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Development of a Land Information System for Asekunowo and Fabiyi Layout in Akure, South L.G.A, Nigeria

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Abstract-- Land is the most great value property of mankind. It is also an essential intelligence asset of any state or country. The aim of this study is to develop a Land Information System for Asekunowo and Fabiyi Family Layout in Akure South LGA, Nigeria. To achieve this, the cadastre layout of the study area was scanned and georeferenced in ArcGIS 10.1 and then digitized. The primary data was the interview conducted with the staff at the Ministry of Land and Housings, while the secondary data was the Cadastre map collected from the Urban and Regional Department, Ministry of Land and Housings, Akure, Ondo State. Coordinate of the study area was collected from Record Office at Survey Department, Ministry of Land and Housings, Akure. GEO CAL software was used to convert coordinate from Nigeria National Origin System (NNO) to UTM coordinate. Backward computation was performed. The result shows that out of 245 parcels of land in the study area, from which 164 parcels of land is use for Residential representing 66.94%, Open space is 30 parcels of land representing 12.24%, Commercial is 29 parcels of land representing 11.84% and Administrative is 22 parcels of land representing 8.98%. Therefore, Residential show the highest percentage of the land use, follow by Open Space, Commercial and Administration has the lowers percentage.

Keywords-- *GIS, Land Information System, Cadastral, Administration*

I. INTRODUCTION

Land is the most great value property of mankind. It is also an essential intelligence asset of any state or country. The welfare of the nation and its economic development are reliable on the state of the land and its practice. It is therefore, obvious that any information on land is crucial and serves as a foundation to financial investments, commerce, industry and agriculture.

Although land is part of man's natural inheritance, access to it, is authorize by ownership. Land information system is prime essential for making choice relating to land investment, growth and administration. Information impairs uncertainty by helping to establish and resolve problems. It is also cognize that digital Land Information Systems must be useful to make it easy for a resources land market as well as operative land-use administration and thereby, more generally, raise the economic development, social growing and renewable development. Cadastre as a complete and up-to-date official register or inventory of land parcels, containing ownership, location, and area of land use information (Zeimann 1972). The International Federation of Surveyors makes us to comprehend that Cadastre as a "parcel based and up-to-date Land Information System containing a record of curiosity in land. It usually includes a shape of description of a land parcels connected to other records describing the nature of the interests, ownership or control of those interests, and often the value of the parcel and its growing. The quality of such a system will rely on finding it symbolic value, accuracy, complete, and receptiveness. Land Information System can also be seen as a "tool for legal, administrative and economic decision making and an aid for planning and development which consists of a database containing spatially referenced land related data for a defined area and of procedures and techniques for the systematic collection, updating, processing and distribution of that data". (Dale, 2000; Chandrasekhar, 2000). Land Information System will reduce willful of land documents and promote land security within Asekunowo and Fabiyi Family Layout in Akure South Local Government Area.

Mapping components of cadastres can be improved significantly through the use of geo information tools i.e. (Geographical Information System and Remote Sensing) (Adeel, 2010). Geographical Information System and Remote Sensing have been used for cadastral mapping in different parts of the world.

This research covers a distance of Land Information system and harmonizes different administrative technique and powerful means of generating land revenue. Land records are very essential because they form the elementary proposed of land reform programme of the both Federal Government and State government of Nigeria.

II. AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to develop a Land Information System for Asekunowo and Fabiyi Family Layout in Akure South Local Government Area.

Specific objectives are to:

1. Design and build a GIS-based cadastral database of all parcels in the study area
2. Convert Cadastre Map of Asekunowo and Fabiyi family from analogue to digital form.
3. Testing the efficiency of the cadastral database.

A. Study Area

The study area is Asekunowo and Fabiyi Family Layout in Akure – South L.G.A. It is located between Latitude 7^0 0′0″ to 7^0 25º0″ N and Longitude 5^0 5′0″ to 5^0 20′0″ E. It covers an area of 21. 472 hectares. Asekunowo and Fabiyi Family is within Irese in Akure South Akure, on a flat plain within the Western Nigerian plain and is about 250 m above sea level.

