

# **Nasarawa Development Platform: A Progress Report on the Development of Spatial Data Infrastructure in Nasarawa State - Nigeria**

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**Key words:** Spatial Data Infrastructure, Land Information System, Urban Renewal, Cadastre,

## **SUMMARY**

Nasarawa State Government initiated Nasarawa Development Platform Project in 2012, to address land administration, management and issues of unplanned and unregulated settlements. It is a project set up to develop a spatial data infrastructure for the State Government and its people - having suffered a lot in the past particularly from 2007 and 2011 when issuance of title documents to land owners was completely suspended and the land administration department virtually rendered jobless. All cadastral activities were grounded to a standstill. This has a negative effect on financial transactions between citizens and Financial Institutions. In the absence of any secured title documents to hold on to, Financial Institutions could not offer any assistance or transact any deal with individual or corporate organizations. Consequently revenue from land transactions nose dive to an all-time low.

The State Government assessed the situation and concluded that only a good and solid spatial data infrastructure could save the situation and move the state forward to a 21<sup>st</sup> century land management practices. This Project has three components - Digital Aerial Mapping, Nasarawa Geographic Information Services and District Planning/ Urban Renewal of three important townships in the State at cost of UD\$16,876,561.00 and completion period of 24 months. The goal is to have well-structured land database in GIS environment, ensure preparation and issuance of secured land title documents for all land/property owners - a spatial data infrastructure to assist the Government in taking decisions from an informed position in all aspects of its development activities.

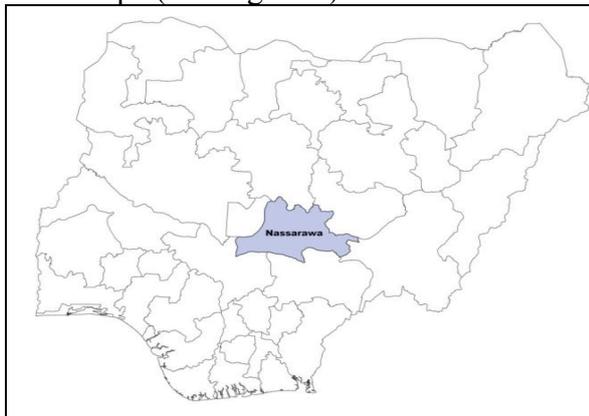
The challenges are many but the project is gradually overcoming them and restoring confidence of the people. It is significant to note that the citizens' perception has considerably changed towards land titling. Land revenue has also increased dramatically becoming the highest revenue earner for the State.

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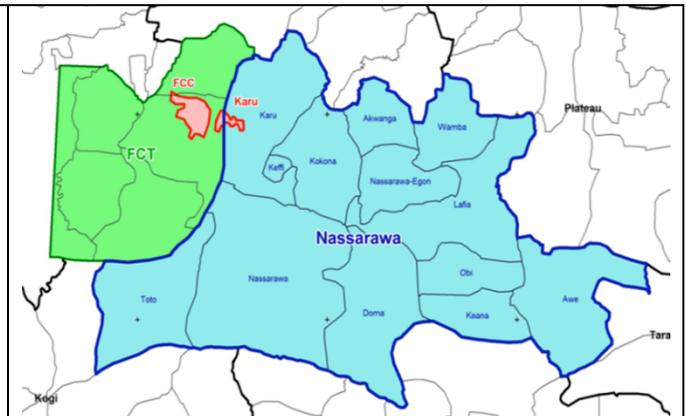
Ibrahim Usman JIBRIL, Nigeria

## 1. INTRODUCTION

Located in the North Central part and sharing a common border with the Federal Capital Territory (FCT), Nasarawa State is one of the 36 States of Nigeria (See Figure 1). Created in 1996 and covers a total land area of 27,290km<sup>2</sup> it has a population of over two million people (2006 National Census). It is predominantly rural with agriculture as its main economic base. Its proximity to Nigeria's Capital Territory and City of Abuja has a lot of impact on its people and landscape (See Figure 2).



