TOWARDS THE DEVELOPMENT OF LAND INFORMATION MANAGEMENT FOR SUSTAINABLE DEVELOPMENT IN DELTA STATE, NIGERIA

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Keywords: Land Management, Administration, Planning, Cadastre, Data Base

Summary
The use of Geographic Information System (GIS) for Land Management is capable of improving the rate at which spatial problems can be solved within a short time. This is because it assists in acquiring storing and retrieving information about land for the purpose of planning and administration. In other words, accurate and reliable cadastral records can be obtained even in graph form. With the generated queries, it is possible to identify landowner with 'Certificate of Occupancy', It is also possible to assess the land for tenement rate generation through the understanding of the status, area, building type, value, term and year of construction. In other words, it implies that Government revenue base can be broadened. Above all, the exercise is particularly useful in decision making in respect of solving some of the spatial problems. In general, there are innumerable advantages of using GIS in land management and these include the following: Phasing out of outdated maintenance procedures and replacement by computerised updating of land records, minimization of vexatious boundary disputes, assurance of easy and instantaneous availability of correct record to the public which thereby helps in introducing the much warranted transparency of public records, and generation of far more accurate maps which can function as efficient decision making tool for Delta State. Crucial to the success of the research was the positive response from the Surveyor General of Delta State who had seen the need for holding a stakeholders forum where issues bothering on land was discussed.

1.0 INTRODUCTION

Life for most people is becoming more complicated, resulting in increased pressure on all the world's natural resources. Land is a key resource without which humankind cannot survive and is an essential component for the creation of wealth. In recent years we have witnessed an unprecedented growth in the world's population and a general move towards urbanisation, especially in developing countries and countries with economies in transition where access to land is becoming increasingly difficult. If we are to improve the quality of life of all living species, especially human beings, then we must find more efficient and effective ways of managing this valuable resource. To achieve this objective we must understand much more about land, its nature, value, use and the rights that exist to exploit it. In other words, we need to radically improve the ways in which we collect, manage and use land information. This we can do through the Cadastre.

According to the International Federation of Surveyors, “a Cadastre is normally a “parcel based and up-to-date land information system containing record of interests in land (e.g. rights, restrictions and responsibilities)” (FIG, 1995). Furthermore, a cadastre is a public land information system that supports the public administration of land (Fadahunsi, and Oluwadare 2005). The problem inherent in the Land Use Decree 1978 or Land Use Act 1980 has been detailed in (Otty et al. 2021). They noted some of the problems as the inalienability of land in rural areas, the vesting of all land for the use and collective benefit of Nigerians only, inadequate compensation provisions, clarity regarding rights to land for grazing purposes, and the age of the Act. Whereas, essential maps covering the State indicating the ownership of each parcel of land are not available. Details that should be on such maps should include parcel boundary, parcel size, parcel ownership and sales history, parcel use and use history and land status (lease, rent or freehold).

Effective land information management not only provides the necessary information on the land title and records for the use of the stakeholders but also does that with dispatch (Nwafor et al 2022). Information on land ownership, value and use of land is crucial to offer tenure security to all, it regulates the land market, implement land reform, preserve the environment etc. Land information management becomes even more urgent in post conflict disaster area, in areas under pressure of large scale acquisition as the current situation in Delta State and in fast growing urban areas. A land administration system is one of the instruments of governments to implement their land policies. Land policy regulates access to land and the management of land through land administration processes.

In the past administration, the Federal government of Nigeria set up a Presidential Committee on land reform of which only five (5) States in the Federation were used as pilot studies where all the land information in the states were scanned, digitised and updated from analogue to digital in order to facilitates good land governance, unfortunately Delta State was not among these pilot States.

This study looked at some issues of land management in Delta State with the Ministries that make use of land information in focus and attempt to proffer some suggestions on how accurate and up-to-date land information can be used for planning and management in the State as most of its land information is still in the analogue form.

1.1 Statement of the Problem

The responsible Ministries involved for land management and administration in the State work independently with little coordination among them. It was observed that each of the land professionals follows a "go it alone" approach, in which, for example, Surveyors are hardly in touch with what Valuers, Planners or Quantity Surveyors are doing, whereas, they often need the same kind of data or to exchange the information they generate. This results in a lot of duplicated effort and data redundancy, in addition to frustrating land owners and developers who have to consult different professionals for land. Different Ministries prepare their own sector plans/maps for their specific purposes thereby capturing the same data

several times with slightly different specifications leading to significant extra cost and inefficiencies.

The whole process is manual, laborious and time intensive. Conventional methods of land survey, preparation of land records, maintenance of all related data for each parcel of land makes land administration and management incomplete and inefficient. Moreover, distortion of land records at various stages hinders land development control and property tax collection. It is against the above background that this study was conducted in other to have accurate and up-to-date land information that can be used for planning and management in the State. This will allow effective use of the information and facilitate the decision making process.

1.2 Aim and Objectives

Aim
To have accurate and up-to-date land information that can be used for planning and management.

Objectives
– To carry out needs analysis to evaluate the geospatial need for land information management of Delta State
– To create information base of the land cadastre to improve land files through the vectorisation of existing analogue plans, using the coordinates of all existing beacons.
– To convert analogue data to digital data in the Ministry of Land, Survey and Urban Development (MLSUD)
– Design and creation of data base by capturing all the required spatial and attribute data that will enable easy retrieval of data receive reports and statistics.
–Querying of the created database to improve data access and enhance coordination.

