

Creation of Digital Cadastre For Anua-IFA IKOT OKPON/USE OFFOT Housing Estate UYO, AKWA IBOM State Nigeria



Geographic Information Systems

KEYWORDS : Digital Cadastre, GIS, Housing Estate, Spatial Data

Ojiako J. C.

Nnamdi Azikiwe University Awka, Anambra State, Nigeria. Department of Surveying and Geoinformatics

Emengini, E. J.

Nnamdi Azikiwe University Awka, Anambra State, Nigeria. Department of Surveying and Geoinformatics

Umoh N. U.

Nnamdi Azikiwe University Awka, Anambra State, Nigeria. Department of Surveying and Geoinformatics

Igbokwe E. C.

Nnamdi Azikiwe University Awka, Anambra State, Nigeria. Department of Surveying and Geoinformatics

ABSTRACT

The agencies of Akwa Ibom State Government charged with allocation and management of lands are yet to incorporate digital method of data management and are currently encumbered with analogue cadastral plans and records. In Uyo, Government estates records are scattered all over Government agencies and are not integrated into a digital format thus comprehensive analysis of parcels in estates using Geographic Information System (GIS) has not been carried out. This research focuses on the creation of a digital cadastre for part of Uyo using Anua-Ifa Ikot Okpon/Use Offot Housing Estate as a case study. The layout plan of the estate was scanned, georeferenced and digitized to get locational data. Non spatial data was obtained through statutory bodies and social survey. The result of database queries shows thematic maps with existing allocation patterns in the estate. The database tables show detailed characteristics of such parcels, blocks and owners.

INTRODUCTION

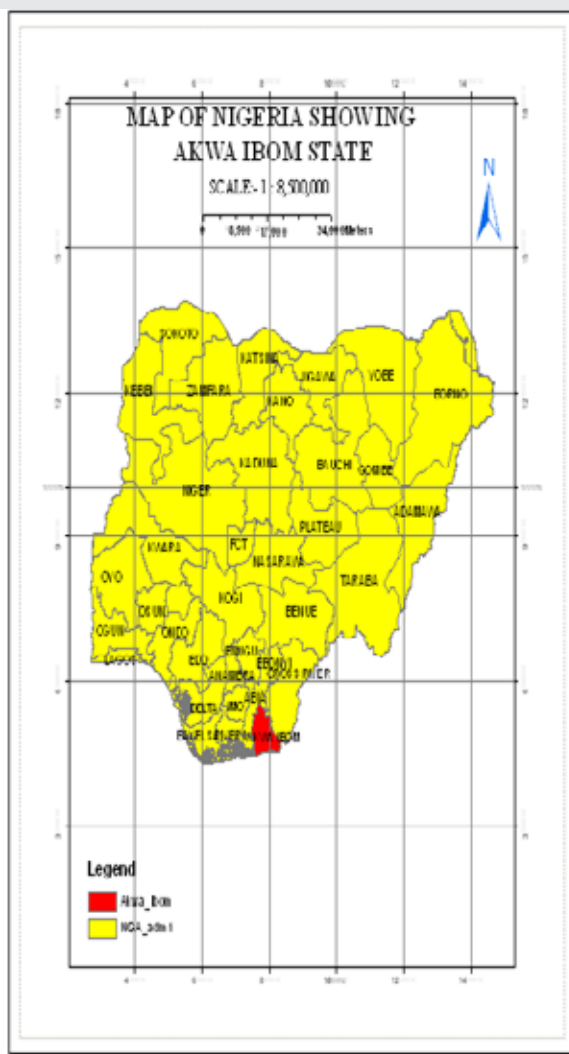
Due to increasing population growth in Uyo metropolis and environs, arising from urbanization and industrialization, there is a high level of pressure on land resources in the city, which urgently calls for the effective management of the resources.

The Akwa Ibom State Ministry of lands and Town Planning charged with the allocation and management of lands in the state is yet to fully incorporate digital method of data management. This makes data management extremely difficult for the ministry. The traditional method of data management has proved to be inefficient. It is faced with problems such as redundancy that is, the unnecessary repetition or duplication of data, high maintenance costs, difficulties in moving from one system to another, difficulties in data sharing, lack of security and standard, lack of coherent corporate views of data management. These issues impede decision making in land related matters in the state.