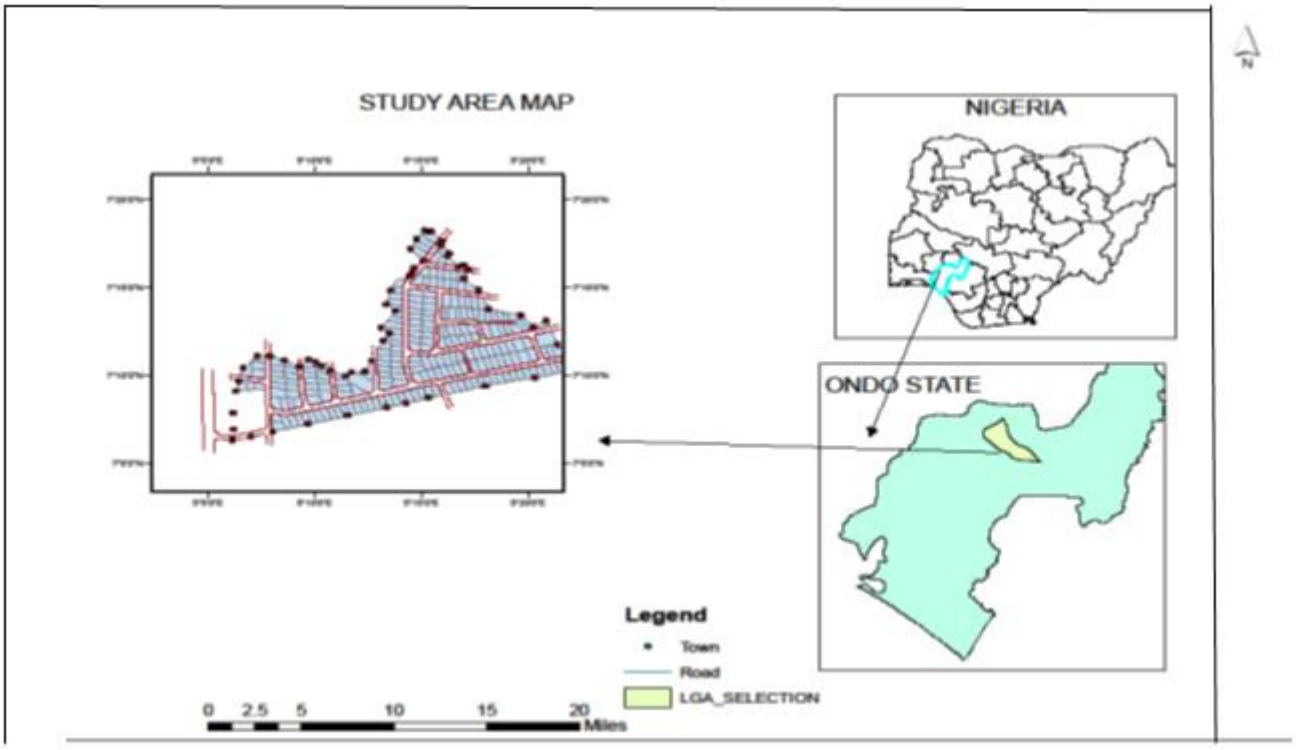

Figure 1: Map of the study area

B. Methodology and Materials

Primary data was collected through interview conducted with the workers at the Ministry of Work, Land and Housings, Akure while the secondary data was the hard copy of cadastral map collected from Department of Urban and Regional Planning, Ministry of Land and Housings, Akure, Ondo State. Satellite image from Google earth The X and Y coordinates of the layout was collected from the record office at Survey Department, GEO CAL software was used to convert the coordinates from Nigeria National Origin system (NNO) to UTM coordinates system,. Backward computation was carried out. The layout plan was then successfully scanned using Ao scanner machine which was later exported into Arc GIS environment, digitizing was done in ArcGIS environment.

Table: 1: Data Sources.