1.3 Scope of the Project

Delta State has twenty-five (25) Local Government Areas and twenty-four (24) Ministries and Directorates, thirteen (13) of the twenty-five (25) local government areas and six (6) of the 24 Ministries and Directorates were used as pilot study. They are the Ministry of Lands, Surveys and Urban Development, Ministry of Agriculture and Natural Resources, Ministry of Environment, Ministry of Transport, Ministry of Housing and Ministry of Water Resources.

The project is limited to showing parcel ownership, commercial facilities (shopping mall, petrol station etc), parcels with existing road, buildings (such as residential, factories, churches, mosques), parcel showing area liable to flood, farmlands, undeveloped plots and parcels with land title (Certificate of Occupancy (C of O)), All these entities and attributes will form the base for database creation for the development of Land Information Management (LIM) in Delta State to be driven by the Ministry of Lands and Urban Development.

1.4 Study Area

Delta State is an oil and agricultural producing state of Nigeria, situated in the region known as the South-South geo-political zone with a population of 4,098,291. The State was created from the then Bendel State 27th August 1991 and named after the delta region of the River Niger. Its capital city is Asaba, located at the Northern end of the state, with an estimated area of 762 square kilometers, and a total land area of 16,842 square kilometers and consists of 25 Local Government Areas. It shares common boundaries with Edo and Ondo States to the North West, Imo and Anambra to the North East, Rivers and Bayelsa States to the South East. In the South West and South it has approximately 122 kilometers of coastline bounded by the Bight of Benin on the Atlantic Ocean. The major ethnic groups are Urhobo, Igbo, Ezon, Isoko and Itsekiri.

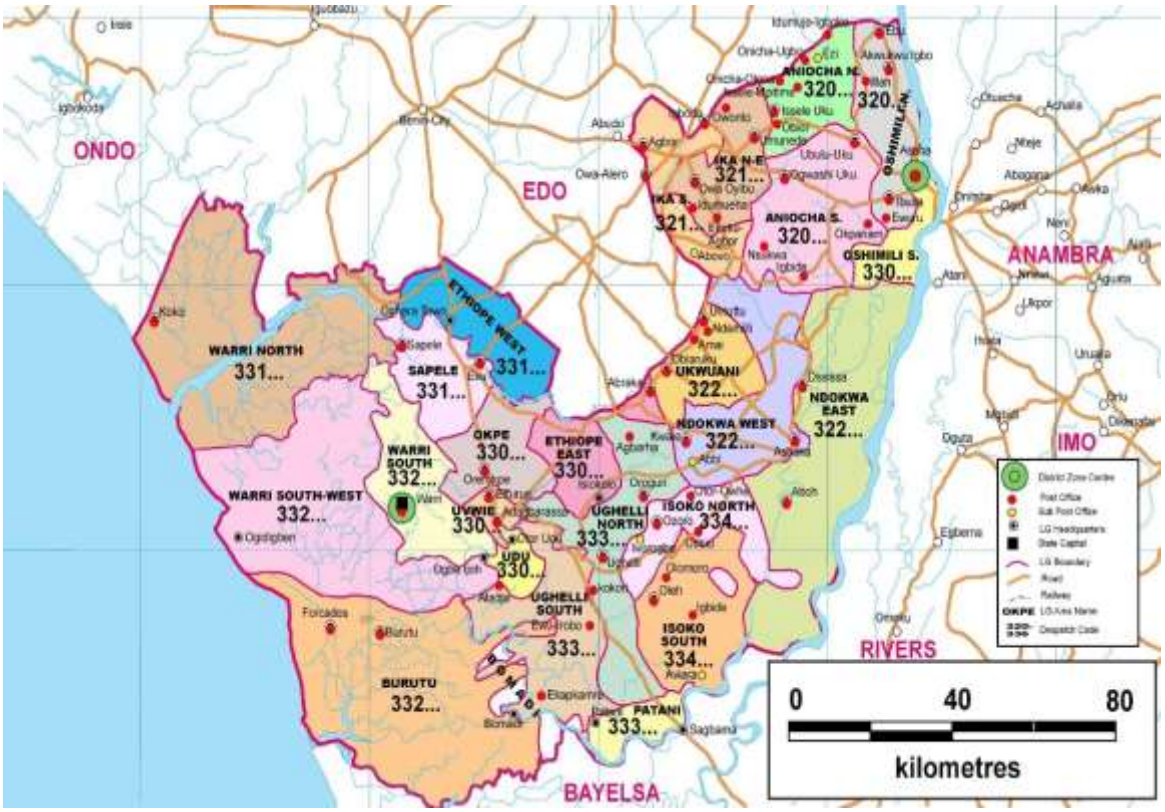

Figure 1.0: Map of Delta State with the 25 Local Government Areas

2.0 LITERATURE REVIEW

Land administration issues have been dealt with for a long time by the United Nations Economic Commission for Europe (UNECE), In particular the Working Party on Land Administration (WPLA). Creuzer (2013) highlighted a number of challenges that were tackled in different areas of the ECA region. Issues such as securing ownership and other

rights in land, spatial planning, informal development, improvement of real estate markets through appropriate land administration data and implementation of geo-data infrastructures for EU member states.