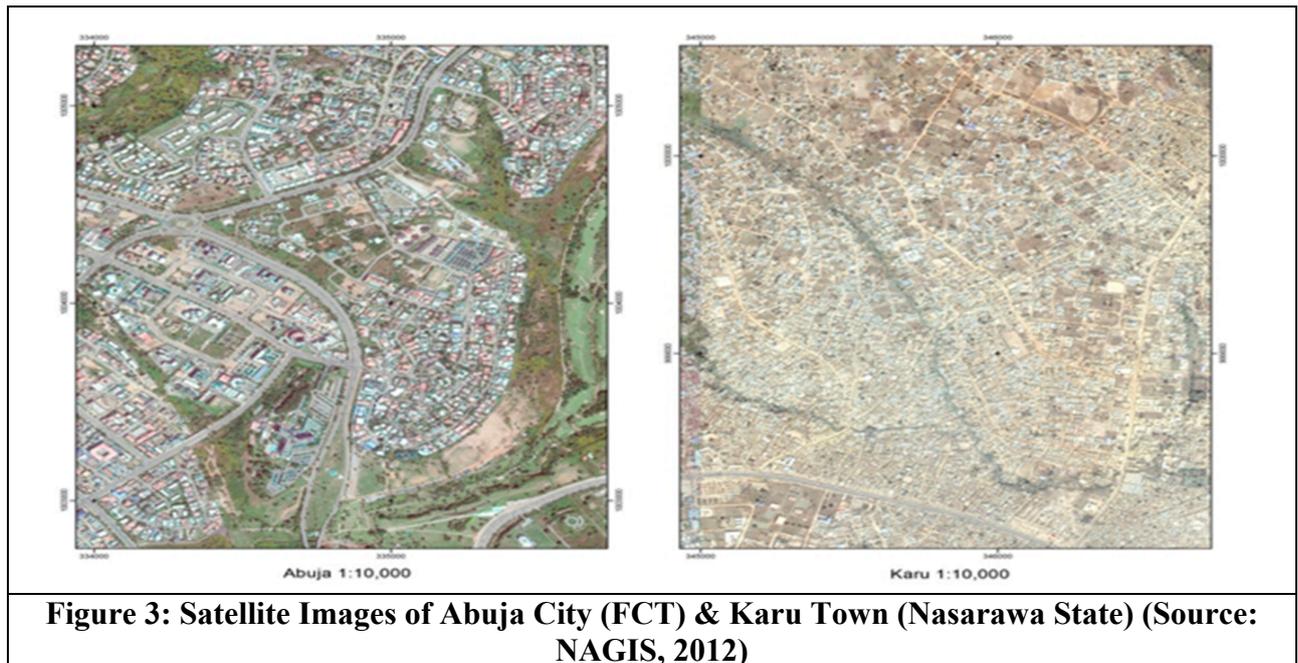
**Figure 1: Map of Nigeria Showing the Location of Nasarawa State (Source: NAGIS, 2012)**



**Figure 2: Map of Nasarawa State (Source: NAGIS, 2012)**

Abuja is among the fastest growing cities in the world today with about 9% annual growth rate (UN Habitat). The same rate could be used for some areas of Nasarawa State especially Karu Area that is very close to the City of Abuja. The serious drive in the years between 2003 and 2007 towards the restoration of the Abuja Master Plan which led to the enforcement of strict planning regulations and enforcements also led to massive influx of people from the FCT to Karu Area and even to other places like Keffi and Nasarawa Townships of Nasarawa State. This means that the State Government (NSSG) has consistently been forced to react to events that it has very little or no control over. Though there are no exact official figures, various estimate claims that Karu area houses between 35% to 45% of the work force of Abuja City. Most of these are low and middle income workers who commute on a daily basis to their places of work outside the State.

This development has led to a rapid growth rate in the neighboring township of Karu. A lot of people have taken advantage of the near absence of development control regulations, monitoring and enforcement activities in the State and the result is a massive existence of developments that are unplanned and unregulated - a massive urban sprawl that could best be described (in some areas) as slum now exists just across the border from the FCT and produces a sharp contrast with the well planned City of Abuja (See Figure 3).



The years between 1996 and 2011 - the first 15 years of the State's existence – are years of neglect with little or no interest in addressing the situation. The State administration from May 2011 recognized the following facts:-

- A total neglect of land management and land resources of the State,
- Land is an important asset and if properly managed could bring economic gains to people.
- A lot could be achieved if the present chaotic development is addressed holistically.
- The State's close proximity to Abuja ought to be a big advantage to it people.
- Very little was generated as land revenue despite the huge potential.

To address these issues holistically, the State Government took a bold step and initiated Nasarawa Development Platform (NDP) Project in May 2012 in order to develop a Spatial Data Infrastructure for the State. This paper attempts an x-ray of the program, the challenges that it, the methods put in place to address the challenges, progress recorded so far - the success and probable impact, both short and long term and the challenges ahead – on land administration not only in Nasarawa State but probably in Nigeria as whole.

## 2. AN OVERVIEW OF THE PROJECT

This project has three components:-

- Digital Aerial Mapping of the Whole State and Six selected Urban Areas.
- Nasarawa Geographic Information Services (NAGIS).
- Urban Renewal & District Planning of three Townships (of Lafia, Keffi & Karu).

The Project commenced in May 2012 and has a completion period of 24 months at a total cost of USD\$ 16,876,561.00.