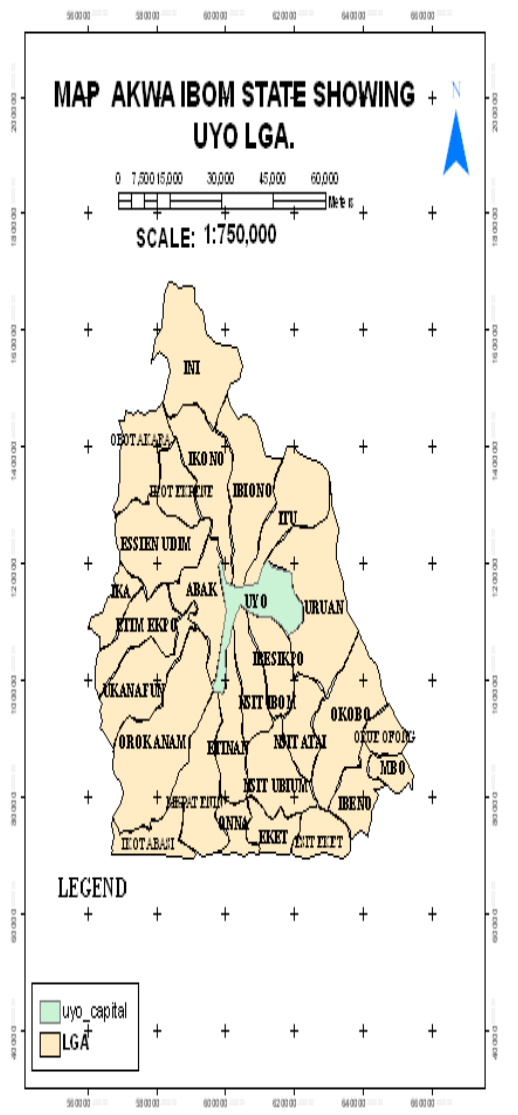
Therefore the best way to minimize these enormous problems was the comprehensive application of Geographic information System (GIS) in plan production and record keeping in other to facilitate its future updating with modern technique. Hence, the creation of digital cadastre of Anua -Ifa Ikot Okpon/Use Offot Housing estate, Uyo becomes the focus of this study.

2.0 STUDY AREA

Anua-Ifa Ikot Okpon/Use Offot Housing Estate, Uyo covers an approximate area of 50.186 hectares of land with latitude $4^{\circ} 50' 26''$ to $5^{\circ} 00' 56''$ N and longitude $7^{\circ} 57' 18''$ to $8^{\circ} 01' 11''$ E (Figures 1a and 1b). It is located in Uyo Capital city of Akwa Ibom state Nigeria.



(1a)



(1b)
Figure (1a): Map of Nigeria showing Akwa Ibom State, (1b)
Map of Akwa Ibom State showing Uyo capital city.
(Source: Office of the Surveyor General of Akwa Ibom State, Uyo)

3.0 METHODOLOGY

The methodology for this study is shown in figure 2

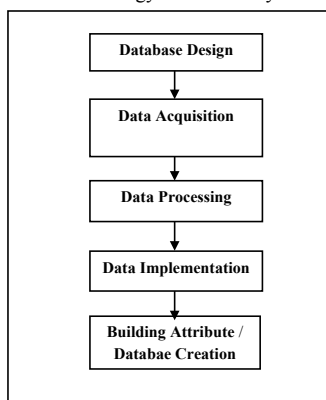


Figure 2: Flowchart and Procedures for the study.

3.1 DATABASE DESIGN

The creation of a structured, digital database is the most important and complex task upon which the usefulness of the cadastral information system depends. Database design is the process of producing a detailed data model of a database (Hernandez, 2012). The design phase consists of three levels (Kufoniyyi, 1998):

- Conceptual Design
- Logical Design
- Physical design

3.1.1 CONCEPTUAL DESIGN

Conceptual design is the first step in database design where the contents of the intended database are identified and described. It deals with the identification of the basic terrain objects together with the spatial relationship that exist among them. It is human-oriented, often partially structured, model of selected objects and process that are though relevant to a particular problem domain. Conceptual design is carried out independently of the software and hardware that will be used to implement the database. Since parcel is the main focus of this study, vector data modelling was considered appropriate for this application because its best represent parcel. In this study, controls and corner points were represented as point object, road and stream/river as line objects while buildings, boundary and parcel were represented an area object. In the designing of the model, entity relationship (E-R) model was used. An entity-relationship (ER) model is a specialized graphic that illustrates the relationships between entities in a database. ER diagrams often use symbols to represent three different types of information. Boxes are commonly used to present entities. Diamonds are normally used to represent relationships and ovals are used to represent attributes.