Haiti being a country with private properties also had issues. They were unable to put in place effective land administration. According to Oriol (2013), There were many legal texts concerning land rights covering every aspect of the land issue (cadastre, registration and surveying, professions linked to land such as land surveyors and notary publics, state domain etc.),but their effectiveness declined over time until the administration can no longer cope with the development of Haiti's economy, demography and society. A land reform was introduced and it affected all land stakeholders. Their current challenge is to introduce management tools which are known and used in most countries into a system which had found some form of balance, despite being unsuitable for the requirements of modern life.

Chile faces a number of wide ranging challenges with regard to governance of the land sector, particularly in what respect to spatial and land use planning, land information management, land tenure security, recognition of indigenous land rights and land conflict resolution. Sulca and Arturo (2014), noted that the land sector of a particular country should contribute to the achievement of political goals and to the attainment of sustainable development. And that substantive progress has been made in improving land governance in Chile in the last decades, but there is urgent need for the establishment of a land information system which can facilitate decision making and foster an effective improvement of the overall performance of the land sector.

Effective administration and management of land is almost impossible without land information. The cadastre is the primary means of providing information about land such as location, size, value, use, improvements, owners and occupiers, and the rights, responsibilities and restrictions relating to land. This concept is further explained in the International Federation of Surveyor's 'Statement on the Cadastre' (FIG, 1995), which defines the cadastre as "a parcel based and up-to-date land information system containing a record of interests in land". The Statement also describes many of the available options in establishing an effective and efficient cadastre.

Among the outcomes of Turkey's impressive economic performance of the past decade are pressures associated with growth in energy use industry, tourism, where agriculture, water management, soil erosion and nature protection remain long term challenges. Durutan and Nedret (2013) Stated that evidence of Turkey being a responsible proponent of sustainable land management in terms of completed and planned investments is evidenced in the agricultural resources base and activity monitoring system that the ministry of Food, Agriculture and Livestock (MFAL) has put into place and the implementation of a 5.5 million ha land consolidation program that underpins sustainable land management as the foundation of rural development and zoning measures that specifically allocate land to agricultural production and clean and renewable energies.

These studies and lessons have clearly demonstrated the necessity of strong land administration institutions, in particular their role in the evolution of vibrant and functional land markets which are key in unlocking the full potential of agricultural land as an economic asset and a tool to achieve economic development. These various models, facts and postulations put forward by these and other authors were carefully perused, analysed and evaluated to proffer appropriate models of land management suitable for the peculiarity of land information management in Delta State

3.0 METHODOLOGY

The study was carried out in two Phases. First, a Needs Analysis was conducted in the six Ministries that make use of land information, and secondly, a geometric data was captured and creation of digital data base.

3.1 Needs Analysis

Prior to the development of the Needs Analysis, a meeting with stakeholders was held. Such as the Surveyor General of Delta State, the Director of Urban Planning Board, The Chairman, Land Use and Allocation Committee, The Directors of the Ministry of Agriculture, Environment, Transport and Housing. The Needs analysis was intended to achieve the following primary objectives:

– Extract detailed information about various ministries existing work flows, data, procedures, and hardware/software platforms
– Determine how to most effectively implement the State's Land Information Management(LIM)
– Prepare a Comprehensive Needs Assessment report detailing the findings of the Needs Analysis

These objectives were achieved through the performance of the following sub-tasks:

– Develop, Distribute, and Analyze User Questionnaires.
– Conduct User Interviews

3.1.1 Develop, Distribute, and Analyze User Questionnaires

Prior to development of the data base design, questionnaires for the purpose of soliciting pertinent information from each of the Ministry's selected for their Needs Assessment were distributed.

3.1.2 Conduct User Interviews

A series of personal interviews was conducted with the selected Ministry employees, over a three week period. A total of twenty four Ministry employees, representing a variety of departments, were interviewed. There is no correlation between the number of employees who completed the questionnaires, and those whom were interviewed. Several employees who completed the questionnaire were not interviewed, and vice versa.

Due to the very large population, the researcher decided to select samples from the population upon which the study was based. Care was taken to ensure that the sample size is large enough to convey a measure of credibility to the outcome of the study; care was also taken to ensure that the choice of the sample is not left to chance, so as to reduce the possibility of bias in sampling. Accordingly, the sample size of the study was 72 (seventy-two) comprising of 12 employees from each selected organizations (6). The Stratified Random Sampling technique was employed to determine the sample size, which were 60. The major reason for using this technique is to ensure adequate or proportional representation of the different categories or types of elements that make up the population in the selected sample.

3.1.3 Validation and Reliability of Instrument

Basic precautions were taken in preparing a valid instrument. The study adopted two types of procedure to establish validity of the instrument. These were the face validity and the content validity. Reliability of the test is the degree to which a test instrument consistently measures what it tends to measure. The split half reliability method was used. For the split-half method, the data collected were divided into two halves, using the odd number items for one and the even numbered items for the other. The study also made considerable use of tables for the presentation and analysis of data. Percentages were utilized in analyzing data on the demographic variables in the study, while the Analysis of Variance (ANOVA) statistical technique was employed to test for significant difference in the perceptions of members of staff of the selected organizations on the issues raised in the stated hypotheses.

