



CREATION FOR A CADASTRAL INFORMATION SYSTEM FOR GONIN GORA LAYOUT IN CHIKUN LOCAL GOVERNMENT AREA OF KADUNA STATE, NIGERIA.

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ABSTRACT

This study was carried out to determine the geographic information system (GIS) as a tool to examine spatial patterns of Gonin Gora layout in Chikun Local Government Area of Kaduna state. The study involves acquiring spatial and attribute data of the study area, creating relevant spatial layers containing vital information about the parcel within the area of study, designing an appropriate database using relational database model (RDBM) cadastral information system and demonstrating the usability of the cadastral information system (CIS) that was created by carrying out simple queries. The research procedure also involves data acquisition using Promark 3 GPS instrument, database design and spatial queries using ARCGIS (10.1). Three(3) single criteria queries were generated for parcel earmarked for religion worship, parcel set for educational purposes, parcels for commercial purposes were identified and multi- criteria seven (7) queries were generated. The database was created and it was successfully test run for cadastral information system as effective tool for quick retrieval of information.

Keywords: Cadastral information system, geographic information system, database creation.

INTRODUCTION

Storing cadastral data in digital databases is gradually becoming a global phenomenon that many countries and states are adopting in handling the land parcel information for proper, accurate, up-to-date information, quick easy access, data sharing. A cadastre is a comprehensive register of the real property of a country. It commonly includes details of the ownership; the tenure; the precise location (in coordinates), in some cases the dimension (perimeter and area inclusive), the cultivation of rural and the value of the individual parcels of land. Also, Turner (2004) defines cadastre as a complete and up to date register or inventory of land parcel in any state of jurisdiction containing information about parcels regarding ownerships, valuation location, area, land use and usually building. GIS with computerized system and hardware is dedicated to manage manipulate geo-referenced data (partial data e.g. land, parcels, land boundaries, building, utilities). For development and management of cadastral land information system. This is made possible through the documentation, maintenance, updating and publication of land records. Land management in Nigeria was modeled after the British and French system (Okere, 1997). Land records are currently kept in paper files, coordinates registers, title records, conveyance and encumbrances. This collection of land records and information are referred as cadastre. Olaley (1988) pointed out that these land information and records were principally

used for the purpose of taxation and boundary adjudication, so the cadastre became the official word and definition of a register of property containing information on land registration.

MATERIALS AND METHODS

Study Area Description

Gonin Gora layout site is located in Chikun Local Government Area of Kaduna State lies on latitude 10° 24' 41" n to 10° 24' 57" n and longitude 7° 24' 01" e and on 7° 24' 55" e. topographic sheet 144 ne Kaduna is centrally located in the northern part of Nigeria bounded in the north by Kano and Katsina States, in the east by Bauchi and Plateau states, in the south by Nasarawa state and federal capital territory, and in the west by Niger and Zamfara states. The system of information collation and retrieval has remained, in most cases, unchanged leading to haphazard development of land resources with serious legal, planning, economic, and environmental impacts. The aim is to acquire spatial and attribute data of the study area. Create relevant spatial layers containing vital information about the parcel within the area of study. Design an appropriate database using relational database model (RDBM) cadastral information system. Demonstrate the usability of the cadastral information system (CIS) that was created by carrying out simple queries