Data require	Sources
Layout Plan/ Map (Spatial data)	Ministry of Work, Land and Housings, Akure
Satellite data (Spatial data)	Google Earth
GPS	Field work

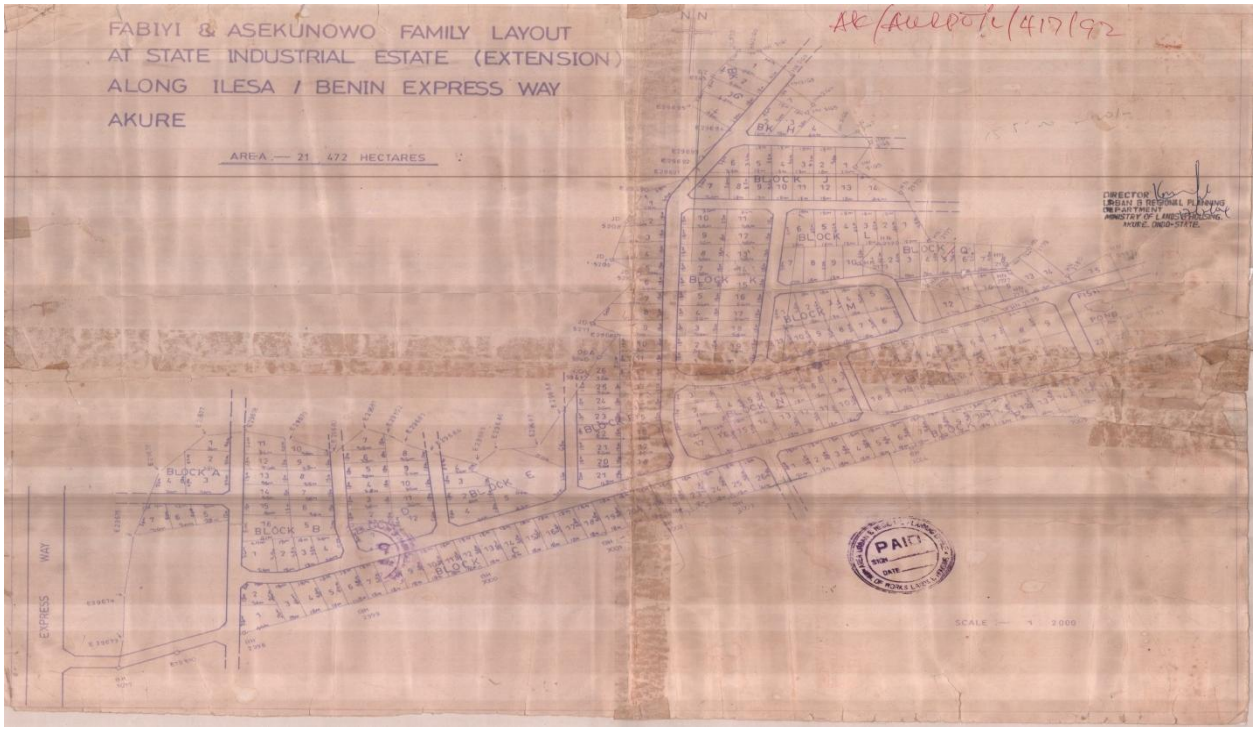

Figure: 2: Scanned of Layout Map
Source (Ministry of work, Land and Housings, Akure)