3.1.2 LOGICAL DESIGN

This is another stage of the database design in which all the real world entities conceptualized were modelled into the real world using logical design. It is the representation of the conceptual design to reflect the recording of the data in the computer system using a relational database management system (RDBMS) (Effiong and Alagbe, 2012). In this phase, the entities, their attributes and their relationships were represented in a single uniform manner inform of relation in such a way that would be no information loss and at the same time no unnecessary duplication of data. For this study, relational data model was used due to its easy implementation and management. The conceptual data model developed in this study was translated into the relational data structure. In the relational data model, data are separated into tables. They are found along rows and columns. The conceptual model was translated into a logical structure and the following relations were derived.

BLOCK:- (Block_Id, Block_Area, Block_Name)

PARCEL:- (Parcel_Id, P_Use, P_Area, P_Perimeter, CofO, P_Tenure, P_Owner)

OWNER:- (Owner_Id, Parcel_Id, Address, Occupation)

These relations give the entities and their attributes. The attributes were linked to the entities by underscoring the attribute identity to the entity.

3.2 DATA SOURCE

The **primary data** collected include the coordinates of some pillar numbers obtained with GPS receiver to be used for geo-referencing of the plan. The **secondary data** used include a hard copy layout plan of the project area and attributes of the plots. This was obtained from the Office of the Surveyor-General of

Akwa Ibom State, No 154 Udo Umana Street, Uyo.

3.4 DATA PROCESSING

Data processing describes how data is converted into information. Data are organized into structure, group and database. The layout plan of the study area was scanned then exported to Arc-GIS 9.3 for georeferencing and digitizing so that spatial analysis would be performed. Attribute data were typed manually into the computer and were used for creation of database. These data were processed and manipulated to give useful information.

4.0 RESULTS AND DISCUSSIONS

The major spatial/attribute results in the study are shown in figures 3 - 10. The spatial queries were classified as single criteria queries and multiple criteria queries. The major queries include those of parcels that have not been allocated to somebody, parcel allocated to Excel Universal School, streets that are not tarred in the estate, parcels for residential purpose without deed of sublease, and parcels allocated to female civil servants with a passport photograph of one of the female civil servants hyper-linked to her parcel.

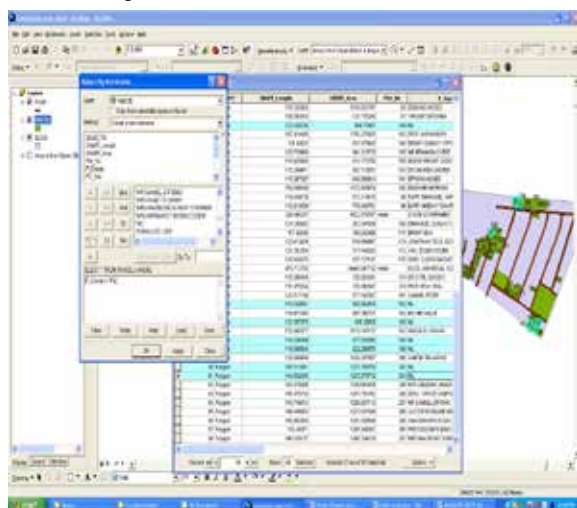


Figure 3: Parcels that have not been allocated to somebody

Fig. 3 shows query command to determine the number of parcels that have not been allocated to somebody. The result shows that 6 plots are still vacant. The map of the parcels that have not been allocated (vacant plots) to somebody is shown in figure 4. This result shows that seven parcels are yet to be allocated to people. This information will help in subsequent allocation of parcels to applicants.

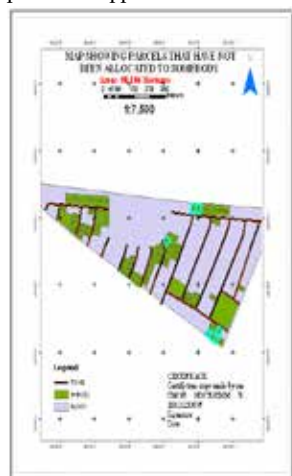


Figure 4: Parcels that have not been allocated to somebody

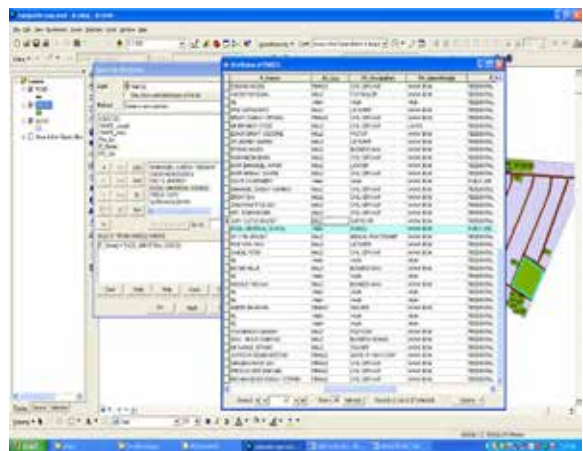


Figure 5: parcel allocated to Excel Universal School

Figure 5 shows a query command to determine the parcel of land allocated to Excell universal school. The result showed all the attributes of that parcel. Figure 6 also shows the parcel of land being highlighted.

