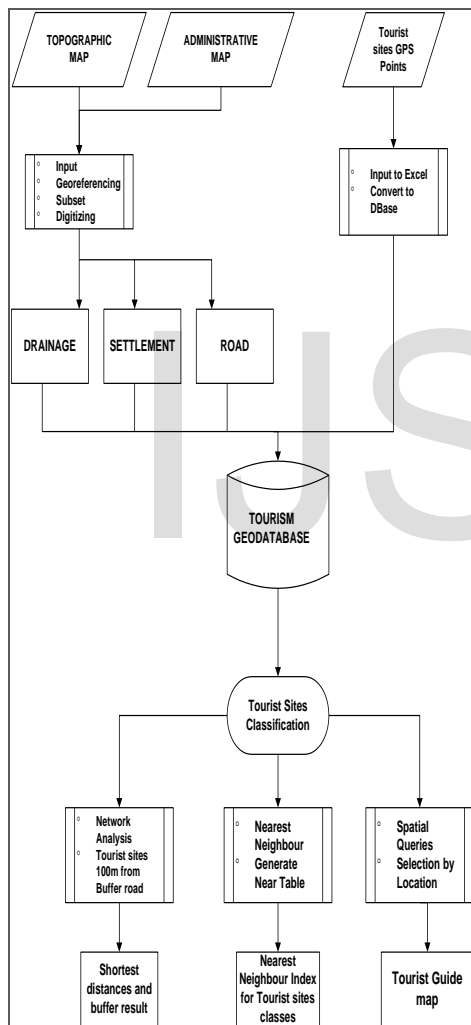
Workflow: Source Author's field work.

3.2.3 Extracting and delineating the study area

To delineate the study area, the topographic map covering the study area was georeference and mosaic in ENVI environment and subsequently carving out the area of interest AOI, it lies between longitude 9° 10′ 33″ and 7° 10′ 51″ earlier delineated from

the satellite image covering the study area, was used to subset the topographic map and exported as Geo-Tiff format to ArcGIS environment where the sub map was digitized. Before the sub map was digitized a personal geo-database (Tourism geo-database), feature dataset and feature class was created in Arc Catalog.

3.2.4 SPATIAL ANALYSES

Buffer Analysis: this is an analysis that Forms shield polygons into a quantified space within the Exertion Landscapes.to remove buffers that overlap; an option of dissolve can be performed.

Nearest Neighborhood Analysis: this analysis Determine distance from each feature to the nearest input features in the Near Features, within the Search Radius.

Regular nearest Neighbor Distance (Spatial Statistics): this instrument processes the remoteness amongst each feature centroid and its adjacent national's centroid site. It gives an average of all the bordering neighbor expanses. Clustered distribution of a feature is when the average distance is less than the average for a hypothetical random distribution. While dispersed distribution of a feature is when the average distance is greater than a hypothetical random distribution. The index is expressed as the ratio of the observed distance divided by the expected distance.

Overlay Analysis: An intersection is extra than an artless integration of link function, because all the qualities of the topographies enchanting fragment in the intersection are approved. Intersection is unique stage in study or classical and it occurs at numerous opinions in the procedure, for this study the overlay method used is intersection.

Join tables: this is about Connecting the element meanings and standards of two tables found on a common element. An account in the Joint Info Table is co-ordinated to every account in the Influence Info Table meanwhile the Recount Element and Flinch Element standards are equivalent. The element standards since the two accounts are imitative to the production table.

Query table: Make Query Table tool gives an SQL query to a database and the outcome are represented in a layer or table view. The query can be used do many things such as

a. Join several tables together
b. Return a subset of columns
c. Return rows from the original data in the database.

Therefore the layer formed by the instrument is provisional and end after the assembly ends except the file is protected.

4. Results and Data Analysis

A total of 28 tourist sites were collected and mapped out. The various tourist sites were also explored and given closer observation. The tourist sites are majorly located along the road due to accessibility. Information on tourist sites and facilities are gotten from

different source and relate to their spatial features.