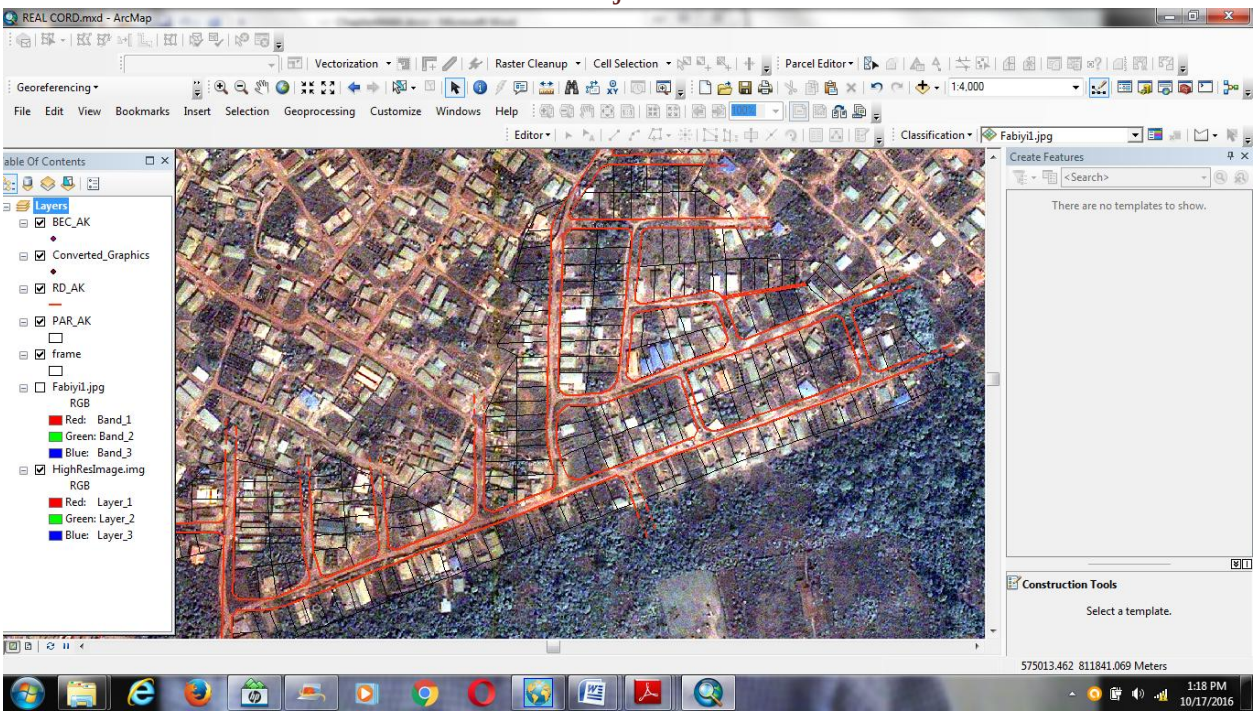

Figure 3: Digital Satellite Image of Asekunowo and Fabiyi Family Layout Plan
Source :(Google Earth)

The digital satellite image of 2014 in figure 3 enable us to know the parcels of land that are developed and the one that yet to develop. It also help us to know whether people of this particular area follow laid down rules and regulation governing the use of land. The images also help us to detect some errors made by surveyors such as roads which were quite difference from the one on satellite image. This proved that some roads drawn by the surveyors do not align with the road on the image when over lay operation was performed. This revered that the road is a bit shifted from what it is on image.