3.2 Data Capture

Two sets of primary data are required to accomplish this type of study. They include geometric and attribute data. Geometric data refers to Location data which include Northings, Eastings and heights, defining the boundaries of the entire area and individual parcel of land. While Attribute data refers to information about individual parcel. Such information may include among others: owner's name, age, sex, state, local government area, occupation of owner, use of land, status, building type, certificate- of -occupancy (number and year), and tenure among others.

For this study, geometric data was obtained by ground survey method using Total Station equipment and reflectors with all accessories. This was earlier carried out and the information was used for the attribute data. While for the secondary information, the map of Delta State was acquired from the Office of the Surveyor General of Delta State. This was used as a base map for the execution of this study. The control coordinates of some points was also collected.

3.3 Creation of Digital Data Base.

The creation of database is the heart of GIS for it is the process of imputing data into the computer. According to Nuhu (2009), GIS is one of the modern methods that could be used

in the computerization of land records as well as enhancing the process of land registration in Nigeria. Having completed the stages of design phases both spatial and attribute data were used to create the database. The basic database sets were put in place and the created tables were then populated with necessary data.

4.0 DATA BASE QUERIES, RESULT AND ANALYSIS

For this study, the manipulation and queries were performed with Arc GIS 10.0 software, in order to achieve the objectives of this study. The queries are as shown below:

– Query 1: Parcel Ownership
– Query 2: Buildings (such as residential, factories, churches, mosques) Status (Under-Construction)
– Query 3: Parcels Liable to Flood
– Query 4: Parcels with Certificate of Occupancy
– Query 5: Parcels with Existing Roads
– Query 6: Undeveloped Plots.
– Query 7: Commercial Facilities e.g. shopping mall, petrol station etc.
– Query 8: Parcels with Farmland