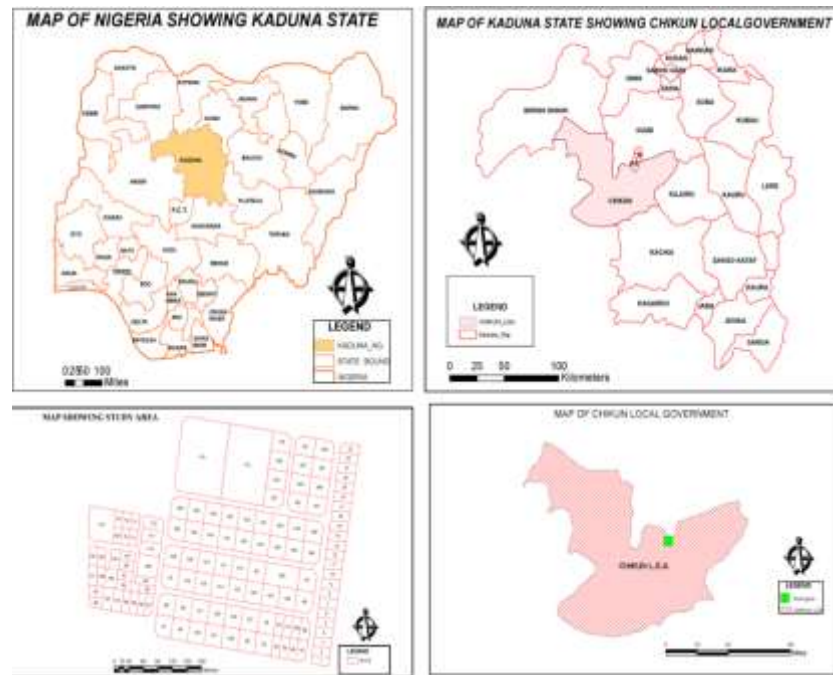


Figure 1: Map of Nigeria showing Kaduna State, map of Kaduna State showing Chikun local government area and map of Chikun showing Gonin Gora layout.

Source: Ministry of land and survey Kaduna State.

Research Procedure

Position fixing in three dimensions for this work involves the measurement of distance (or range) to at least four satellites whose x , y and z are known using differential global positioning system (Promark 3) receivers to define geometric data (x , y and z coordinates) of points and features positions on the project site. In this research both spatial and attribute data were acquired from primary and secondary sources, GPS coordinate (x , y , z) and other information obtained directly from the field (reconnaissance survey) of some allottees and ministry of land survey country planning, Kaduna secondary source of data includes existing maps and plans of the areas concerned; coordinates of existing controls, bench marks and

trigonometrical stations were obtained from the ministry of lands, survey and country planning, Kaduna. This phase of cartographic design determines the look of the end product. Layers were created; points defining each and every detail were joined by selecting 'polyline' from drawing toolbar taking guide from the recce diagram. The different graphic entities of whose files shares similar domain were grouped together under the same layer and assigned a colour, line type and line weight. Layers were created in AutoCAD 2009 and the drawing was exported to ArcGIS (10.1) environment for analysis and queries were generated. The figure 2 below explains the research methodology.