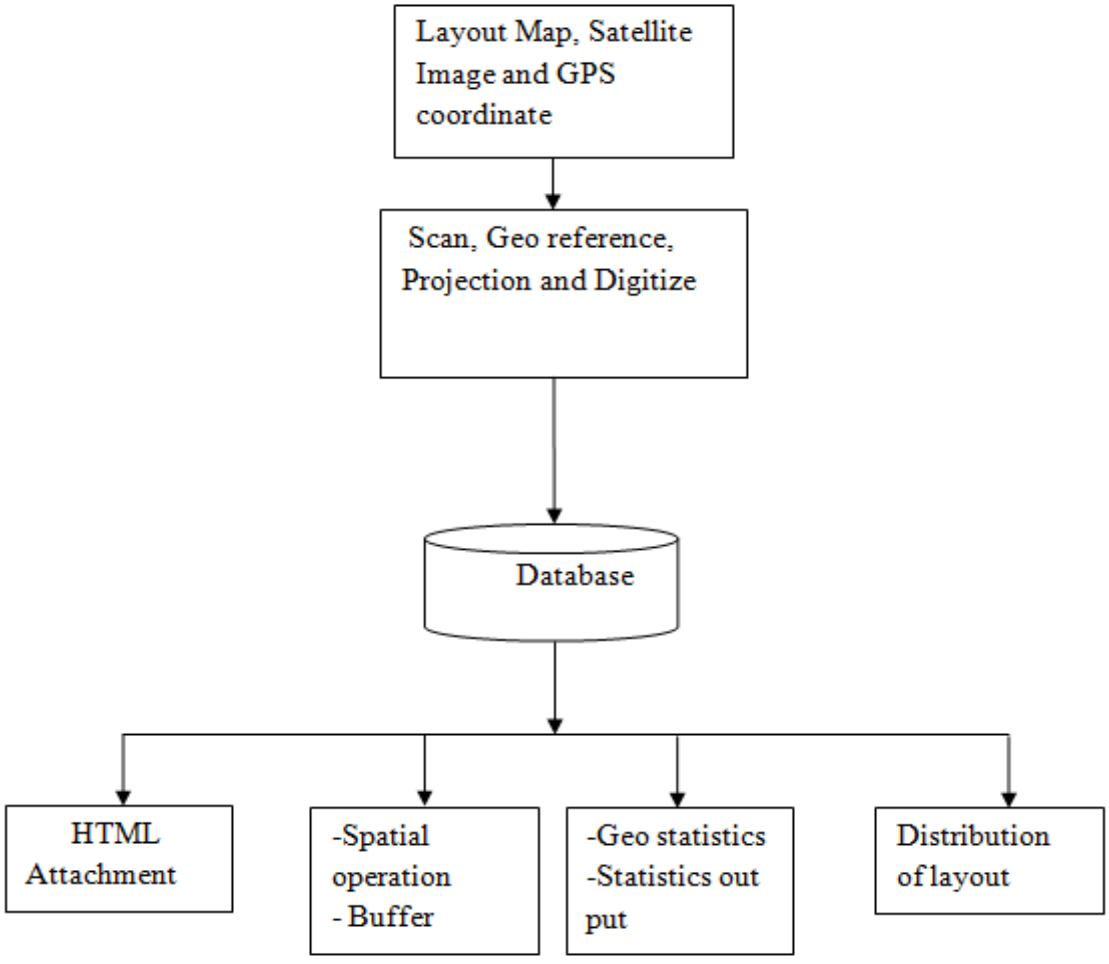

Figure 4: Flow Chart

III. RESULTS AND DISCUSSION

Objective (I) was achieved by create a database for this study area

Database query involves the retrieval of information stored in the database through the use of certain parameters based on the researcher's aim in order to develop a Land Information System. The major spatial/attribute query results in the study are shown below in figures 5 and 6