Id	NORTHINGS	EASTINGS	DESCRIPTION	ELEVATION
1	999814.37	329733.72	Wonderland Musuem Park	487
2	999350.01	333500.32	Art and culture area 10	509
3	999957.69	333646.38	Old parade ground area 10	486
4	10000906.63	334468.74	Ecumenical centre	499
5	1001947.78	333801.23	National Mosque	476
6	1003083.28	334825.87	Millenium Park Maitama	486
7	1004932.66	333358.69	Begger Dam	491
8	1007549.22	332111.68	Katempe Hills	621
9	1004742.77	328869.18	Tobix Recreation park Jahi	487
10	1004925.77	327043.93	Water parks Kado	449
11	1004754.19	336393.12	Polo club Maitama	497
12	1004696.25	336289.06	IBB Golf Course	499
13	1004186.21	339023.21	Aso rock	885
14	1002286.8	335021.07	Secretariate park Aso,3 arms zone	501
15	1004174.8	333865.47	Maitama garden park,IBB way	486
16	1003676.76	332480.11	Wuse park,city parlous	473
17	1003437.93	327248.19	Jabi lake	456
18	998624.581	332126.07	Zoological garden garki,Area 1	443
19	998935.09	332072.4	Queen's field garden,Garki	454
20	999036.43	332081.99	D E's garden Garki Area 1	478
21	998051	332372	Heritage garden Area 3	483
22	999060	329901	National stadium	453
23	1002847.14	331127.21	Wuse Rock Park	478
24	1004253.37	326594.27	Julius Bergger water front park	446
25	1008102.58	313431.77	Gwagwa forest reserve	394
26	999088.15	332718.04	Children development park	479
27	998709.81	332093.41	J.Useni parks	480
28	1004645.51	335182.27	Maitama Neigborhood park	487

Tourist sites.source: field work

Collected sample sites

Traditional/cultural tourist sites constitute 17% of tourism re-sources in Amac as shown below.list of Traditional /Religious tourist site in AMAC.

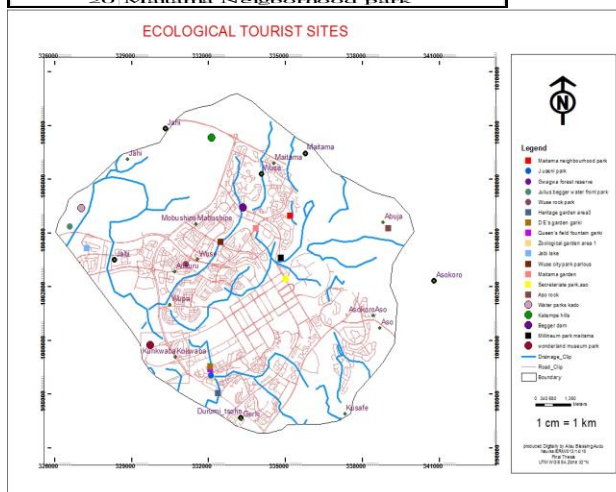| S/N	Traditional Tourist site
1	Abuja Art and Culture
2	Ecumenical Centre
3	Old parade ground area 10
4	Polo club Maitama
5	National Mosque
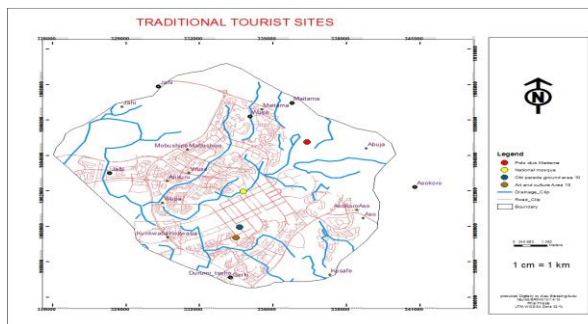
Traditional/Religious tourist site in the study area.

Location of Ecological Tourist sites
Ecological tourist sites influence Natural and life supporting system.it constitutes 71% of tourism resources in the AMAC, With 20 ecological sites.
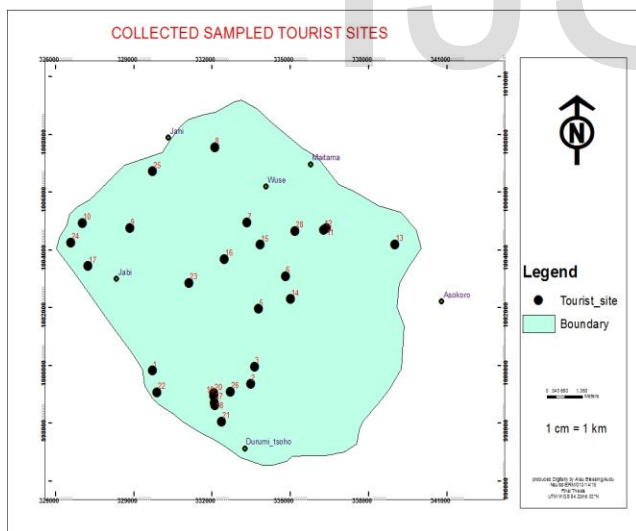List of Ecological tourist sites

S/N	Ecological Tourist site
1	Wonderland Musuem Park
2	Art and Culture Area 10
3	Millenium Park Maitama
4	Begger Dam
5	Katempe Hills
6	Water parks Kado
7	Polo club Maitama
8	Aso Rock
9	Secretariate Park Aso,3 arms zone
10	Maitama garden park,IBB way
11	Wuse park,city parlous
12	Jabi lake
13	Zoological garden garki,Area 1
14	Queen's field garden,Garki
15	D E's garden Garki Area 1
16	Heritage garden Area 3
17	Wuse Rock Park
18	Julius Bergger water front park
19	Gwagwa Forest Reserve
20	Maitama Neigborhood park

Ecological tourist sites:source Authors field work.