### 3. DIGITAL AERIAL MAPPING OF THE STATE

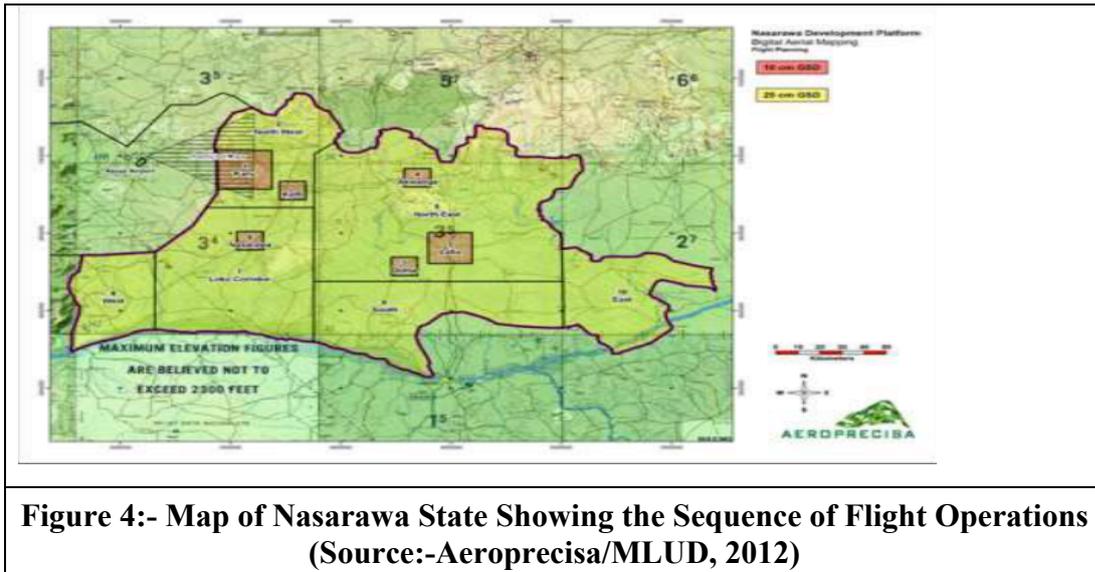
This project component is aimed at flying the whole Nasarawa State at medium resolution of 25cm GSD and the production of Orthophoto maps and 1m contour lines. The images are to help in setting up a Rural Cadastral System for the State as well as establishing Regional Development Plan for sustainable planning. Six other major towns within the State – Akwanga, Doma, Karu, Keffi, Lafia and Nasarawa) – are to be flown at a resolution 10m GSD which would also lead to the production of Orthophoto maps and 1m contour lines. The images are to assist in the development of GIS-based Land Information System (LIS) and for the generation of Master Plans for each of the six cities (See Table 1 & Figure 4).

The database can provide accurate and reliable information that would serve other vital development projects for the State, such as mining exploration, transportation planning, environmental protection and more. This would complement the raster based Orthophoto map with a vector based Line Map of Scale 1:2,000 following the 10cm GCD Orthophoto and scale 1:10,000 following the 25cm GSD Orthophoto. The detailed Line Map would be preceded by a fast track 1:25,000 vector data set generated from recent 5m Satellite Images, Topographic Maps and other available sources.

Seq	Area	GSD	Overlap	Area (km2)	GCP	Frames	Altitude(ft)
1	Karu & Keffi	10	60/30	769	20	3,286	3,852
62	North West	25	60/30	2,322	6	1,644	9,628
23	Lafia & Doma	10	60/30	544	20	2,340	3,852
4	Akwanga	10	60/30	144	10	686	3,852
75	North East	25	60/30	9,161	6	6,760	9,628
36	Nasarawa	10	60/30	144	10	686	3,852
57	Loko Corridor	25	60/30	5,357	6	3,568	9,628
8	West	25	60/30	1,980	8	1,478	9,628
9	South	25	60/30	4,071	6	2,941	9,628
10	East	25	60/30	2,808	8	2,000	9,628
Total				27,300	100	25,388	

**Table 1: Detail Sequence of Flight Operations & Data Acquisition for Nasarawa State  
(Source:- Aeroprecisa /MLUD, 2012)**

The Line Map would include feature extraction for transportation, hydrography and landmarks, points of interest and structures, places names from existing topographic maps, contour lines, spot elevations and land cover from photogrammetry. Table 1 and Figure 4 show the details of the sequence of the Flight Operations.



#### 4. TOWN PLANNING & URBAN RENEWAL

This component of the Project is aimed at addressing the issues:-

- Of the existing unregulated, unplanned settlements and the environment,
- Squatter settlements in Karu Area (and other Townships of the State),
- The dearth of infrastructure that has for long been a source of concern to the people of the State. It is to also aid in Urban Renewal Plan, produce general land use plan and assist in Development Control activities.

#### 5. NASARAWA GEOGRAPHIC INFORMATION SERVICE (NAGIS)

The third component of the NDP Project is a major land reform program aimed at achieving so many things few of which are listed as follows:-

- Developing a Spatial Data Infrastructure (SDI) for Nasarawa State.
- Storage and usage of such data for seamless operations.



Figure 5: Orthophoto of Unplanned part of Old Lafia Township (Source:-NAGIS 2012)

- Eventual establishment of Nasarawa Geographic Information Service (NAGIS) for the purposes of Development Planning and revenue generation in the State.

It would serve as a center for geospatial data that will guarantee easy access to land related information and ensure accelerated socio-economic and spatial development. It would also comprise all such land information components to include property certification and title regularization. Furthermore, the system will have the capability to produce Certificates of Occupancy (Cs of O) modules and will include e-payment and revenue collection component. It would be designed to generate massive revenue to the State Government, so that at the end of the implementation the Project would have paid for itself and will serve as the only official source of geospatial data for the State. This would ensure that Financial Institutions have confidence in the ability of the State Government to manage and provide an enabling environment for doing business based on World best practices - a computerized and robust GIS environment that would ensure scalability, consistency, reliability and continuity.

