

# Computerisation of the Cadastral and Land Registry: The Abuja Experience

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**Key words:** Computerization, Cadastral, Manual Record Keeping, Land Records

## SUMMARY

Abuja the new capital of Nigeria came into existence by virtue of the Federal Capital Territory Act, of 1976. The Territory covers a total land area of approximately 8,000 square kilometers, while the City proper is to cover a total land area of 250 square kilometers. A Master Plan for the City and the Territory was designed by the International Planning Associates, (IPA) and accepted/approved by Government in 1979.

Construction work started in the early 1980s, while the seat of the Federal Government finally shifted from Lagos to Abuja in 1991. Efficient control, administration and management of the entire FCT landmass became the key to successful implementation of the Abuja Master Plan and the orderly development of a “City-beautiful” envisaged by the Master Plan itself. This cannot be achieved successfully without a reliable and up to date cadastral and land records.

The Land Use Act of 1978 is the principal law guiding land acquisition, resettlement, and its allocation to all eligible Nigerians; Private, Government Organizations and None Governmental Organizations. It provides for the Government to hold land in trust for the use and common benefit of all Nigerians, for the realization of equity, fairness and justice in the control and management of land, resettlement and compensation purposes. This ideal cannot be achieved without adequate and efficient land administration tools. One of those tools of course is a reliable and up-to-date land records.

All the Land related departments of the Federal Capital Development Authority (FCDA) and the Federal Capital Territory Administration (FCTA) have been maintaining manual record keeping right from inception (about 29 years). This system is prone to a lot of problems such as, Multiple allocations of plots, Land Use Abuses, Encroachments, Inefficient system of Revenue Generation, Proliferation of Unplanned/Squatter Settlements, The use of obsolete Survey Equipment, Rampant subdivisions and redesign of plots and Extensions beyond the Federal Capital City Master Plan limits.

However, in the year 2003 the Government of the Federation took the bold decision to embark on complete computerization of the cadastral and land registry of the FCT. The outcome of this project is the subject of this paper. Within two years the project was able to revolutionise the entire operations of the Land Administration and other land related departments of the entire FCT. Decision concerning land can now be taken from an informed position with a reliable data.

# Computerisation of the Cadastral and Land Registry: The Abuja Experience

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## 1. INTRODUCTION

Land is the most important resource in the world. Individuals and organizations interested in development within their own capacity will therefore require clear guidelines on all land issues to help them in their planning and investment decisions as they relate to land acquisition and development.

When the Federal government of Nigeria realized that Lagos could no longer perform effectively the dual role of State as well as the Federal Capital due to reasons such as;- Acute traffic congestion, disorderly development, lack of sufficient land for expansion amongst others, it set up a panel which looked into the problems and recommended the relocation of the Federal Capital from Lagos(in the Atlantic coastal area of the country) to the present more convenient location – in the central part of the Country - Abuja. (see figure 1).

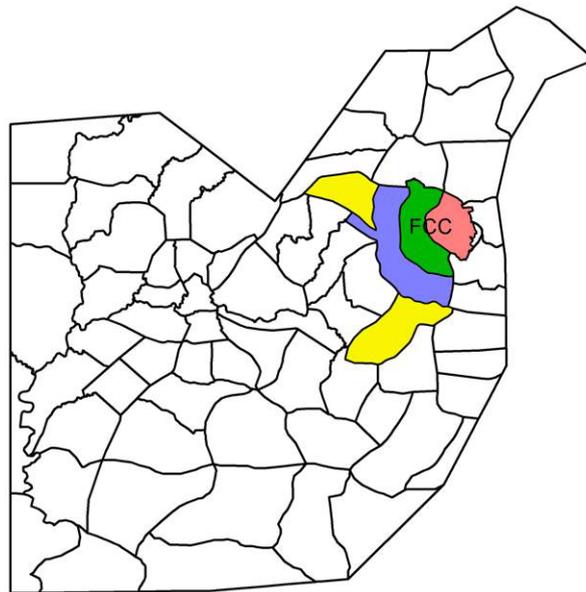


**Figure 1:** Map of Nigeria showing the location of Lagos and the new FCT, (AGIS, 2006)

## 2. ESTABLISHMENT OF THE FCT

Abuja the new capital of Nigeria came into existence by virtue of the Federal Capital Territory Act, of 1976. The Territory covers a total land area of approximately 8,000 square kilometers, while the City proper, when fully developed would; cover a total land area of 250 square kilometers (see figure 2). A Master Plan for the City and the Territory was designed by the International Planning Associates, (IPA) and accepted/approved by the Federal Government in 1979. The Plan made provisions for general framework for the orderly development of the City and the Territory. It also coordinates land use, infrastructure, housing and other service in a manner that recognizes inter-relationship and requirements.