Location of Modern Tourist sites
Modern Tourist sites encompass the architect who designed those buildings and inrfrastructure.

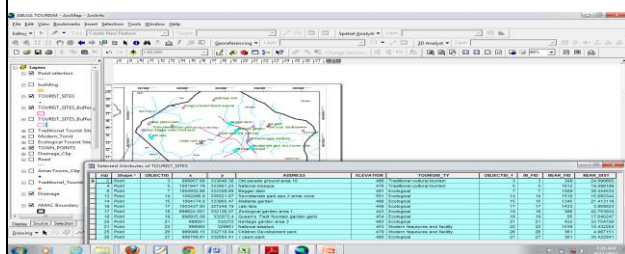| S/N	Modern Tourist site
1	National stadium
2	IBB Golf Course
3	Children Development Park
4	Tobix Recreation park Jahi
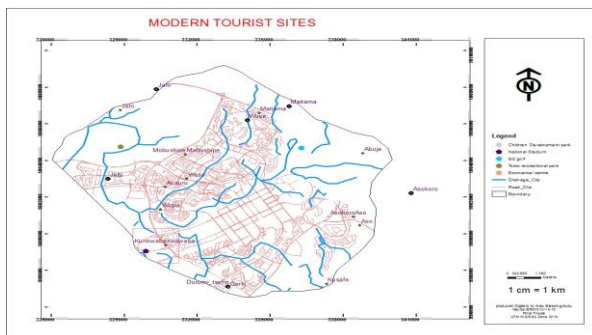
Modern tourist sites: Source, Author's Field work.

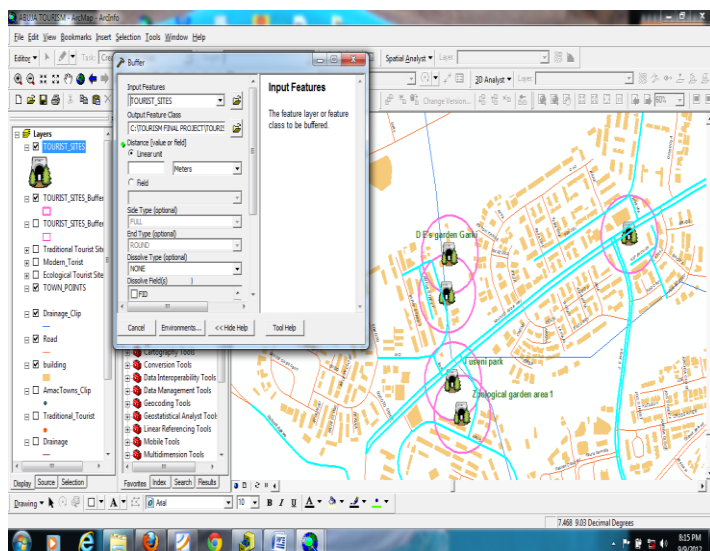This is all the tourist sites in the study Area.
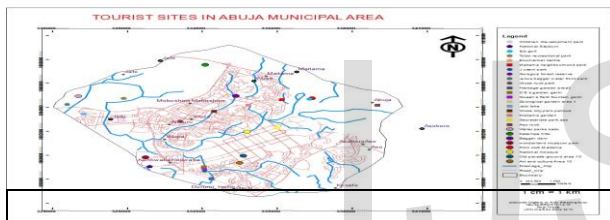
Tourist sites attraction in AMAC.

Results pf 100m Buffer
A buffer of 100m from the road.

Source: Author's field work

The selection by location (spatial query) was used to identify tourist sites that have more roads connected to them i.e. roads that intersect within the buffer zone of 100 meters.


Results of 100m buffer.
Source: Author's Field work.