## 6. EXISTING SITUATION BEFORE THE NDP PROJECT

All the major Townships of Nasarawa State suffer from lack of proper planning and near total neglect of the environment. Karu area suffers most, its economic potential are untapped and completely neglected - sharp contrast with the well planned environment of its immediate neighbor, Abuja City. The area is characterized by a lot of large scale acquisition by private individuals as well as cooperate organizations with no control- a direct consequence of its close proximity to Abuja City which in turn led to unplanned, unregulated and squatter settlements with all the attendant environmental hazards that go with such areas (see Figures 5 & 6).



**Figure 6: Refuge Dump & Poor Drainages in Karu Urban Area  
(Source:- Envicons 2013)**

Farming has been a primary economic activity of the people. The gradual takeover of such lands for housing and commercial development is a major challenge that is already posing a problem for the people and the state administration. A lot of the farmers have been forced to become tenants on their own lands, having sold same to the more affluent people that were attracted to the area because of the proximity to Abuja City. Since early 1980s when physical development commenced within the FCT unplanned development within Karu axis has been going on in several directions at an alarming rate. However the most significant areas and direction of growth are along the major highway of Abuja – Karu – Keffi. This has led to traffic grid lock particularly right from the boundary of the FCT through Mararaba to Masaka area (see **Figure 12 and 13**) all year round, despite the dueling of the highway. The vision of the state Government is to develop the area as a twin city that can compete favourably with Abuja in terms of all the social and economic activities.

A lot of the people have customary titles much of which is undocumented. Very few property owners hold statutory title to land. A lot of them have no certificate of occupancy evidencing their grant and or holdings. A certificate of occupancy is an instrument that can be registered in Nigeria and an evidence of a grant for a right of occupancy. It is the only title document that almost all financial institutions accept as collateral in order to secure a mortgage. It is therefore easy for one to see why the lack or absence of such documents could be a major source of concern not only for the State Government but for other stake holders particularly Financial Institutions willing to invest or borrow money to real Estate Developers.

The result of the work so far carried out (since May 2012 to April 2014 a period of twenty three (23) months), is indicating a huge success story for the people and Government of Nasarawa State. The seriousness and determination so far shown by the State Government if sustained to the end could also be a major determinant of success.

## **7. TWENTY THREE MONTHS AFTER**

Twenty three months after the take up of the project all the three components are running effectively. The amazing results are presented below.

## 7.1 Digital Aerial Mapping

For the purposes of logistic and flying the state was divided into 10 zones (See Figure 3). A significant milestone was attained on the 28th day of December 2013 when flying of the entire land mass of the State was completed, making Nasarawa the first state in Nigeria to achieve such a wonderful goal. So far all the six (6) townships areas have been flown at 10cm resolution (See Figure 8 for the samples of the 10cm images). This gives total land coverage of 1,601 square kilometers with 3146 orthophoto frames (see table 2).

#	Town	Area Surveyed in km <sup>2</sup> (Ortho Coverage)	Building Count	Buildings per SQM
1	Akwanga	158	30,184	191
2	Doma	158	27,230	172
3	Karu	650	229,341	353
4	Keffi	148	48,310	326
5	Lafia	406	113,239	279
6	Nasarawa	147	26,014	177
	<b>Total</b>	<b>1667</b>	<b>474,318</b>	

Table 2:- Preliminary Results of Building Counts from Orthophoto 10cm of Six Townships

(Source: NAGIS, 2014)

The rest of the State was flown at 25cm resolution. The data acquired are undergoing post flying processing. However the project is now using the data from the six townships to do a rooftop count of existing buildings and or properties. This would help in actual identification of the urban areas which would in turn give us a more refined figure per square kilometer.



Figure 8:- A Sample of the Image, Lafia Township, 10cm captured December 2012 (Source:- Aeropresica/NAGIS, 2012)

It would also give us an accurate identification of the slum area, local business districts and other areas of interest, major land marks etc. within the urban areas. These figures would also be made available to the Planning Directorate as well as the National Population Commission to assist them in future planning and combining of data sets for useful government services. A preliminary result (see Table 2 and Figures 9 to 11) has given us up to 474,318 buildings spread over an area of 1667 km<sup>2</sup> in the six town ships. The next stage is to use the data in population estimation. It is

believed that a near accurate population figure could be obtain for these townships and ultimately for state after a careful study and collaboration with the National Population Commission.

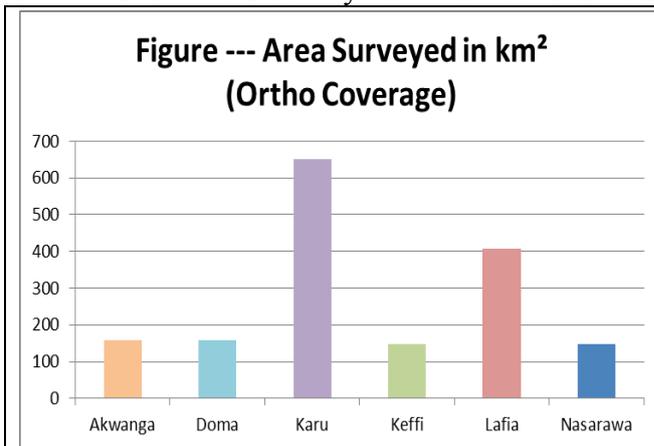


Figure 9:- Preliminary Result of the Area Surveyed in km<sup>2</sup> from Orthophoto 10cm of Six Townships derived from Table 2 ( Source: NAGIS, 2014)