Construction work started in the early 1980s, while the seat of the Federal Government finally shifted from the Coastal Area of Lagos to the new central location in 1991. Efficient control, administration and management of the entire FCT landmass became the key to successful implementation of the Abuja Master Plan and the orderly development of “a City-beautiful” envisaged by the Master Plan itself. This cannot be achieved successfully without a reliable and up to date cadastral and land records.



**Figure 2:** Map of the FCT, showing the location of the city of Abuja (AGIS, 2006)

## 3. THE LEGAL FRAME WORK

The Land Use Act of 1978 is the principal law guiding land acquisition, resettlement, and its allocation to all eligible Nigerians, Private Government Organizations and None Governmental Organizations. It provides for the Government to hold land in trust for the use and common benefit of all Nigerians, for the realization of equity, fairness and justice in the control and management of land, resettlement and compensation purposes. This ideal cannot be achieved without adequate and efficient land administration tools. One of those tools of course is a reliable and up-to-date land records.

In addition the FCT Act of 1976 vest the entire land mass of the FCT absolutely in the Government of the Federation. It also established the Federal Capital Development Authority (FCDA), and charged this body with the role of planning and development of the Federal Capital Territory (FCT).

#### **4. FCT LAND RELATED DEPARTMENT**

To be able to achieve the goals set up by the relevant laws the FCDA has the following land related departments/agencies:

- Land Administration
- Urban and Regional Planning
- Development Control
- Survey and Mapping
- Resettlement and Compensation
- Engineering Services
- FCT Water Board
- Abuja Environmental Protection Board,(AEPB)
- Satellite Towns Development Agency,(STDA)

#### **5. RECORD KEEPING WITHIN THESE DEPARTMENTS**

All the above land related Departments of the Federal Capital Development Authority (FCDA) and the Federal Capital Territory Administration (FCTA) have been maintaining manual record keeping right from inception about 29 years ago (see figures 3 and 4). This system is prone to a lot of problems.



**Figure 3:** Stacks of land files of the old system (AGIS, 2004)

## 6. PROBLEMS OF THE EXISTING SYSTEM

Some of the problems identified with the existing system of manual record keeping include the followings:

- Multiple allocations of plots
- Forgeries of Land Documents
- Unauthorized Bodies involved in Land Allocation
- Land Use Abuses
- Encroachments on road corridors, road reservations, sewer lines and water mains reservations (see figures 6 and 7)
- Multiple Surveys
- Inefficient revenue generation and out right lost of revenue
- Proliferation of Unplanned/Squatter Settlements
- Lack of current topographical base maps
- Obsolete Survey Equipment
- Rampant subdivision and redesign of plots
- Extensions beyond the FCC Master Plan Limits without proper authorization



**Figure 5:** Stacks of land documents of the old system (AGIS, 2004)

## **7. WHY COMPUTERIZED?**

In realization of the above problems associated with manual system of record keeping and the rapid rate at which the City and its environs are growing, the past management of the FCTA/FCDA made several attempts to computerise the system. Those attempts failed because of gross under estimation of enormity of the problems as well as the lack of strong political will to successfully pursue the actualisation of the exercise. However, in the year 2003 the Government of the Federation took the bold decision and embarked on complete computerisation of the cadastral and land registry of the FCT. The out come of this project is the subject of this paper.

## **8. OBJECTIVES**

The objectives of the project are as follows:

- The Computerization of the Land Registry
- Computerization of the Cadastral maps of Phases 1 & 2 of the FCC
- Identification of multiple allocations of plots and eliminate them
- Subsequently to fully computerize the remaining phases of the City and the remaining part of the FCT
- Provisions of land data, as well as detailed maps of the City and those of the Area Councils (i.e. municipal and local government administration)
- The products at the end should include information related to the ownership of plots as well as historical information such as changes in property ownership etc.
- To be able to set up Abuja Geographic Information Systems (AGIS) as only source of geospatial information for the FCT.
- The system should guarantee CONTINUITY, SCALABILITY, FLEXIBILITY, CONSISTENCY, and SUSTAINABILITY

## **9. METHODOLOGY**

The taskforce that was set up to accomplished these goals visited and study the user needs of all the land related departments. It also reviewed consultant's reports prepared earlier for the FCDA/FCTA. All the data sources where then identified and classified. These subsequently led to data collection and data entry and proccession, field verification was also undertaken and the results evaluated. Finally the design of the software was done and satellite images acquired.