4.1 Data Presentation

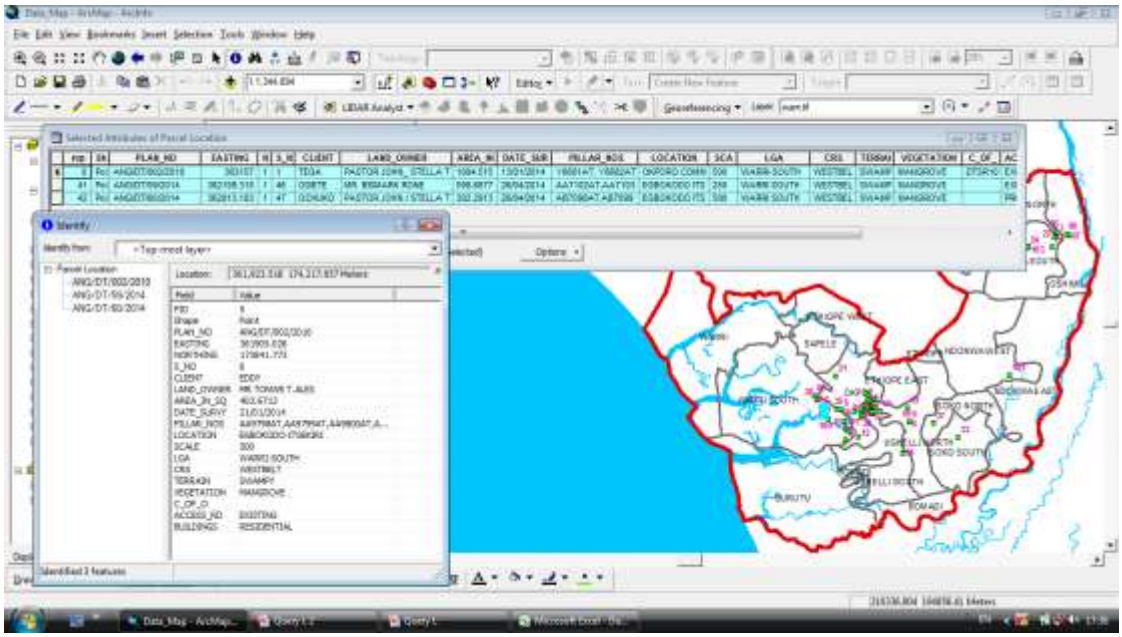

Figure 4.1 Query 1: Parcel Ownership Parcel

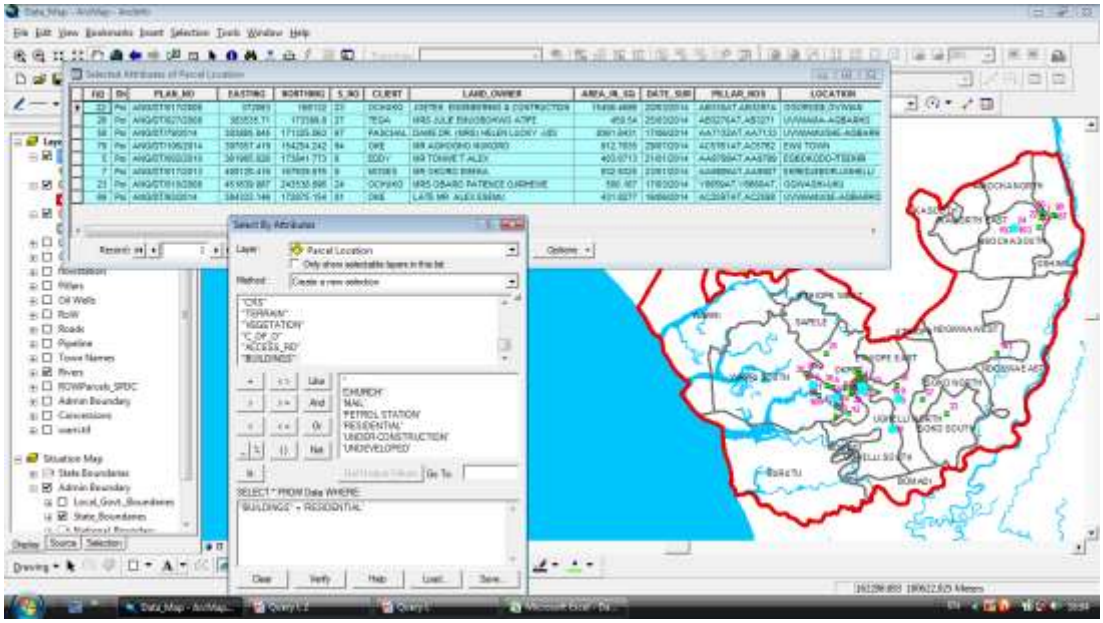

Figure 4.2: Query 2: Buildings (Parcels with Residential Buildings)