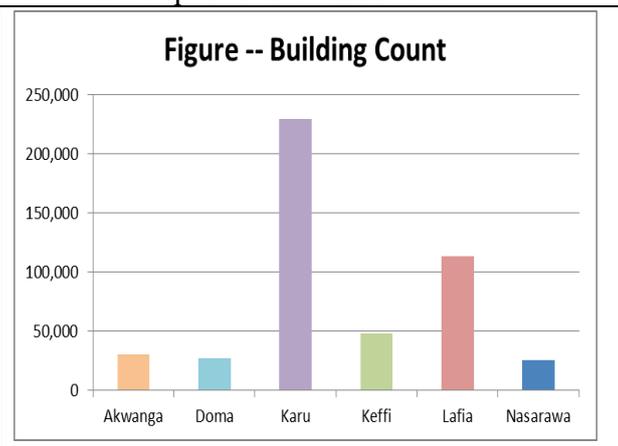


Figure 10:- Preliminary Result of the Building Count from Orthophoto 10cm of Six Townships derived from Table 2 ( Source: NAGIS, 2014)

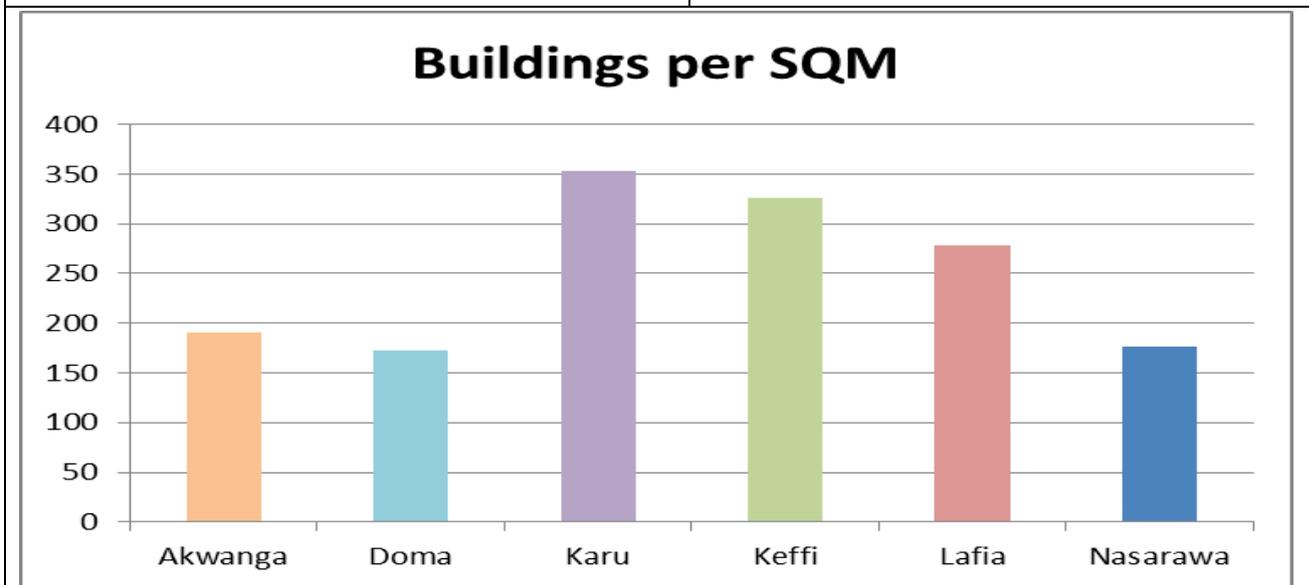


Figure 11:-Preliminary Result of the Building Count (per sqm) from Orthophoto 10cm of Six Townships derived from Table 2 (Source:- NAGIS, 2014)

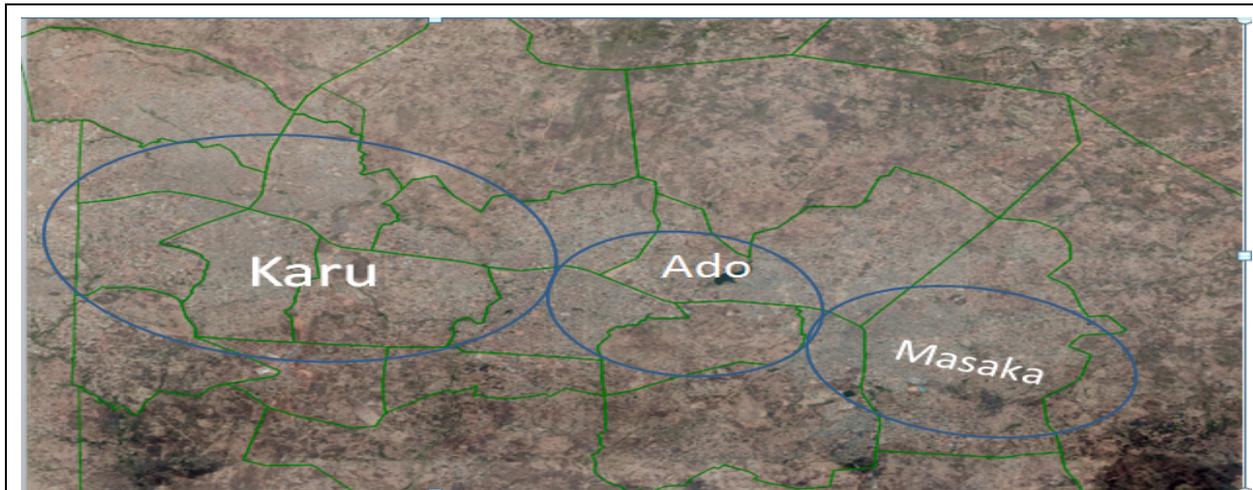
## 7.2 Urban renewal & District Planning