## **10. ACHIVEMENTS SO FAR**

Within two years the project was able to achieve the followings

### **10.1Hardware**

The Consultants supplied and installed Computer Hardware consisting of the following items:

- 9 Laptops with 1 GB RAM, 3.06 GHz and 60GB HDD
- 12 TFT Screen PCs with 2GB RAM, 2.6GHz and 80GB HDD

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- 2 Servers with 1GB (RAM), 3GHz and 350GB HDD
- 2 Domain Controllers
- 2 A0 Colour Plotter and 3 A3 laser Colour printers
- 1 A0 Scanner and 1 No. A3 Scanner
- 1 A3 Photocopier
- 4 UPS for the Servers
- 60 Laptops purchased by FCTA



**Figure 4:** Some of the installed hardware (AGIS, 2004)

## 10.2 Software

The installed Computer Hardware runs the following software packages:

- Windows Server 2003 SBS
- Oracle database (9.i Standard Edition)
- Windows XP Pro with MS Office Professional and TrendMicro Virus protection
- GeoMedia and 11 GeoMedia Professional
- Microsoft Visio, Adobe Photoshop, Sybase Power designer, Microsoft Visual Studio.Net Professional 2003

## 10.3 GIS Objects

Wide selections of graphical and textual data have been entered into the system: Over 2,500 maps have been captured and are available in digital form.

The GIS is structured in 75 data groups with over 600 attributes and contains more than 115,000 objects.

### 10.3.1 General

Existing Aerial Photographs and Satellite Images that cover Phases I & II and even beyond, obtained from Messes JBN, FCT Water Board and other participating organisations were

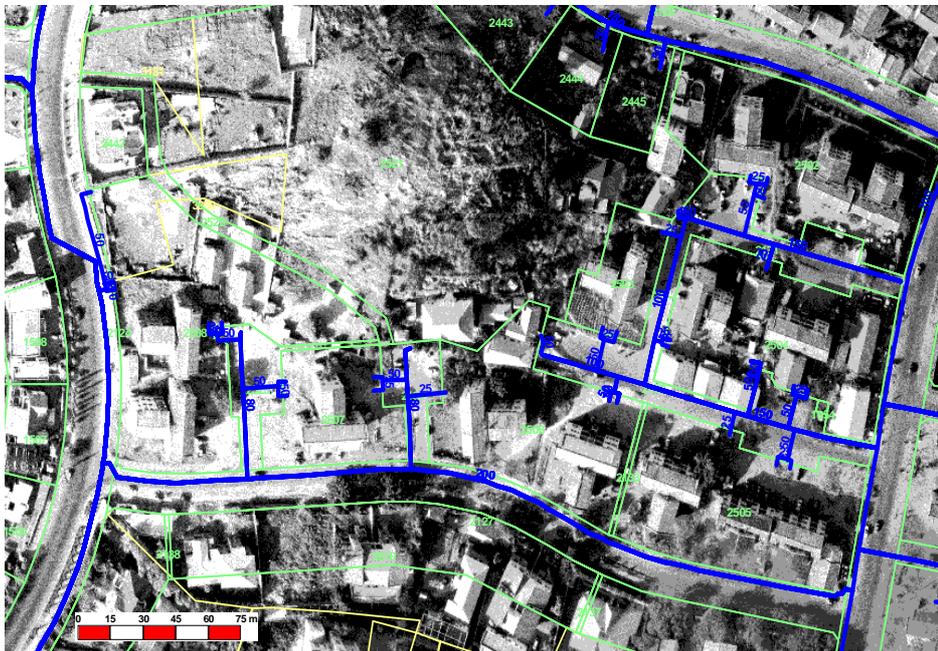
included into the GIS. A map index for various map scales and the administrative boundaries were digitised and are available in the GIS for better orientation.

### 10.3.2 Engineering Infrastructure

Over 1,500 “as built” drawings of Engineering Infrastructure, covering FCC Phases I and II, were obtained, scanned and stored in the form of raster data. The "as-built" drawings for trunk water and sewer lines have also been scanned.

### 10.3.3 Water Network

Digital data for the Water Networks in FCC Phase I was obtained from FCT Water Board and migrated from AutoCAD into GeoMedia. The cleaning and updating of the data was also done (see figure 5).



**Figure 5:** FCT water board and migrated from Autocad into Geomedia

### 10.3.4 Development Control Activities

The street network for Phase I of the City as well as those of Utako and part of Jabi District, which were named in Phase II were digitised into the GIS.



**Figure 6:** Buildings on water mains, (AGIS, 2004)

Detailed information from available files for approvals of Building Plans was keyed into the system. The information capture is for the period 1980 to 2005. The essence of this exercise is to provide database form that will be used in Stage II of the Project for analysis and designing appropriate workflow for the Department.

#### 10.3.5 Planning And Survey Data

The Master Plan for the city and the Land Use Plans for Phases I & II were scanned, georeferenced and digitised into the GIS. All available Topographical Maps at scale 1:10,000 were scanned, clipped, georeferenced and are available in the GIS as raster backdrop. All available Cadastral Maps and many layouts and redesigns, even beyond Phases I & II, of the City, have been scanned, clipped, georeferenced and are available in the GIS as raster backdrop.