Results of Nearst Neighbor Analysis.
This analysis is to determine the average distance of the tourist sites to the nearest roads i.e. main road, express roads etc. within a minimum search radius of 5m

Tourist sites and their Near distance table

Tourist Sites SID	Tourist Sites	Distance from Road(m)
1	Wonderland Musuem Park	117.95
2	Art and culture Area 10	77.57
3	Old Parade Ground Area10	24.09
4	Ecumenical Centre	10.45
5	National Mosque	19.09
6	Millenium Park Maitama	90.76
7	Begger Dam	38.44
8	Katempe Hills	382.82
9	Tobix Recreation park Jahi	881.05
10	Water parks Kado	912.71
11	Polo club Maitama	882.63
12	IBB Golf Course	802.69
13	Aso rock	2672.51
14	Secretariate Park Aso,3 Arms zone	15.69
15	Maitama garden park,IBB way	21.41
16	Wuse park,city parlous	89.12
17	Jabi lake	3.85
18	Zoological garden garki,Area 1	42.75
19	Queen's field garden,Garki	17.64
20	D E's garden Garki Area 1	64.22
21	Heritage garden Area 3	33.75
22	National stadium	10.43
23	Wuse Rock Park	58.84
24	Julius Bergger water front park	233.37
25	Gwagwa Forest Reserve	1782.53
26	Children Development Park	4.98
27	J.Useni parks	30.42
28	Maitama Neigborhood park	96.89
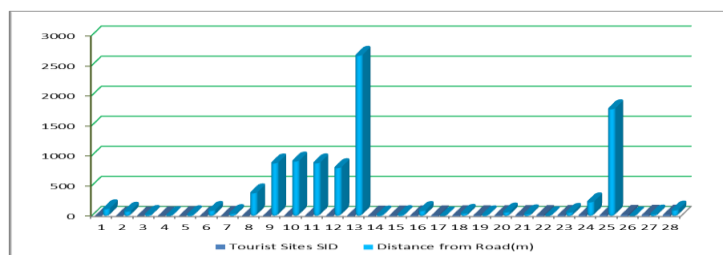
A graph of Near distance
Source: Author's Field work.
The result of the near distance analysis shows Aso Rock and Gwagwa forest are farther from road with distance of 2672m and 1782m respectively as shown above.

4 EQUATIONS

Tourist site distribution patterns

Applying the (distance) analysis that is bordering national analysis guide, which is stated as proportion of experiential mean detachment distributed by projected mean distance (OMD/PMD)? The regular detachment amongst nationals in a theoretical indiscriminate dispersal is the projected space. If directory is less than 1, arrangement displays collecting; if directory/guide is greater than 1, configuration shows scattering. The Calculation is based on Euclidean theory. From the result OMD/EMD (index) =388.4 as shown in figure above. Since this value is greater than one (>1), there is less than 1% likelihood that this dispersed pattern could be the result of random chance. Greater than 0.89 (>0.89) and thus the distribution pattern of the Tourist sites is said to be dispersed i.e. scattered and distributed. This was statistically significant at 99% Confidence level, meaning the pattern is dispersed.
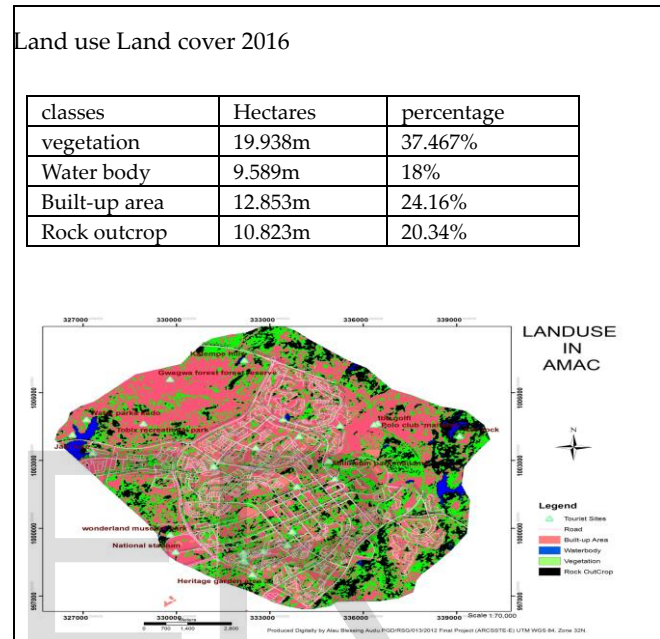
Graphic result of Tourist sites ANN Index in AMAC