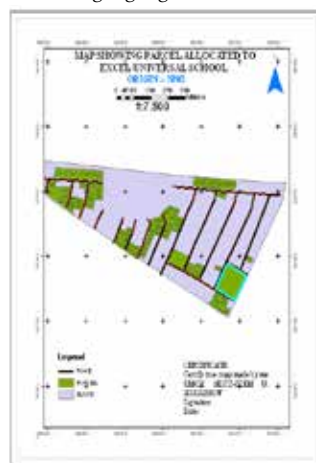


Figure 6: parcel allocated to Excel Universal School

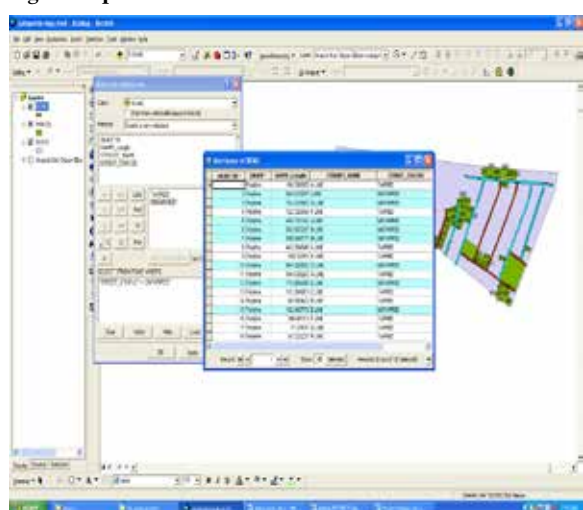


Figure 7: Streets that are not tarred in the estate.

A query command to determine untarred streets within the estate is shown in figure 7. The result showed that a total of 8 streets were not tarred. Figure 8 shows the untarred streets being highlighted in light green colour. The result indicates that

M-line, N-line, D-line, E-line and G-line are the untarred streets. This result gives information on development planning of the estate.

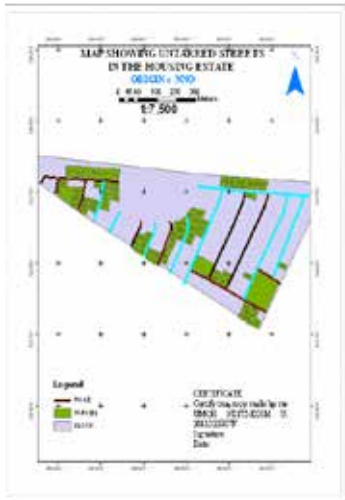


Figure 8: Untarred streets in the estate.

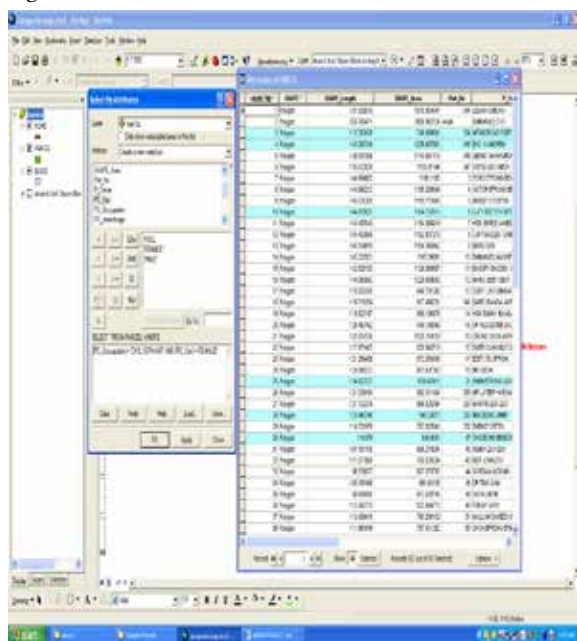


Figure 9: Query module, Attribute table and Passport photo of one of the female civil servants that has a parcel in the estate.