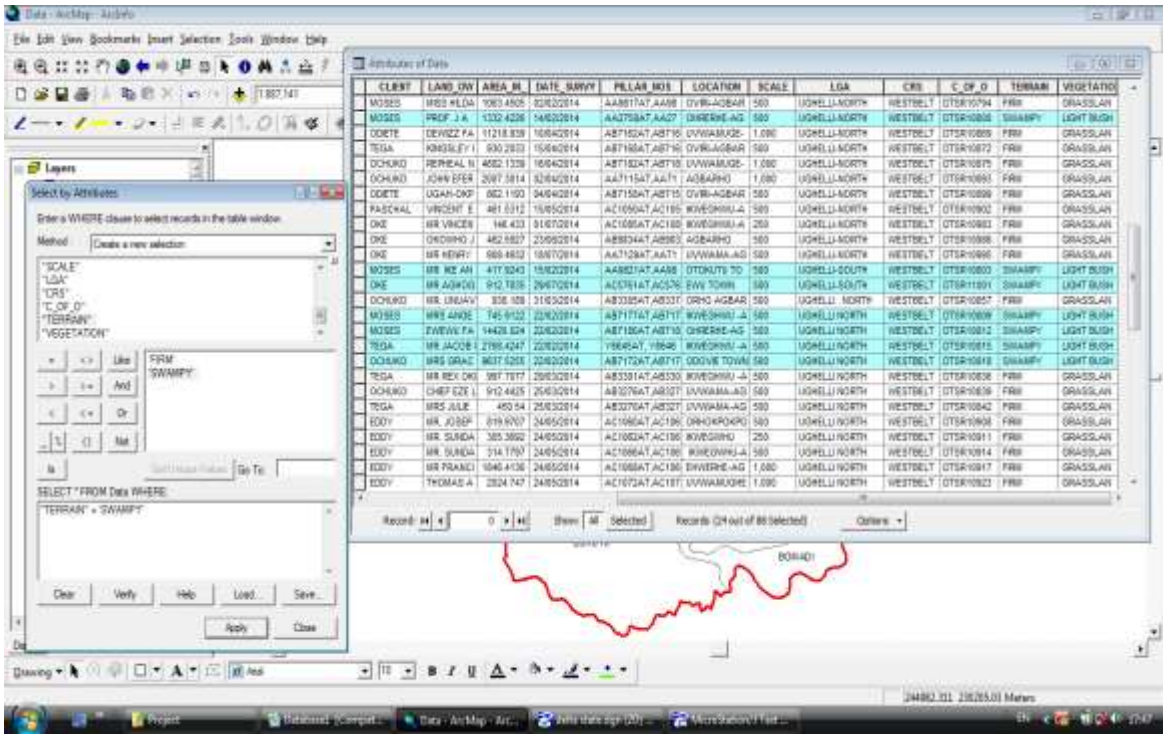

Figure 4.3: Query 3: Parcels Liable to Flood

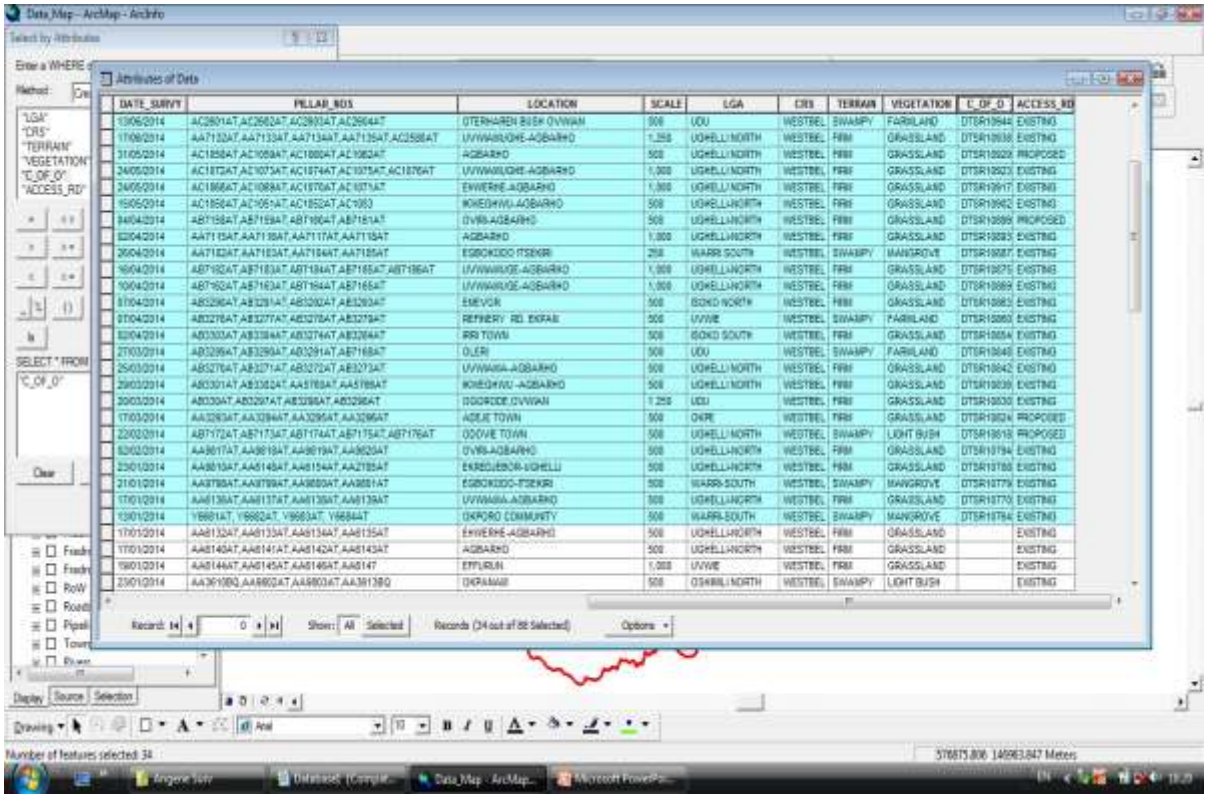

Figure 4.4: – Query 4: Parcels with Certificate of Occupancy

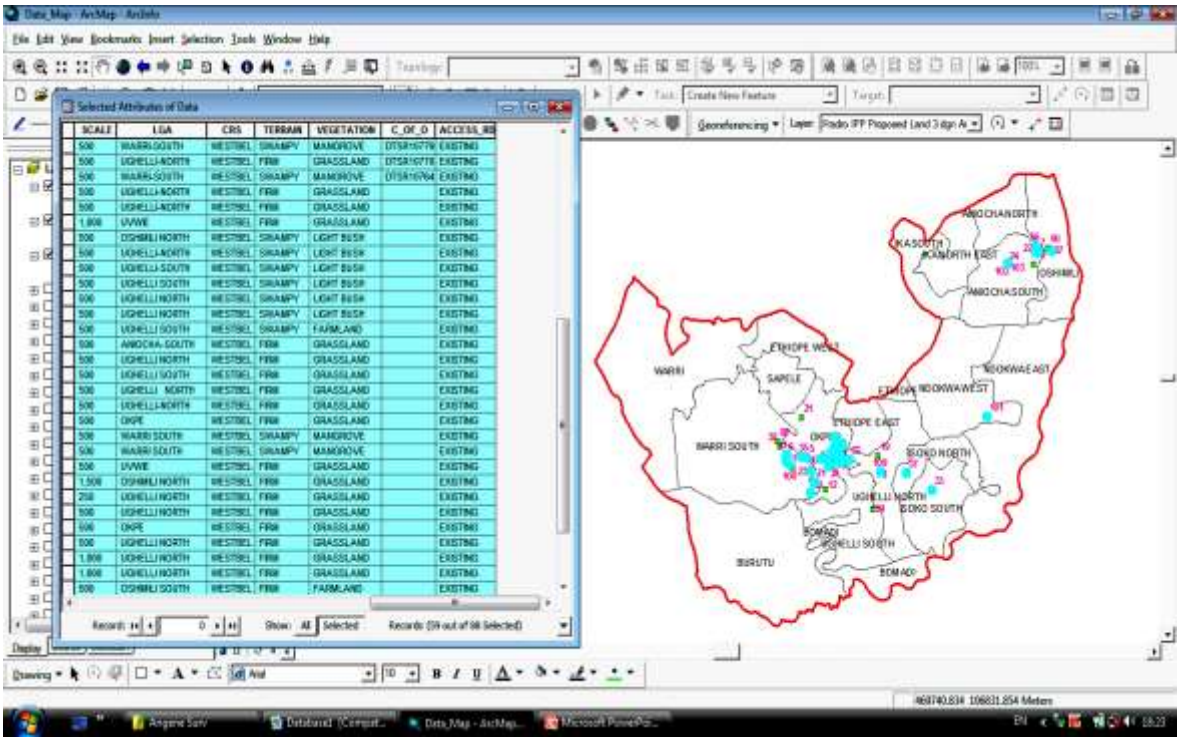