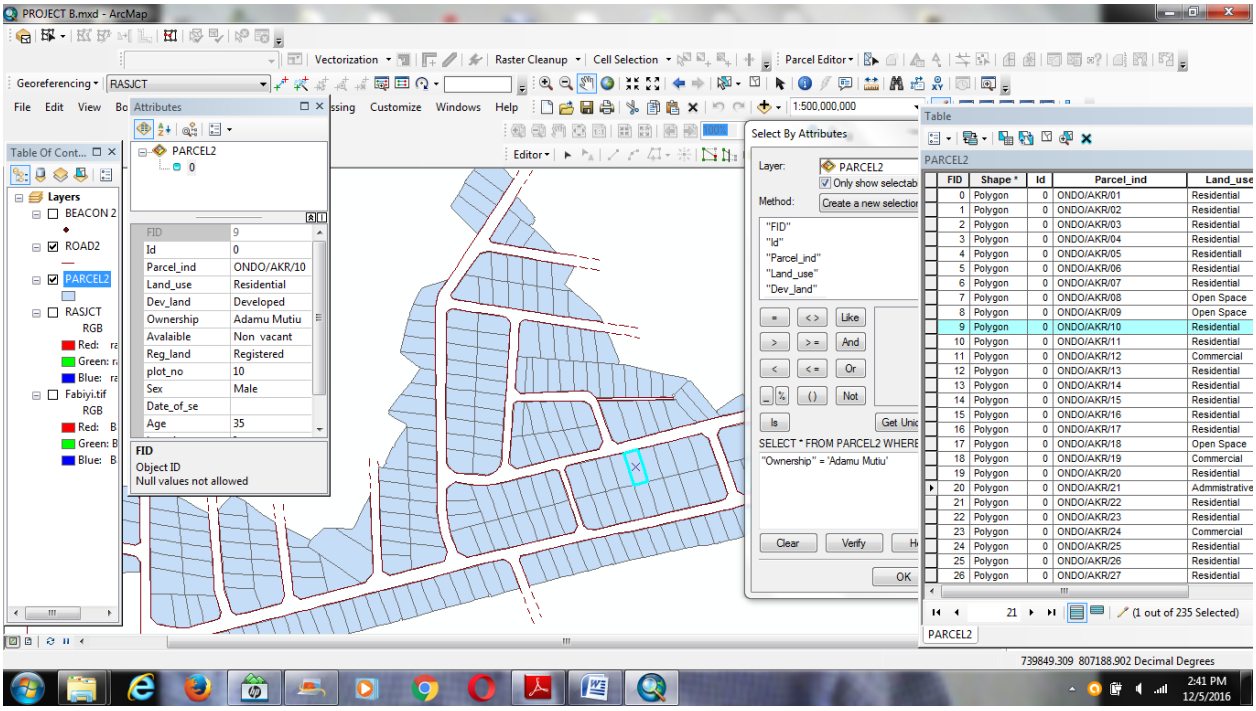

Figure 5: showing the details information about the parcel in the database

Using the method described above its possible to query any information in database figure 5 shows parcels that have been allocated to somebody. It consists of the syntax model or the query builder box, HTML pop attachment which show details information about true owner of the parcel, attribute table as well as the map of the selected plot in light blue colour. The information made us to comprehend that this particular parcel of land are now occupy by the person whose name are displayed in database.

Figure 6 below, shows the syntax modeled, the attribute table as well as the map of the selected undeveloped parcel highlighted in light blue colour. It comprehend that a total of 30 plots are yet to have developed and 215 are said to have been developed. This will enable the government to determine the open space in this area. This essential information would be assisted local authorities in making decision whether to improve any infrastructure facility that will be useful for people living in this area.

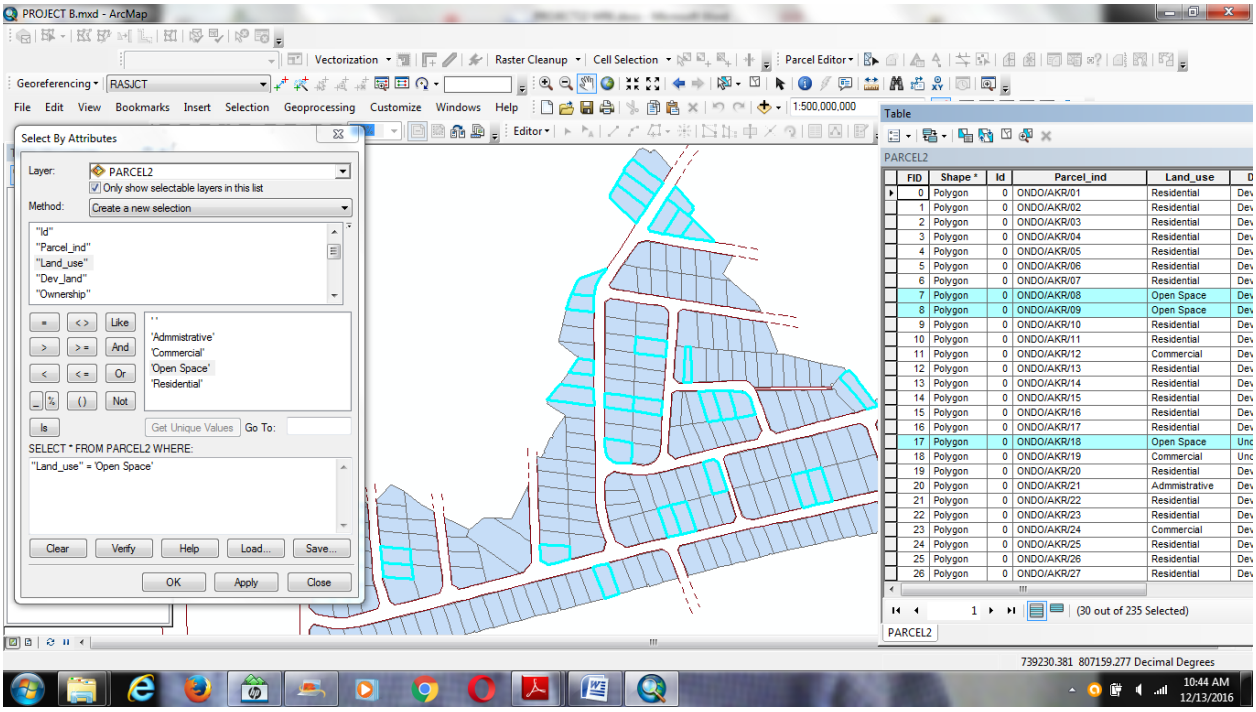

Figure 6: Showing Selected Open Space at Asekunowo and Fabiyi Family Layout

Objective (II) was also achieved by converting the cadastral map of the study area from analogue to digital form and the result was presented in Figure 7