Digital Cadastral Data from FCDA, generated in-house and by Geodata, Satec and Arinmap were migrated into the GIS. To update the cadastral data, over 15,000 Title Deed Plans (TDP) have been scanned and over 110,000 Property beacons (PB) coordinates were calculated from the Survey data and TDPs. From this over 32,000 plots (As at: 01/2006) were determined and digitised covering FCC Phases I & II.

## 11. CAPABILITY OF THE NEW SYSTEM

The computerised system established in Stage 1 can give information on landed properties, cadastral maps, land records, land use, street network, engineering infrastructure, trunk sewer- and water lines.

This information came from digital maps and databases, from aerial photos and satellite images, individually or in combination from their respective sources, offering 100% coverage of what is available for Phases I & II of FCC with 80-90% accuracy.

The system can produce a variety of graphic and tabular information products, ranging from lists, report and paper maps to vector, raster and database data.

The information products can be used for decision support in land allocations and all kinds of land related matters like detecting, documenting and resolving cases of multiple allocations of plots, encroachments on corridors of roads, water- and sewer trunk lines as well as land use mismatches (see figure 7).



**Figure 7:** Encroachment on road corridors, (AGIS,2004)

The computerised system is scalable in its components hardware and software and can be expanded in detail and in range to cover the whole of FCT and support all MFCT/FCDA Departments and its Agencies.

## 12. LIMITATIONS OF THE NEW SYSTEM

A key requirement in the Terms of Reference of the project is the inclusion of integrated, customized GIS and LIS software. The expected product is a user-defined, menu-driven application, with point-and-click functionality. Such a Graphic User Interface would enable ease of data entry and validation, with capabilities for automatic report generation. This is not yet in place. The on-going stage 2 project is expected to remedy this limitation.

The conceptualisation of the LIS application began with input from the Taskforce in the early days of the project. Initial data modelling involving workflow analysis and identification of critical data structures and data elements were done. The system is being use to capture data from land record files.

The software is limited, however, being restricted only to entering data from Land Department. At present, the software cannot be used to capture textual data from Development Control, AEPB, or Water Board. This would be taken care of in the stage II of the project now ongoing.

### **13. CONCLUSION**

When fully operational, a computerised cadastral and land registry will facilitate easy storage, access, analysis/modelling and presentation of geospatial data which is vital in assisting decision makers and professionals alike in efficient and effective execution of their work. The cases of multiple allocations of plots and distortions of the Abuja Master Plan will be completely eliminated.

It is envisaged that the Computerization of the Land Registry and Cadastral if extended to cover the entire city and the Area Councils, including the satellite towns will apart from eliminating the problems of land administration in the FCT, it will also go along way in bringing sanity in the activities of the Ministry and its Agencies. It will as well improve their revenue base and put an end to the persistent land administration and management problems in the Federal Capital Territory.

### **ABBREVIATION LIST**

AEPB	Abuja Environmental Protection Agency
AGIS	Abuja Geographic Information System
FCC	Federal Capital City (of Abuja)
FCDA	Federal Capital Development Authority
FCT	Federal Capital Territory
FCTA	Federal Capital Territory Administration
GIS	Geographic Information System
STDA	Satellite Town Development Authority

### **APPRECIATION**

The technical assistance and contributions of Mr. Christian Hickel, (MSc. Survey Engineer and GIS Specialist) with Abuja Geographic Information Systems, AGIS) Stage II Project (Abuja – Nigeria), towards the preparation of this paper is greatly acknowledged please.

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## BIOGRAPHICAL NOTES

### **Ibrahim Usman Jibril**

Age: 48 years

Educational qualifications: B.A.ED (geo/educ) & MSc. with specialization in land administration

Working experience: over 15 years as lands officer in the administration of the Federal Capital Territory, Abuja. Has worked (during his national service year) as an instructor in map reading with the Nigerian Army School of Artillery, Kachia – Kaduna state, Nigeria, has also worked as a geography teacher in many secondary schools and a polytechnic in Nigeria; attended advance training programme in Gavle – Sweden on land administration and geographical information, organised by Swedesurvey (the overseas agency for the national land survey of Sweden) sponsored by Sida, has served at various times as secretary of the, technical committee on rural lands within the FCT, ministerial committee for the appraisal of physical planning and development issues within the FCT, land use and allocation committee of the FCT, taskforce on computerisation of the cadastral and land registry of the FCT, currently working with Abuja Geographic Information Systems (AGIS), a body that is the only official source of geospatial information for the Federal Capital Territory, Abuja - Nigeria,

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