Figure 4.5: – Query 5: Parcels with Existing Roads

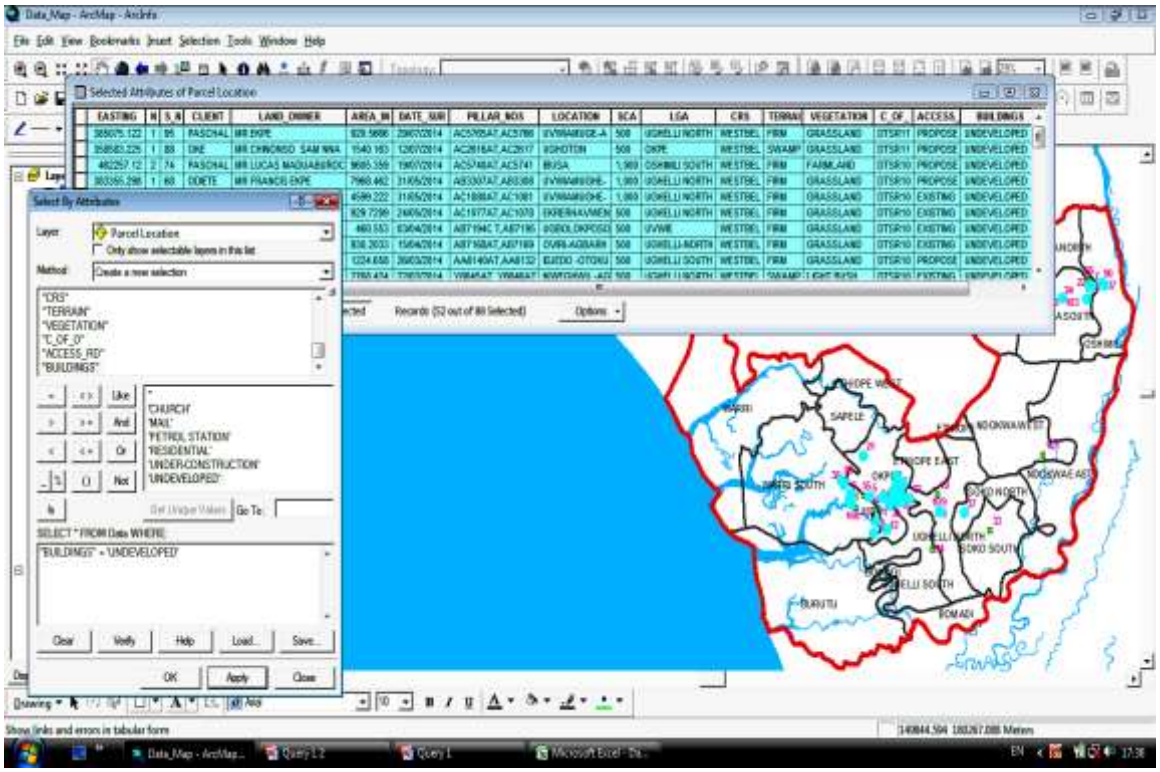

Figure 4.6: – Query 6: Undeveloped Plots.

Figure 4.7: – Query 7: Commercial Facilities (shopping mall)