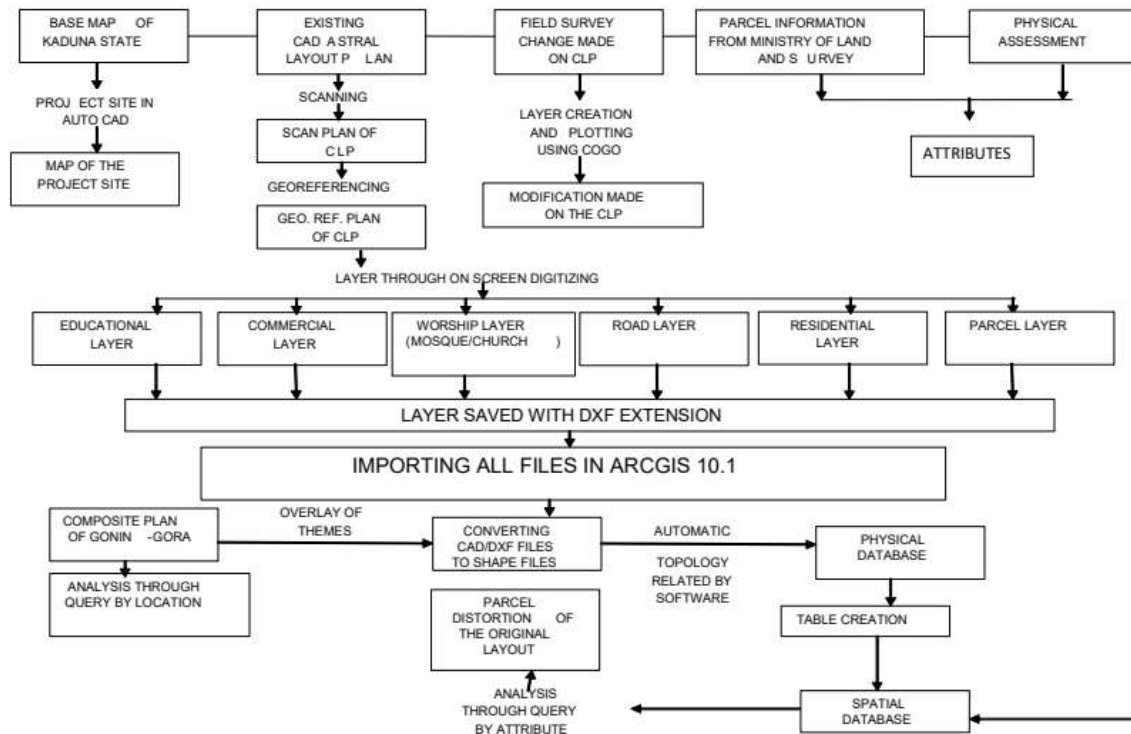


Figure 2: The Cartographic Model of the Study

RESULTS AND DISCUSSION

The spatial analytical capability of GIS makes it to be outstanding among other information systems, some of these spatial analytical capabilities include, overlay operation, buffering, spatial search, topographic operation and connectivity operation. GIS use these spatial analytical capabilities to answer fundamental generic questions about location, condition, trends, routine, pattern and modeling by manipulating and analyzing the input data. The spatial search operation for this project was carried out through query generation to retrieve information stored in the database pertaining to certain systematically defined attributes within the database to answer some spatially related questions. The operation involves the link between the database and the composite plan of the study area. Queries were generated to provide the answers to the application of use of GIS map in managing part of Gonin Gora layout and the results displayed in the form of hardcopy map or stored in a softcopy. The query

has intention of involving only one parameter in its query and answer. Here, only one condition is used to design a query so as to retrieve information from database. For the purpose of the studies five criterions were analyzed, likewise multi –criteria were used in this two or more parameters were used.

Figure 3 shows the result of the query of the parcel earmarked for Christians and Muslims. Reviewed that only two (2) building parcel. In the entire layout of 125 parcels only two parcels were earmarked for religious worship. This information can help in regulating structures within the scheme and would enable to calculate the distance between houses and places of worship. The location of the places of worship and fire station can also be determined in case of fire outbreak the shortest route will be followed. Nancy and winter (2006), in the places of worship and neighborhood stability, journal of urban affairs, also showed that only limited spaced are reserved for places of worship as discovered by the study.

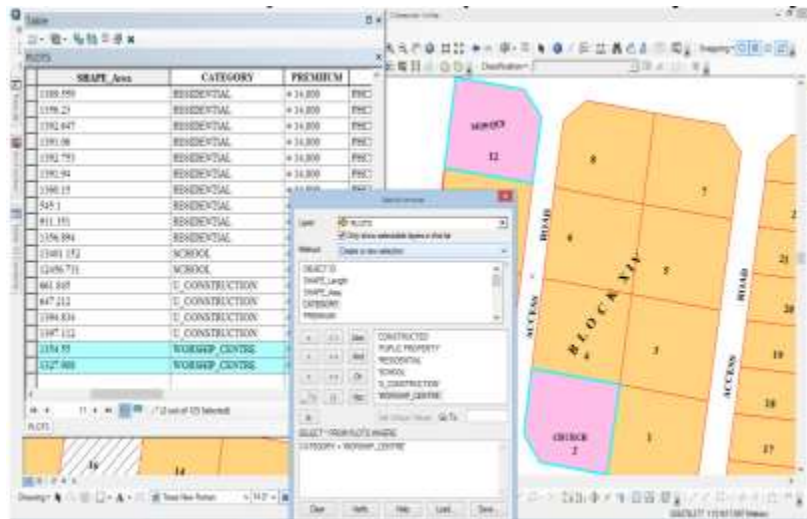


Figure 3: Query of Parcels Earmarked for Religious Worship

The result of the query in figure 4 below of the parcels that are set aside for residential purposes. The result reviewed that 114 of the parcels are set aside for residential purposes. If database is been embraced and implemented by the state ministry of

land and survey authorities, this information can be updated easily when there is change of ownership. Likewise the studies conducted by Pindiga and Orisakwe (2013) shows that layout are mostly for residential development.