Figure 7: Map Showing the Distribution of Layout Plots

Table: 2: Distribution of Plots

Land Use	No of Parcels	Percentage
Administrative	22	8.89%
Commercial	29	11.84%
Open space	30	12.24%
Residential	164	66.94%
Total	245	100%

An examination to the distribution of plots was documented in table (2) indicates two hundred and forty five (245) parcels of land in the study area, from which 164 parcels of land was used for Residential representing 66.94%, Open space is 30 parcels of land representing 12.24%, Commercial is 29 parcels of land representing 11.84% and Administrative is 22 parcels of land representing 8.98%. Therefore, Residential show the highest percentage of the land use, follow by Open Space, Commercial and Administration has the lowers percentage.

Lastly, objective (III) which to analyzing and testing the efficiency of the cadastral database was achieved using various capabilities and analytical tools provided in the ARCGIS 10.1. These tools include:-

1. Finding out the open space parcels.
2. Finding out those who observe 9meters setback.
3. Calculate the statistics output.

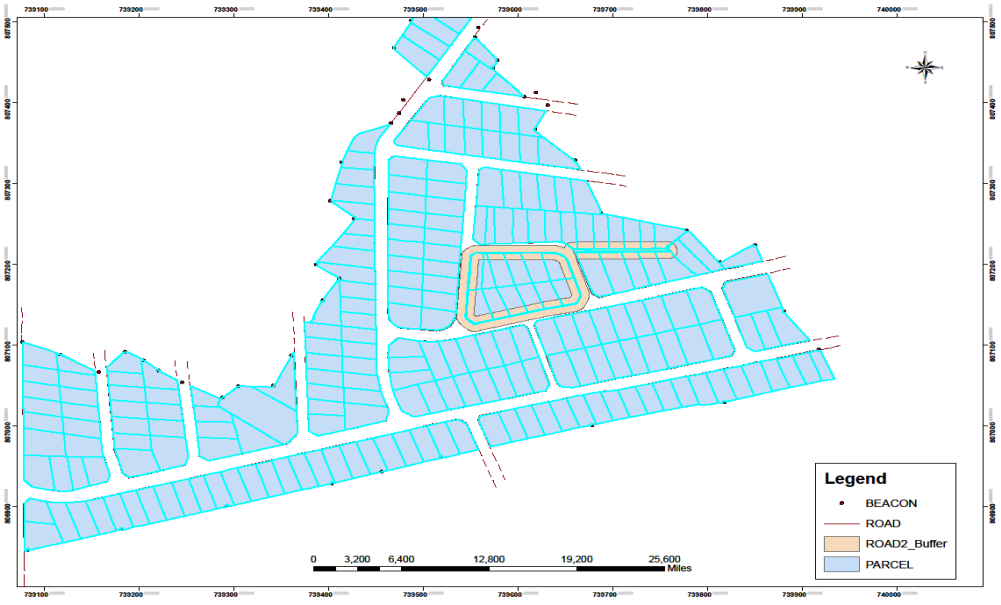

Figure: 8: Map showing the number of parcel that Observe 9meters Setback from Road