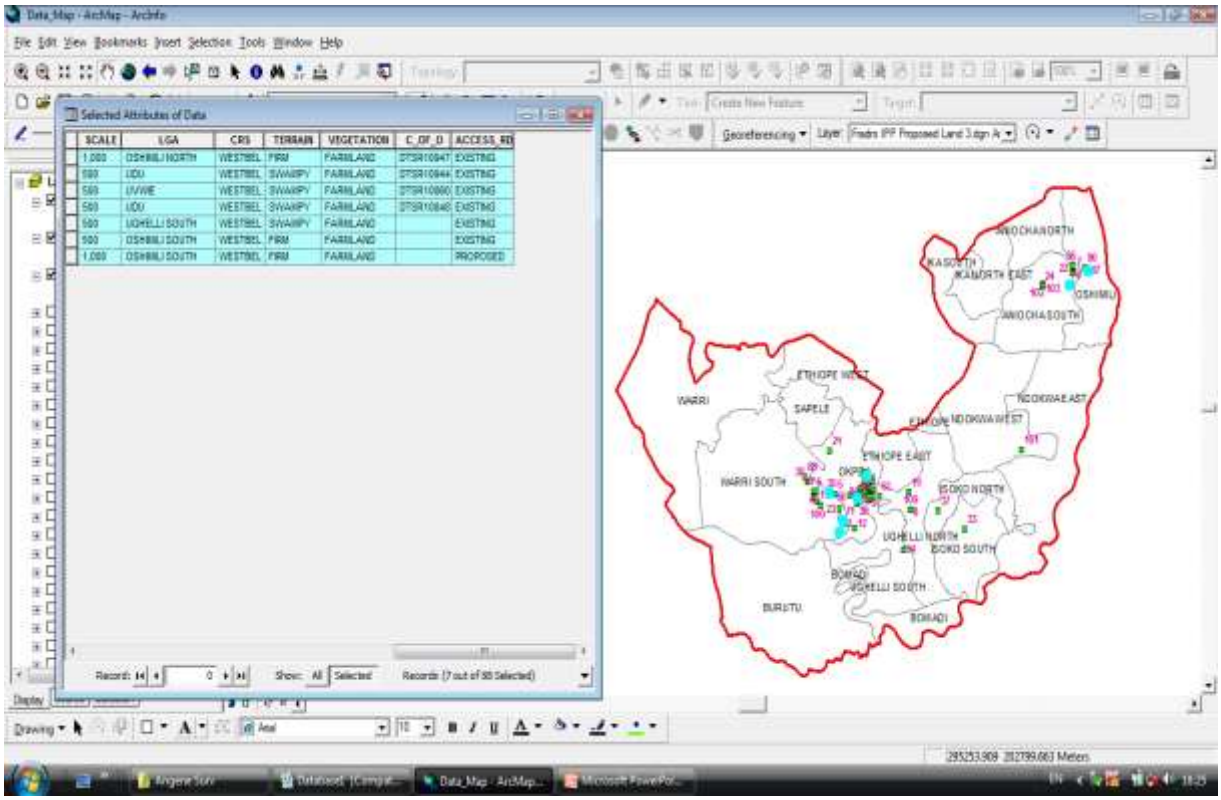

Figure 4.8 Query 8: Parcels with Farmland

4.3 Summary of Results

The total number of plans used for the study was eighty seven (87). In order to show how land information can be used as a tool for effective planning and sustainable development, some selected database queries and analysis were performed as shown below, and the results of the database queries and analysis helped in achieving the aim of the project.

– Parcel Ownership: With just a click, details of parcel owner could easily be seen. Fig. 4.1 shows the parcel owner as Mr. Tonwe T. Alex, showing other attributes.
– Identify parcels with buildings (Fig. 4.2) Residential buildings were eight (8) in number.
– Identify parcels liable to flood (Fig. 4.3). Ten (10) were identified within the study area.
– Identify all parcels with Certificate of Occupancy (C of O). They were Thirty four (34) (Fig. 4.4).
– All parcels with existing roads were queried and identified. They were thirty (30) in number (Fig. 4.5).
– Parcels not developed were identified to be fifty two (52) Fig. 4.6.
– Parcels used for commercial purposes were identified. Shopping mall was two (2), Fig.4.7.
– Parcels used as farmland were identified as seven (7) Fig. 4.8.

4.4 Major Research Findings

Having analyzed the various responses of the respondents, and testing the correctness of the hypotheses, the following were the findings of the study.

– Most of the Ministries that make use of land information use paper copies of existing data or maps in keeping land records. This makes retrieval of data during processing of applications very difficult and therefore brings about a lot of delays in the land delivery services provided by these ministries.

– In the ministry of land, it is almost impossible for data on a computer in one office to be accessed on a computer in another office or even in the same office. This is due to the fact that the computers used by these offices are stand alone computers and so transfer of data is done manually with a storage device. Flat files used in keeping records move from one office to the other with their attending bureaucracies. Some of the departments in the ministry therefore place restrictions on the data in their custody.

– The ministry of land seem not to have any problem with data interoperability when a department or agency receives data from another agency / ministry or they are not aware of it since they use the manual way of processing application;

– The use of internet for land records management has not been popular in all the ministries used for the study. Where they exist, the internet connection sits on just one computer and it does not contribute towards the efficiency of the land information management

But there exist one consistent significant reason in all. A systematic bias in favour of the development of land information management at the expense of more acquisition of analogue data.

5.0 CONCLUSION

Using GIS for cadastral rnanagement is capable of improving the rate at which spatial problems can be solved within a short time. This is because it assists in acquiring storing and retrieving information about land for the purpose of planning and administration. In other words, accurate and reliable cadastral records can be obtained even in graph form with the generated queries; it is possible to identify landowner with 'Certificate of Occupancy'. In general, there are innumerable advantages of using GIS in land management and these include the following: Phasing out of outdated maintenance procedures and replacement by computerized updating of land records, minimization of boundary disputes, assurance of easy and instantaneous availability of correct record to the public which thereby helps in introducing the much warranted transparency of public records, and generation of far more accurate maps which can function as efficient decision making tool for Delta State.

A great deal of information was compiled during the Needs Assessment phase of this project. Though there were a number of underlying challenges for the introduction of Land Information Management (LIM) for land administration and management system in Delta State, decisions can be made with more confidence and conviction based on more and better information that will enhance the decision-making processes through reduction of uncertainty. It was of importance that greater cooperation amongst the different land

professionals with the long-term objective of creating a stronger integrated surveying profession should be established. A good start could be an integrated approach to the training of surveyors, so that the new surveying graduate will be sufficiently broad based as to be able to perform most of the functions of the present day surveying with modern technology, as most comprehensive system would be useless if its users would not have the technical knowhow on how to benefit from it. So there is need for training and re-training of professionals.

Crucial to the success of the research was the positive response from the Surveyor General of Delta State who had seen the need for holding a stakeholders forum where issues bothering on land were discussed in details.

Finally, harnessing the power of Land Information Management (LIM) is not always easy. It can be complex and challenging. However, the ultimate benefits associated with the introduction of Land Information Management (LIM) in `terms of the effective and efficient utilisation of human and physical resources means that they are well worth striving for.

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