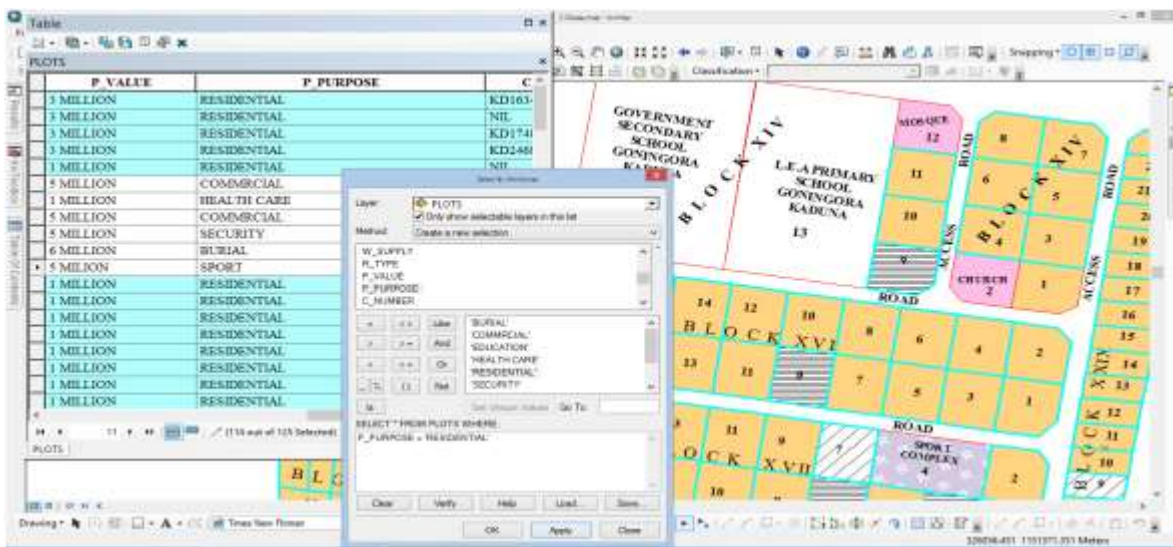


Figure 4: Query for Parcels Earmarked For Residential

Figure 5 reveals the result of the query of the parcels that are set aside for educational purposes. The result reviewed that 02 of the biggest parcels are set aside for educational purposes. If database is been implemented by the state ministry of land and

survey authorities, this information can be maintained easily so that the area may not be carved out for other purposes. Jamshid et al., (2017) in their studies shows few but bigger parcels are earmarked for educational purposes.

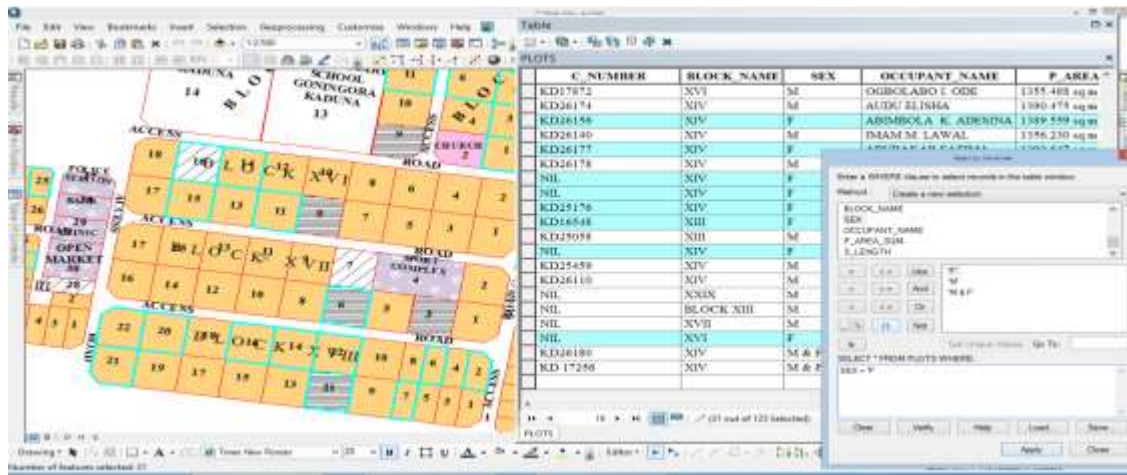


Figure 7: Query of Parcel Owned By Females and For Residential Purposes

The figure 8 shows the result of the query of the parcels that areas are greater than 500m² but less than 900m² two criteria used greater than and less than was used, in cadastral information system enable land managers to calculate ground

rent for each parcel and also to know sizes of the various parcels. Babawuru (2010) also attest to the fact that parcels area is important in cadastral information system.