Draft final reports of Karu/Keffi and Greater Lafia areas were submitted by the Consultants in March 2014. These reports are based on detailed survey, appraisal and analysis of existing development based on mapping information, Orthophoto images and satellite imagery conducted by the Consultants between the middle of the year 2012 to the end of the year 2013. It covers

Detailed Land Use Plan & Detail District plans, Urban Renewal and Upgrading Scheme.

### 7.2.1 Urban Renewal

Past neglect by government is a contributing factor to the constant unprecedented growth rate in these areas. The Consultant's report laid a broad view of the Urban Renewal Master Plan of Karu, Keffi and Lafia area. From the report it is clear that the population of Karu area would continue to increase from the 205,477 (recorded in 2006 National Census). Already the 2011 projection is put at 254,175 (at annual growth rate of 4.7% [Envicoms Team, 2014]). Other towns that make up the



**Figure 12:- Orthophoto of the Proposed Urban Renewal Site (Source : Envicoms / NAGIS 2014)**

Areas of greater Karu are Mararaba, Ado, New Nyanya, Masaka and Auta-ba-lefi. All these areas are slated for urban renewal program. See figure 12. It is significant to note that the problems have been brought to focus and place as a priority that deserves prompt attention of the Government.

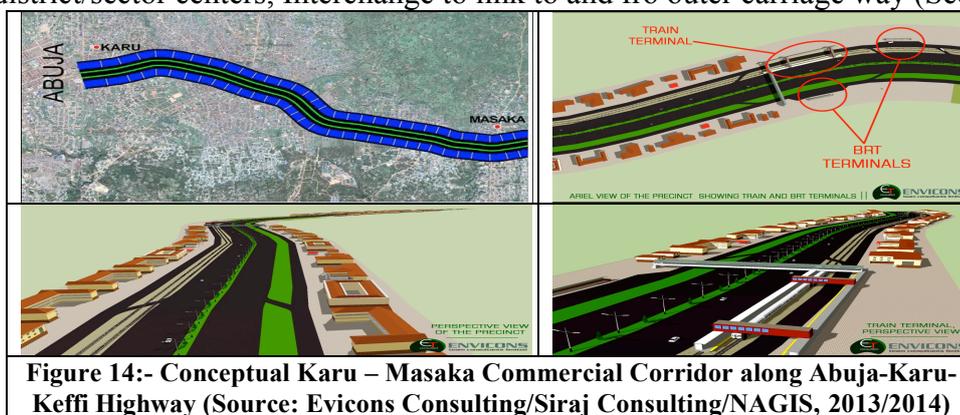
### 7.2.2 Commercial Activities

Part of the submission also proposed a commercial corridor along the existing Abuja – Karu – Keffi high to stretch from Karu to Masaka way - a distance of about ten kilometers. This is significant because of the haphazard and unregulated commercial activities that are taking place on this corridor. Most of the urban informal sector activities of small scale traders, artisans, hawkers etc, carry out their businesses on the side the Abuja – Karu – Keffi major high way. This in turn has led to the occupation of the road shoulder as well as the outer lane of the high way thereby leading to constant traffic gridlock almost all day long on this highway. (See Figure 14). The concept is to provide 'articulated development along a highly viable city suburb axis' (Envicoms, 2013, P 51). Some of the features of this development corridor includes: - 'A central highway with a right of way of 200m, A 100m bus and rapid transportation for mass transit –



**Figure 13:- Commercial Activities & Traffic Logjam along Abuja-Karu-Keffi Major Highway (Photo: Evicons Consulting/NAGIS, 2013)**

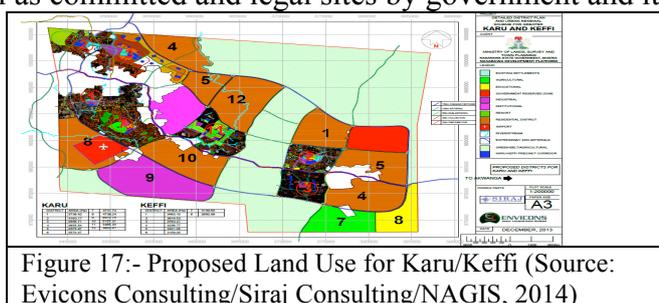
to and fro carriageways to be completely separated, 50m each way for the vehicles, Bus stations at district/sector centers, Interchange to link to and fro outer carriage way (See Fig. 14)