STATISTICS OUT OF STUDY AREA

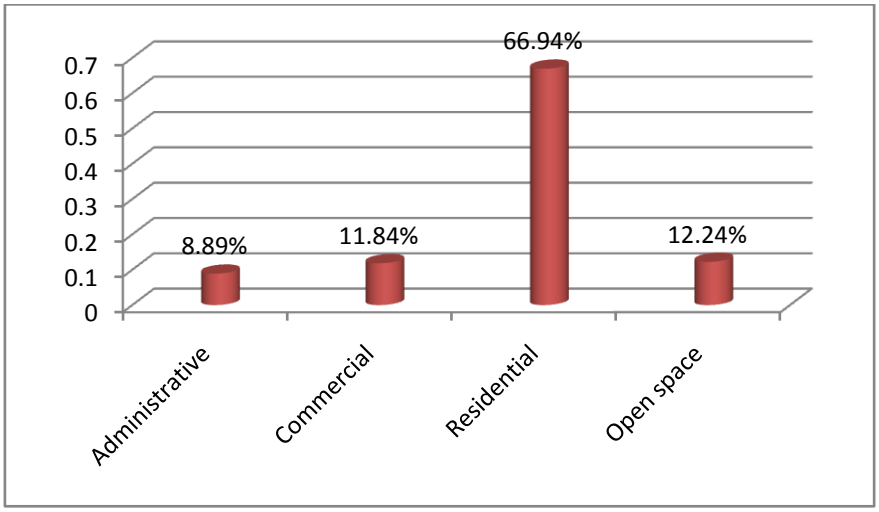

Table: 3: Land Use and Percentage

Land Use	Percentage
(Developed Land) Residential, Commercial & Administrative	88%
(Undeveloped Land) Open space	12%

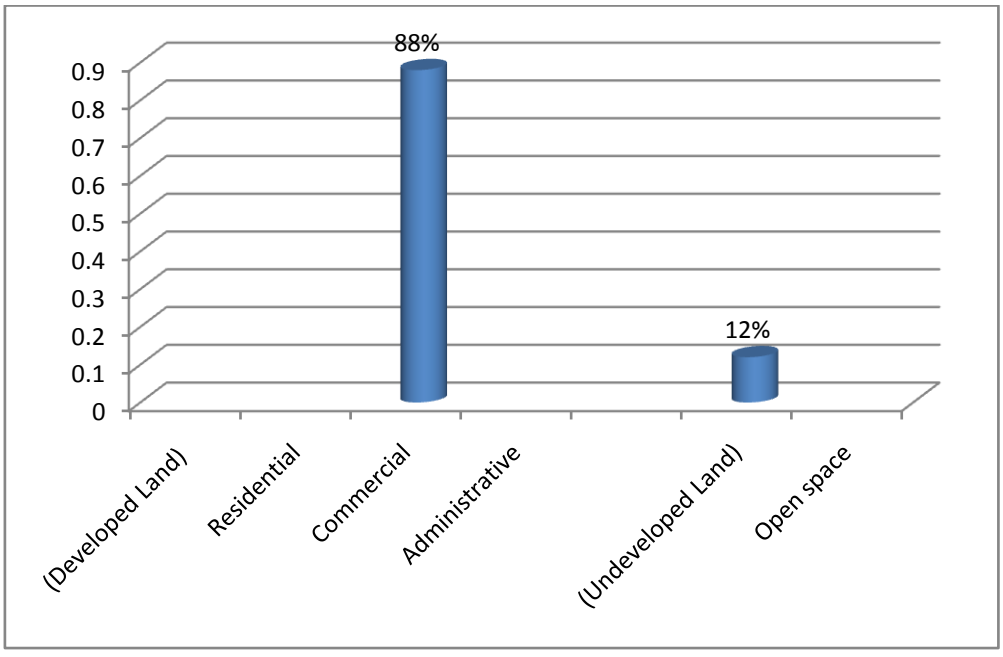

Figure: 9: Show Land use and the percentage

CONCLUSION

GIS and Remote Sensing have been proven to be efficient in cadastral mapping. They allow easy means of collecting, analyzing, updating, storing and communicating vast amount of land information which is necessary for informed decision making. This research has come to a conclusion that Remote Sensing and GIS are essential tools for carrying out cadastral mapping most especially in areas where land records are not exist. The digital cadastral map (database) can provide various kinds of information in different forms (reports, statistics output and maps).

RECOMMENDATIONS

The digital Cadastre data base created for Asekunowo and Fabiyi Family Layout, located at Irese in Akure South LGA is hereby recommended for Ministry and Survey department to be adopted. There should be an enlightenment program for Cadastre users and allocation officers such as the staff of GIS unit of Surveyor General's offices to comprehend and to know how the vital of Land Information system is.

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