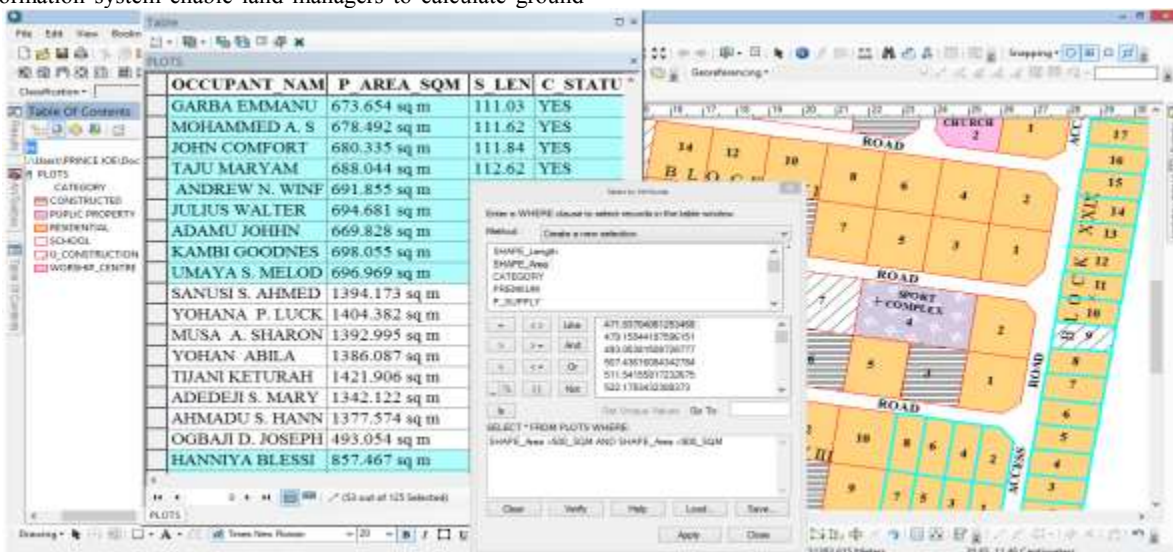


Figure 8: Query of Parcels That Are Greater Than 500m² And Less Than 900m² In The Layout.

The figure 9 shows the result of the query of the parcels that are owned by females and has no certificate of occupancy. This enables the manager of the estate to know owner of the plot by sex and those that do not complete their processes of obtaining

certificate of occupancies. At the click of button of set of command the information require is easily obtainable.