Average nearest Neighbor Summary
Observed Mean Distance: 322099.977260
Projected Mean Distance: 829.297982
Nearest Neighbor Ratio: 388.400773
Z score: 3921.663999
P-value: 0.000000
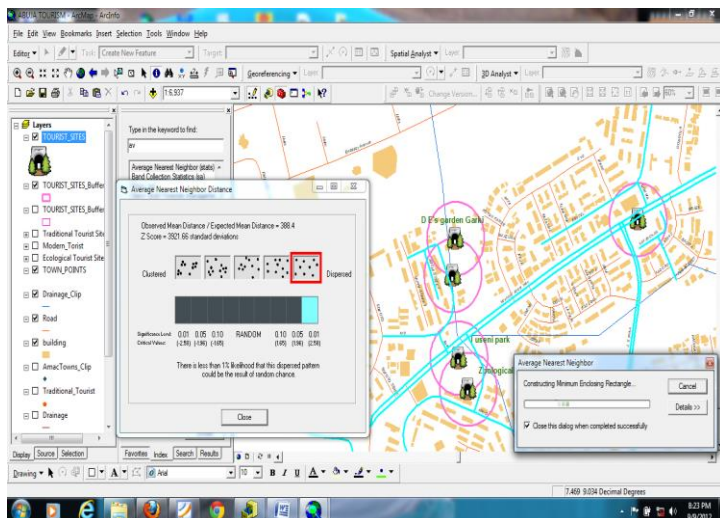
Land use pattern of AMAC
The minimum distance classification method was applied to determine the dominant land use in the area and how it affects the development of tourism in AMAC and environs. The result as in table 4.9 shows that vegetation, Greenland, and orchard are 37.47%, water body is 18%, built-up area 24.16%and rock outcrop is 20.34%.Therefore the dominant land cover in the area, is vegetation. Vegetation, water body and rock out crop forms the ecological tourism in the area.

Land use Land cover 2016

classes	Hectares	percentage
vegetation	19.938m	37.467%
Water body	9.589m	18%
Built-up area	12.853m	24.16%
Rock outcrop	10.823m	20.34%

Land use land cover classification.

5.In conclusion The study was aimed at evaluating and facilitating the development of tourist location pattern in Abuja Municipal Council using geospatial techniques, mapping tourist sites in the AMAC with the application of geospatial technology to identify the tourist sites. The use of geospatial technology enabled the topological relationships with regards to direction to be displayed on the map

Results from this study indicated that some tourist sites are not easily accessible; they are far from the road site, while some are easily accessible. Some of the tourist sites are located in a nodal road meanwhile some are not located in a nodal road therefore; the level of patronage is very low for those tourist site sites that are not easily accessible and located not in a nodal road. The 100m buffer indicates the distance from the tourist to the road. The spatial query s used to identify tourist sites that have more roads connected to them. The nearest neighbor Analysis was to determine the average of the tourist sites to the nearest roads within a minimum search radius of 5.

The bar chart indicates that only 2 tourist sites are (Aso and Gwagwa) are farther from the road. The nearest neighbor index(distance) expressed as the ratio of the observed mean distance and divided by

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projected mean distance(OMD/PMD).base on the Euclidean theory, the value was greater than one(>1)likely it is dispersed pattern(Scattered and distributed) with statistic confidence level of 99%.the land use pattern of AMAC indicates that vegetation, Greenland and orchard are 37.41%,water body18%,build up area 24.16% and rock outcrop is 20.39%.therefore vegetation,waterbody and rock outcrop forms the ecological tourism.Ayeni et.al (2001)

There are suitable natural tourist sites in AMAC that need to be developed as tourist centers to meet the international standard. If these natural tourist sites are developed and well maintained, it will aid in the reduction of the effects of climate change in AMAC therefore the ecological or natural tourist sites should be encouraged.

5.2 Recommendation

Based on the Study carried out, the following recommendations are made: Tourist sites should be located in nodal and accessible areas. More traditional tourist sites should be established. There is opportunity for more ecological tourism; this will increase the income of the industry. There should be an opportunity to generate revenue by implementing gate fee in all the sites.

It was therefore recommended that this study be used as a spatial decision support system for decisions regarding locations of tourism facilities within Abuja municipal area amongst other.

The Nigeria ministry of tourism needs to establish Geospatial units that will help solve most of the spatial problems that cause menace to the tourism sector.

Location identified as optimum for tourist site should still be visited for confirmation. The topography of the study area which could not be gotten in this study due to the availability of time should also be taken into consideration.

With the involvement of GIS, tourism industry will grow significantly all over the world and the earlier the industry embraces it, the better for its development.

5.3 Limitation of the Study.

The study is limited to tourist attraction sites in within Abuja Municipal Area Council.it does not cover luxury and hotels; it dwells on natural site attractions. The tourist sites are mostly very far from each other. Tourist industry should be able to give details on the sites and they should be friendly and accommodating.

5.4 Acknowledgments

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