**Figure 14:- Conceptual Karu – Masaka Commercial Corridor along Abuja-Karu-Keffi Highway (Source: Evicons Consulting/Siraj Consulting/NAGIS, 2013/2014)**

### 7.2.3 District Planning

The scope of the project covers design of 11 districts for detailed Planning. 5 in Greater Karu, Four (4) in Greater Lafia and Two (2) in Keffi. Details can be seen in Figure 17. The criteria to be applied in delineation would include land use and uncommitted spaces, population concentration, administrative and cultural boundaries, natural and man-made boundaries, nature and character of economic activities as well as committed and legal sites by government and it agents.



**Figure 17:- Proposed Land Use for Karu/Keffi (Source: Evicons Consulting/Siraj Consulting/NAGIS, 2014)**

Above all these Plans would assist tremendously in increasing the revenue base of the State.

#### 7.2.4 **Transportation Plan**

In view of the persistent traffic gridlock in Abuja - Karu – Keffi road and constant loss of man-hours on the road construction of two parallel by-passes, one on each side of the Karu – Keffi corridor is proposed to reduce the amount of time that is constantly wasted on the existing highway, open up new areas to orderly development and generate more economic activities that would in turn put more money into the pocket of the low income, reduce poverty and increase the revenue base of the State through taxation.

Apart from the above there is also the proposal for the extension of the Abuja Rail line to Keffi knowing fully well that most residents of Greater Karu work in the FCT. This makes it necessary for daily commuting and so a rail extension would fit perfectly and assist greatly to ease a lot of travel stress. Details of the proposal can be seen in Figure 17. Above all these proposals are intended to be carried out in phases over a period of thirty years.

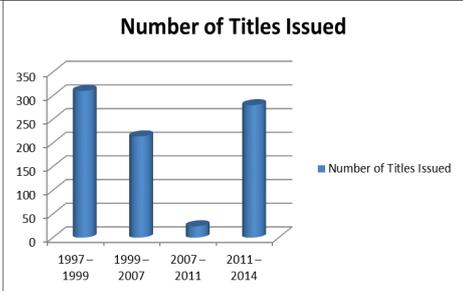
### 8. **NAGIS**

Data capture of the existing land records in the State’s Lands Ministry is almost completed. For the first time the MLUD is able to know the total number of all land files that are in its custody – i.e. in the Land Registry and the Land Archives. It is also now easier to trace and retrieve existing paper documents normally kept in paper files at both the Land Archives and the Land Registry. Out of the over 25,000 files in the MLUD, 23,074 have been captured into the LIS database while a total of 21,750 files have been captured into the DMS. Similarly about 464 cadastral maps have been indexed and scanned and are been geo-reference. On the whole we now have over 519,675 pages of scanned land documents and still counting. The Project team is now doing quality control and data cleaning exercise. The current survey data are undergoing quality control and data harmonization in order to obtain a reliable database, with high data integrity. Scanning and geo-referencing of existing layout and maps has been completed.

#### 8.1 **Land Titling**

Since the creation of the state about seventeen years ago records shows that only about 828 titles to land were granted by the MLUD. The first two years of the state witness the highest number of titles issued or created at 310 (or 37.43%). The eight years of the civil and democratic administration that follows the military, witnessed only 214 (25.84%) titles issued. This followed a period of stagnation between 2007 and 2011, when only 24 title documents were issued – a mere 2.90%. In the last three years 280 (33.82%) title documents have been granted and more are on the way using the new NAGIS database. Land title documents such as Right of Occupancy (R of O) letters and Certificates of Occupancy (C of O) were redesigned by the Project Team and adopted by the Lands Department of the MLUD. (See Table 2).

Period	No. of Titles Issued	(%)
1997 – 1999	310	37.43
1999 – 2007	214	25.84
2007 – 2011	24	2.90
2011 – 2014	280	33.82
<b>Total</b>	<b>828</b>	<b>100</b>