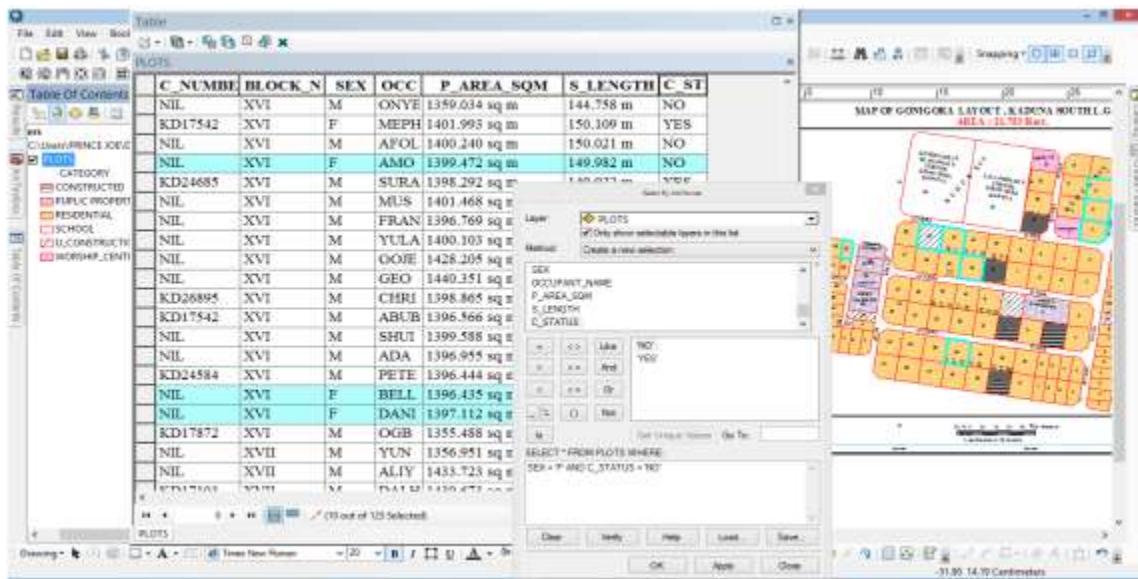


Figure 9: Query for Parcel Owned By Females without Certificate of Occupancy

The figure 10 shows the result of the query of the parcels that are for residential whose areas are greater than 400m² and less than 500m², this is another result of multi-criteria using

greater and less than to determine the size of parcels it is also used for valuation and other assigned task.

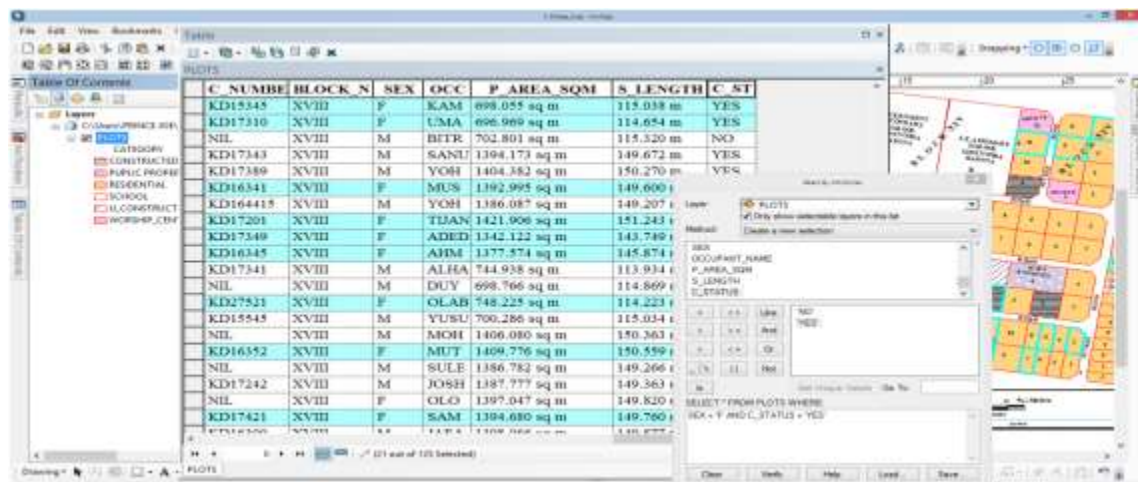


Figure 10: Query for Parcel Areas Greater Than 400m² but Less Than 500m²

The figure 11 shows the result of the query of the parcels that are owned by males and has no certificate of occupancy, this is

also identifications of who owned parcel and indication of either with a certificate or not. This enables the manager to know those without certificate to their properties.