A query command to determine the female civil servants that have parcels of land in the estate is shown in figure 9. The result shows the attributes of the selected female civil servant that have parcels in the estate as highlighted in light green color. The result indicates that only 19% out of the total allottees of parcels in the estate are female. The passport photograph of one of the

female civil servants that has parcel in the estate is hyperlinked to her parcel. Figure 10 also shows the parcels allocated to female civil servants being highlighted in light green color.

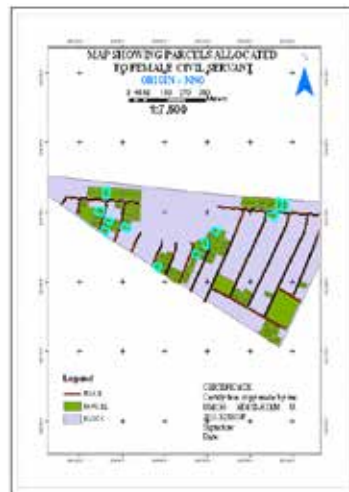


Figure 10: Map parcels allocated to female civil servants.

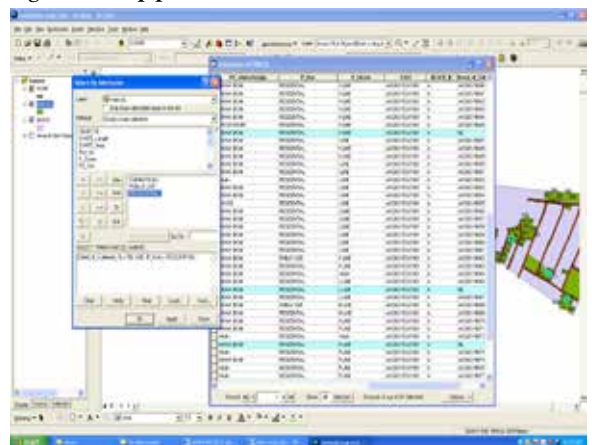


Figure 11: parcels used for residential purpose but without Deed of sublease

A query command to determine parcels used for residential purpose but without deed of sublease are shown in figure 11. The result is highlighted in light green color. This information can help verify true occupants of parcels. Figure 12 shows the parcels being highlighted in light green color.

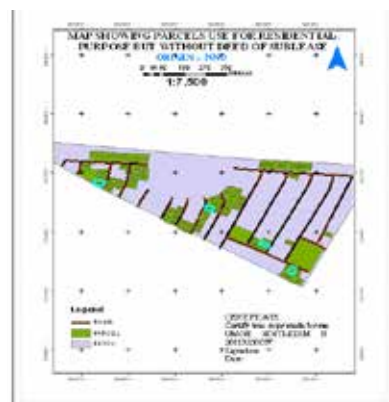


Figure 12: parcels use for residential purpose but without Deed of Sublease

5.0 RESEARCH FINDINGS

The results as depicted in some of the analyses and information revealed the following findings about the estate: There are some parcels without deed of sublease though they have been allocated. Only few female citizens of the state have parcels in the estate. That is, only 19% of allottees in the estate are female while 81% of the allottees of parcels in the estate are male. Some streets in the estate are just graded and are not tarred while some other ones are tarred. The streets in the estate are named with alphabets with block "A" of the estate having streets names "A-line" to "K-line". Some parcels in the estate have been allocated to non indigenes of the state. That is, 3% of the allottees in the estate are non indigenes. A parcel has been allocated to Excel Universal Schools to serve the estate children. No parcel has been allocated for siting a shopping mall in the estate. No parcel has been allocated for a Police Station which would boost security situation in the estate, however, there are yet to be allocated parcels which can serve this purpose.

6.0 CONCLUSION

This study has successfully demonstrated the use of GIS in Cadastral Management of Anua -Ifa Ikot Okpon/Use Offot housing estate. The capabilities of Information System in GIS to conduct spatial search and provide answers to some generic question has been established. The database created was carefully accessed and tested with various queries invoked. The information generated can assist in decision making in cadastral management and land administration by various authorities involved.

REFERENCE

- Effiong, E. and Alagbe, A. O. (2012): GIS for Emergency Response in Oyo Metropolis. A paper presented at the 47th AGM/ Conference of NIS at Ilorin, Nigeria. pp 26 and 27. | Hernandez, M. J. (2012): Database Design for Mere Mortals: A Hands-on Guide to Rotational Database Design. 3rd Edition. Pearson Education, Indianapolis, Indiana. Pp 15, 22 and 31. | Kufoniya, O. (1998): Basic concept in Geographic Information Systems in; Principle and Application of Geographic Information Systems, Edited by Ezeigbo C. U. Lagos: Panaf press, pp.1-3 |