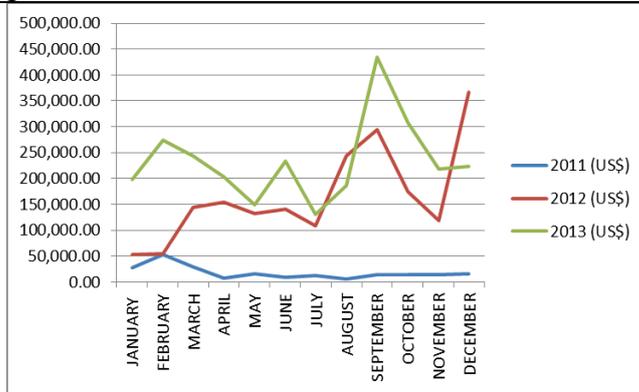


**Table 2:- Land Titles Issued by the MLUD Since 1997 (Source:- MLUD 2014)**

## 8.2 Revenue Generation

Before the NDP project and the land reform program very little is done in the MLUD. Revenue generation was neglected in the past. However this scenario has now changed dramatically. Total revenue generated and collected from various land charges in the year 2011 was US\$ 218,869.46 with the highest figure of US\$53,670.88 in the month of February and the lowest figure of US\$5,111.09 in the month of August. This contrasted sharply with the dramatic increase of a total collection of US\$ 1,983,912.31 in the year 2012 with a mean monthly collection of US\$165,326.03. The highest figure of the year - US\$367,036.48 - was recorded in December, while the lowest collection of US\$52,247.16 was recorded in January. The figures for 2013 are even better – a total of US\$ 2,800,067.78 – with the highest month in September at US\$433,807.36. This is an all-time record that has never been achieved (See Table 4) in the 18 years of the State’s existence as far as land revenue generation and collection are concern.

MONTH	2011 (US\$)	2012 (US\$)	2013 (US\$)
JANUARY	27,879.62	52,247.16	197,275.23
FEBRUARY	53,670.88	54,839.65	273,305.99
MARCH	28,670.88	143,443.57	244,288.60
APRIL	8,115.99	154,251.21	202,642.87
MAY	16,233.51	132,228.88	149,924.09
JUNE	8,600.31	141,364.61	232,984.68
JULY	11,871.63	107,883.36	130,835.22
AUGUST	5,111.09	242,962.23	185,849.57
SEPTEMBER	14,527.95	294,716.36	433,807.36
OCTOBER	13,494.98	174,995.91	307,381.17
NOVEMBER	14,417.90	117,942.88	218,508.94
DECEMBER	16,274.72	367,036.48	223,264.06
<b>TOTAL</b>	<b>218,869.46</b>	<b>1,983,912.30</b>	<b>2,800,067.78</b>



**Table 3: Land Revenue Generation for 2011 - 2013 in US\$(Source MLUD, 2014)**

This dramatic increase is a direct result the NDP project through the creation of land database that makes it easy to retrieve files and process fast. Billing and issuance of such bills became simpler and more vigorous. Similarly issuance of demand notices started and is now more regular unlike the past when no such notices were issued. Also even the few property owners that were keen to pay often get discourage simply because their files could not easily be traced and so bills don’t get

prepare for them to pay. Recent trend has shown that people have now realized the determination of the Administration to issue title documents. This has also increase the willingness of property owners to pay land charges in order to obtain a more secure land title document. This is an important positive sign for the NDP. There is also a dramatic increase in peoples' awareness and willingness to come forward and register their properties as well as to obtain new and secured land title documents. This can be seen from the number applicants that come forward on a daily basis to file in new applications in the land records section. This is good omen for real property market and a positive step for the people and Government of the State.

The billing system that takes a lot of time for the Land Revenue Officers to calculate and dispatch to land title holders for payment because it is done manually is now automated and more efficient.

## CONCLUSION

So journey so far has been one of encouragement and the result though modest is amazing. The project team has managed to turn things round within a short time particularly in the MLUD. This can be seen from the record of data capture in the LIS data base. The land revenue generation has increased tremendously becoming the most important source of internally generated revenue (IGR) in the whole State. It is also significant to note that despite the lean resources available to the State Government the leadership has a vision and is able to go into this project from its savings and without having to borrow from external sources. About US\$13,750,000.00 has so far been paid by the State Government for the job done by the Consultants out of the total contract sum of UD\$16,876,561.00. This is the Government way of sending strong and positive signal to investors both within and outside Nigeria. It is by so doing exposing the great economic potentials of the State. So many areas of investments opportunities such as mining of solid minerals, transportation – particular railways, airport development, agro-allied industries, real estate developments as well as large scale commercial and retail business abound in the state.

With this Strategy the State Government has open a big corridor for land reform in the State. A lot of people have suddenly realized that Nasarawa State could be an alternative to the neighbouring FCT since new secured land title documents could now easily be obtained. This is already making a lot of people to come forward in order to obtain such documents to their holdings. There is a ready market in Abuja city and once this project is completed it would have open the corridors for people to invest in land and real estate development and generate more employment opportunities particularly the less privilege urban poor.

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## LIST OF ABBREVIATIONS

- vii) FCT - Federal Capital Territory
- viii) FCTA - Federal Capital Territory Administration
- ix) NSSG - Nasarawa State Government
- x) MLUD - Ministry of Lands & Urban Development
- xi) NAGIS -Nasarawa Geographic Information Services
- xii) NDP – Nasarawa Development Platform
- xiii) TDP – Title Deed Plan

## BIOGRAPHICAL NOTES

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Land Officer 1990 to Acting Director of Land Administration of the FCT 2011. Attended Advance Training Program in Gavle – Sweden on Land Administration and Geographical Information, organized and sponsored by Swedesurvey/SIDA in 2004. I served variously as Secretary, Technical Committee on Rural Lands, Ministerial Committee on Appraisal of Physical Planning and Development Issues, Land Use and Allocation Committee, Taskforce on Computerisation of the Cadastral and Land Registry which led to the establishment of Abuja Geographic Information Systems (AGIS), Deputy Director, Logistics & ICT in Department of Development Control all in FCT.

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