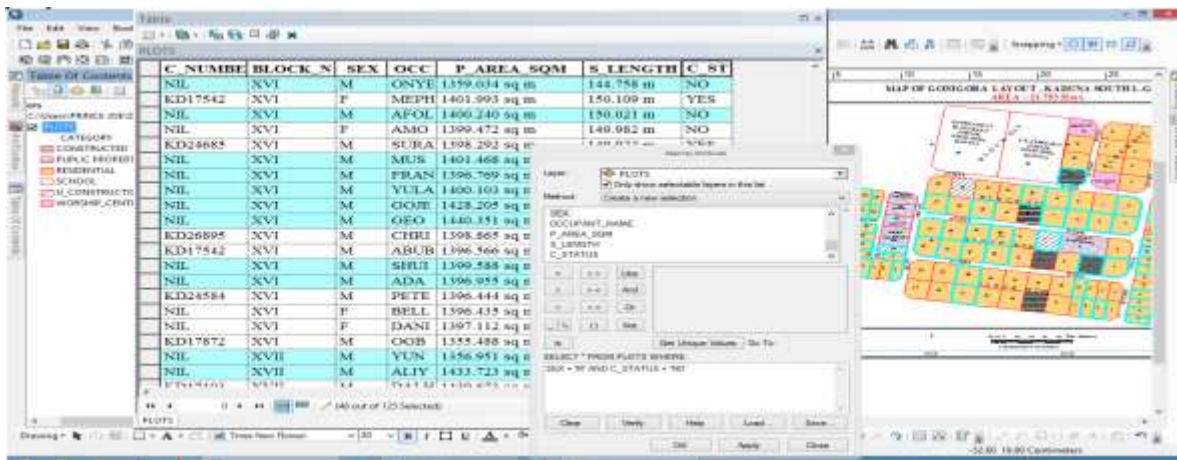


Figure 11: Query for Parcel Owned by Males without Certificate of Occupancy

The figure 12 shows the result of the query of the parcels that are owned by males and with certificate of occupancy. This enables the manager to even calculate ground rent and make projection of what to expect in a year, as revenue for the state.

It also enables the manager to have complete records of those that have certificate of occupancy to their parcel and the purposes for such property. Musa *et al* (2016) also categories parcels and their records according to the sex of the owners.

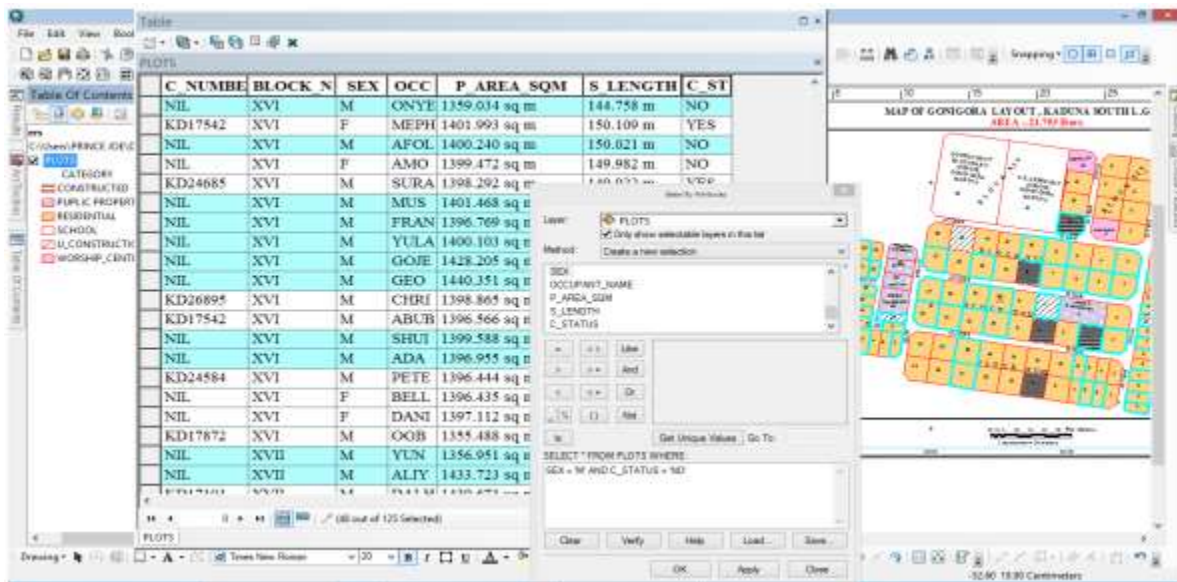


Figure 12: Query for Parcel Owned by Males with Certificate of Occupancy

CONCLUSION

This study was achieved through the creation of cadastral information system and production of digital map of the study area. The database was created and twenty three (10) queries were performed on the created database for test running. One common characteristic of the various land records that are held by most cities and towns in Nigeria are incomplete and not up to date information. Their existence is mostly unknown to other government agencies. GIS should be used to handle all the cadastral records; it is user friendly, easy to handle, quickly and also it cost effective. National approach for accurate and reliable cadastral mapping of the entire country should be embarked upon. The database created should be updated continuously in the ministry of the lands and survey to make it as current as possible. The local government (Chikun) should embark upon creation of cadastral information system for all it landed properties. There is the need for the local government to

have GIS department and to trained staff that will handle the operations. Kaduna state government should as a matter of urgency reactivates the survey divisions must especially the KADGIS to be functional and handle all land related issues for proper, easy land administrations and for revenue generations as is obtainable in Abuja, Nassarawa state and Kano state.

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